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EX POST EVALUATION #8

**AF PROJECT GH/MIE/WATER/2012/1
INCREASED RESILIENCE TO CLIMATE CHANGE IN NORTHERN GHANA
THROUGH THE MANAGEMENT OF WATER RESOURCES AND
DIVERSIFICATION OF LIVELIHOODS**



Dry Season Garden, Zaazi, Northern Region

→ Ex post evaluation of Adaptation Fund project "Increased Resilience to Climate Change in Northern Ghana through the Management of Water Resources and Diversification of Livelihoods"

Final Evaluation Report

August 2026

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About

The Adaptation Fund (the Fund) was established through decisions by the Parties to the United Nations Framework Convention for Climate Change (UNFCCC) and its Kyoto Protocol to finance concrete adaptation projects and programmes in developing countries that are particularly vulnerable to the adverse effects of climate change. At the Katowice Climate Conference in December 2018, the Parties to the Paris Agreement decided that the Fund shall also serve the Paris Agreement. The Fund supports country-driven projects and programmes, innovation, and global learning for effective adaptation. All of the Fund's activities are designed to build national and local adaptive capacities while reaching and engaging the most vulnerable groups, and to integrate gender consideration to provide equal opportunity to access and benefit from the Fund's resources. They are also aimed at enhancing synergies with other sources of climate finance, while creating models that can be replicated or scaled up. www.adaptation-fund.org

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The Adaptation Fund supported project "*Increased Resilience to Climate Change in Northern Ghana through the Management of Water Resources and Diversification of Livelihoods*" was implemented by the United Nations Development Programme (UNDP) and executed by the Ministry of Environment, Science, Technology And Innovation of Ghana between 2016 and 2020. This ex post evaluation was commissioned by the Technical Evaluation Reference Group of the Adaptation Fund (AF-TERG).

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Acronyms and abbreviations

1D1F	One District One Factory
1V1D	One Village One Dam
AF	Adaptation Fund
AF-TERG	Adaptation Fund Technical Evaluation Reference Group
CWSA	Community Water and Sanitation Agency
DCE	District Chief Executive
EPA	Environmental Protection Agency
EU	European Union
Ex Post-EAI	Toolkit for the Ex Post Evaluation of Adaptation
FGD	Focus Group Discussion
GLSRSSMP	Ghana Landscape Restoration and Small-Scale Mining Project
GoG	Government of Ghana
IWRM	Integrated Water Resource Management
KII	Key Informant Interview
M&E	Monitoring and Evaluation
MEST (formerly MESTI)	Ministry of Environment, Science, and Technology
MoFA	Ministry of Food and Agriculture
NAP	National Adaptation Plan
NCCAS	National Climate Change Adaptation Strategy
NCCP	National Climate Change Policy
NDC	Nationally Determined Contribution
NGO	Non-Governmental Organization
PFAG	Peasant Farmers Association of Ghana
PFJ	Planting for Food and Jobs
PPE	Personal Protective Equipment
SRF	Strategic Results
ToC	Theory of Change
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
VSLA	Village Savings and Loan Association
WACDEP	Water, Climate and Development Programme
WRC	Water Resources Commission

Report Summary

Evaluation background and objectives

The Technical Evaluation Reference Group of the Adaptation Fund (AF-TERG) commissioned an ex-post evaluation of the ***"Increased Resilience to Climate Change in Northern Ghana through the Management of Water Resources and Diversification of Livelihoods"*** (GHA/MIE/Water/2012/1) project as part of its multi-phase approach to ex-post evaluation of Adaptation Fund (AF) interventions. This evaluation:

- Assesses changes in project outcomes since the final evaluation.
- Identifies enabling and constraining conditions influencing sustainability of outcomes.
- Analyzes how sustained outcomes contribute to enhanced local resilience.
- Determines what emerged from local efforts and other pathways to sustain results.

The evaluation also contributes to learning for the Implementing Entity (IE) and Executing Entity (EE) by identifying what has worked well or poorly in the water sector, with the expectation of informing future programming and design decisions.

Project information

The project was implemented by the United Nations Development Programme (UNDP) and Government of Ghana (GoG) between 2016 and 2020. The Ministry of Environment, Science, and Technology (MEST) served as the Executing Entity. The project sought to enhance the resilience and adaptive capacity of rural livelihoods to climate impacts and risks affecting water resources in Ghana's northern regions. The project focused on the Volta River System, which spans roughly 70 percent of Ghana's land area. The project was approved by the AF Board in May 2015 and was launched in May 2016. The expected implementation period lasted until April 2020, however due to funding disbursement delays and the COVID-19 pandemic, the project received a no-cost extension to December 2020, albeit with fewer communities reached and assets constructed than planned.

The project addressed climate risks across four vulnerable regions: the Northern, Savannah, Upper West, and Upper East regions. The project responded to the disproportionately high difficulties that poor farmers in northern Ghana face in managing climate risks, particularly related to drought due to declines in rainfall and increasingly erratic patterns of rainfall. The intervention regions also experienced low socioeconomic development and household food insecurity that were further threatened by their dependence on rain-fed livelihoods, such as agriculture and forestry. The project therefore aimed to improve water resource management to reduce vulnerability to climate change and variability, while also promoting livelihood diversification to lessen dependence on climate-sensitive agriculture. To achieve its objectives, the project pursued three outcomes through distinct components:

- **Outcome 1:** Improved basin level management and planning of water resources, taking into account climate change impacts on surface and groundwater sources.
- **Outcome 2:** Climate resilient management of water resources by at least 50 communities in northern Ghana.

- **Outcome 3:** Enhanced diversification of livelihoods under climate change by at least 50 communities in northern Ghana.

In the Final Evaluation, sustainability was considered **Likely**.¹ The Final Evaluation did not provide outcome-specific sustainability ratings, however, and the supporting evidence for this overall determination focused primarily on Outcomes 2 and 3, with no discussion of the likelihood of sustainability of Outcome 1 nor how national water management policy would link to regional, district, or local levels.

Evaluation methods

The evaluation used the ex post framework and methodology captured in the *2025 Toolkit for the Ex Post Evaluation of Adaptation Interventions (Ex Post-EAI)* published by the AF-TERG. It followed a phased timeline, beginning with preparatory consultations with UNDP, MEST, and select country stakeholders, as well as project document review and external research. These activities informed the development of a Theory of Sustainability² and the selection of fieldwork sites. Site selection used a purposive sampling strategy driven by availability of photographic evidence of water and livelihood assets at completion, lists of assets, learning potential, geographic diversity, presence of multiple project activities, safety, logistical feasibility, and hypothesis-testing potential. The evaluation team also administered an online survey targeting NGO partners involved in implementing livelihood activities under Outcome 3, but discrepancies in the responses reduced confidence in the accuracy, reliability, and generalizability of the data. Therefore, the survey data were excluded from the analysis. Interviews with GoG district and regional officers on-site, Water Resource Commission officials, and academic experts provided valuable input to Outcomes 1 and 2.

Participatory fieldwork was central to the evaluation approach, with 15 days spent visiting eight communities across three regions. Fieldwork communities were: Mognegu I (Northern), Sabare 2 (Northern), Tampion (Northern), Zaazi (Northern), Tumu (Upper West), Goli (Upper West), Chache (Savannah), and Kiape (Savannah). The evaluation team used multiple participatory methods, including large focus group discussions (FGDs) with ranking activities, seasonal calendars, transect walks, and key informant interviews (KIs). Across fieldwork methods, the evaluation team consulted with **over 200** local community members, leaders, and NGO representatives, **50 percent** of whom were women. Each community visit concluded with community validation sessions with key respondents to confirm and verify findings, clarify inconsistencies, and expand on previous inputs.

Findings

Sustainability of outcomes

Five years after project closure, this ex post evaluation assigns an overall sustainability rating of Moderately Unsatisfactory.³ Most diversified livelihoods were not sustained and thus did not

¹ Likely is the highest rating on the final evaluation's four-point scale of likely (4), moderately likely (3), moderately unlikely (2), and unlikely (1).

² MEST and UNDP were engaged in these activities through interviews, in lieu of a collective Theory of Sustainability co-creation process.

³ In the Ex Post EAI, **Moderately Unsatisfactory** is assigned to projects with the following characteristics: "Only some of the project's adaptation benefits to the environment and communities persist. Additional resources, partnerships, capacities, and local ownership of activities are needed to sustain positive results. Some of the project outcomes are maladaptive – meaning they have led to unintended negative effects on the environment and/or communities, potentially

continue to provide income, due to the need for additional partnerships and capacities, as well as functional water assets to support the livelihoods. The most durable benefits stem from functioning water assets and buffer zones, which continue to support daily household and productive needs. However, these gains remain fragile as water access during the dry season remains insufficient and unlikely to help households withstand intensifying climate shocks.

OUTCOME 1: Improved basin level management and planning of water resources taking into account climate change impacts on surface and groundwater sources

The sustainability of this outcome was rated as moderately satisfactory, though findings under this outcome should be interpreted cautiously. Evidence to inform an assessment of whether basin plans were still in use was notably scant, and the absence of evidence does not necessarily mean that sustainability is present or absent. The available evidence presents a mixed picture:

- **Climate-informed integrated water resource management (IWRM) plans and water management boards remain in place in the Black Volta River but not in the Oti River Basin.** The Black Volta Basin Board, established by the project in 2017 to sustain the water catchment conservation measures, is still functioning, according to one interview. Project-established climate adaptation monitoring committees are no longer operational.
- **Other partners have emerged to help finance activities in the Black Volta Basin IWRM investment plan, but a substantial funding gap remains.** Post-closure, the government has reported using the Black Volta Basin investment plan as the basis for discussions with private sector stakeholders, donors, and government agencies to seek financing. Some direct investment has been made in IWRM activities by the Water Resources Commission and other development partners, such as Hilton Foundation, The Nature Conservancy, and the World Bank.
- **Basin-level IWRM in the intervention area continues to be highly relevant.** Climate impacts and variability are increasing, reducing the rainfall season while simultaneously contributing to higher intensity rainfall—with significant impacts for rural agricultural communities in Northern Ghana.

OUTCOME 2: Climate resilient management of water resources by at least 50 communities in northern Ghana

Outcome 2 has been partially and unevenly sustained. At least one project borehole was operational in three of eight communities visited, and partially operational in another three; in the remaining two communities, new evidence suggested that the boreholes were not operating at project close, and they stayed non-operational. The ex-post team visited three of the 10 dam embankments upgraded by the project before completion. Of these, two continue to function, although both leak; the third visited embankment broke during project implementation and was not repaired prior to project close. Communities reported increasing pressure on rain-fed dams from multiple uses. Fieldwork confirmed that trees planted as buffer zones for the dams remained partially intact in most visited communities, especially where trees were at least partially protected

increasing vulnerability to climate change, exacerbating existing issues, or creating new risks. The Ex Post EAI uses a six point scale: Highly Satisfactory (6), Satisfactory (5), Moderately Satisfactory (4), Moderately Unsatisfactory (3), Unsatisfactory (2), and Highly Unsatisfactory (1).

by fencing. In two communities, buffer zones had somewhat decreased dam siltage and erosion. A couple of communities received trees as woodlots. Lack of knowledge on sustainable felling rates remains a risk for sustainability.

The functionality of water infrastructure has relied largely on ad hoc repairs and community coping rather than sustained management systems or institutional support. Across nearly all communities visited, boreholes required repairs during or after project implementation, with costs frequently borne by communities themselves. Some communities received project guidance to charge user fees for water, but most chose not to do so on equity grounds. Given a lack of resources, communities sought non-traditional methods for maintenance, such as salvaging spare parts from non-functioning boreholes to keep AF-funded ones operational. Few community members reported receiving training in borehole maintenance, and many communities did not know which institution or contractor was responsible for construction or follow-up, nor where to source spare parts. Women were drivers in water use and even funding maintenance in several sites.

Where water assets remained operational and accessible, especially year-round borehole access, households experienced sustained benefits. In communities with accessible and functional boreholes, households experienced continued benefits in terms of reduced time burden (primarily for women and girls), improved water quality, and more reliable access for domestic needs. However, many boreholes regularly dried up during the dry season, precisely when reliable access was most needed. Facing water scarcity, some communities introduced water rationing measures, while others resorted to using dam water or spoiled borehole water for domestic consumption (human and animal) despite health risks.

OUTCOME 3: Enhanced diversification of livelihoods under climate change by at least 50 communities in northern Ghana

Most climate-resilient livelihood practices were not sustained after project closure, with some variation by livelihood. Sustainability of agro-processing practices was mixed. Some facilities continued to function and helped women generate additional income; other facilities experienced disruptions due to conflict, withdrawal of NGO support, low compensation for products, faulty construction of facilities, or lack of electricity or accessible water. Dry-season farming was only sustained in one community visited by the evaluation due in part to missing or inadequate inputs (e.g., too-short hoses), seasonal water shortages, and a lack of technical guidance to adapt practices when conditions changed. Beekeeping and fish farming practices were discontinued in all fieldwork communities. For beekeeping, reported constraints included a lack of practical training, inadequate or poorly designed personal protective equipment, weak access to markets, and unclear benefit sharing arrangements for honey profits. Fish farming failed due to lack of training on how to restock fingerlings, theft of fish stocks and equipment, and poor harvest due to issues with dams (e.g., declining water levels, collapse). Livelihood activities such as gardening were largely dependent on improved access to water and thus sometimes hindered by weak sustainability of Outcome 2 assets.

Sustained livelihoods led to modest income increases among a few participants, while Village Savings and Loan Associations (VSLAs) emerged as a supporting factor for livelihood related outcomes. Examples emerged of beekeeping and dry-season farming contributing to income benefits for some women and households initially, before lack of functioning irrigation systems and access to buyers reversed those gains. VSLAs (either existing or project-introduced) emerged as

one of the more durable livelihood-related mechanisms, as they helped households manage income variability, pay school fees, and in some cases finance repairs to water infrastructure.

Emerging, unintended, and maladaptive outcomes

The evaluation team found few emerging outcomes (both positive and negative). Emerging outcome primarily involved adapting project resources for other purposes; examples include repurposing a project-supported agro-processing center building for a junior high school and using honey proceeds to purchase small livestock. A few unintended outcomes were considered negative or maladaptive. For instance, in some communities, people are reverting to using unsafe water given insufficient potable supply. In Goli, the broken embankment destroyed dry season farming in the community, reducing an important income and food source and imperiling the wellbeing of residents.

Factors affecting sustainability

Sustainability of outcomes was shaped by a combination of design and implementation limitations, ownership and power dynamics, partnerships, and availability of water for livelihood activities.

The design process included local voices, but implementation decisions and constraints still reduced usability and ownership. For example, some boreholes were placed far from households or productive sites, which reduced use and willingness to maintain them. Combined with poor quality asset construction, limited capacities for asset maintenance, and incomplete inputs, this led to high repair burdens, early failures, and reduced sustainability. Many livelihood interventions lacked the complementary inputs and capacities required for sustained use.

Where communities demonstrated strong ownership and initiative, some benefits were sustained or adapted. Community ownership, self-empowerment, and partnerships supported continued use of assets in several sites, such as agro-processing in two communities and dry season gardening in a third. **But contested ownership, elite capture, and communal governance challenges often undermined collective assets.** Ownership and decision-making authority over assets was disputed or unclear in several communities, which weakened incentives to contribute labor, fees, or maintenance. Project-supported assets were removed or controlled by actors other than the intended user groups, such as local elites or implementing partners. Power dynamics also shaped benefit-sharing; for example, beekeeping groups reported that leaders controlled proceeds from honey sales.

Partnerships helped sustain or revive results in a few locations, but follow-on support was uneven and often external to government systems. Notably, only three of the 16 NGOs that had originally provided livelihood training in the communities visited by the evaluation provided ongoing support to communities post-closure. Some communities benefitted from new or continuing partnerships with two non-governmental actors or other development partners. Local government officials, such as from district EPA offices, were mostly not engaged during project implementation, and have not played a systematic role in post-closure support.

Reliable water access was necessary but not sufficient for sustaining project-supported livelihoods. Outcomes also depended on infrastructure quality, complementary inputs, and effective local management and support systems.

Climate resilience

Overall, the project made limited contributions to strengthening climate resilience across the system. While some localized and short-term gains were observed, most resilience characteristics were weak due to limited scale, inconsistent sustainability of outcomes, and insufficient institutional support and learning mechanisms.

- **Scale:** Impacts were largely localized and small-scale; the evaluation did not observe any basin- or district-level protective effects implemented in the communities. Scaling gains were largely driven by individual initiative, such as in one community where youth and women purchased pumps to expand irrigation practices based on project-supported successes. One community's experience illustrates the importance of working at system scales to enhance resilience; the project focused on embanking one side of the dam and now increased silt from the other sides has reduced water availability and increased the flood risk.
- **Redundancy:** Project investments (e.g., boreholes and dams) added some redundant water sources for communities, but boreholes sometimes dried up during the dry season—indicating a limited ability to withstand increasing climate pressures and contributing to dry-season water scarcity. Because most livelihood outcomes were not sustained, they minimally contributed to diversifying livelihood practices or increasing income as a means of enhancing resilience to climate risks.
- **Diversity and inclusion:** The project contributed to improving some women's economic activities and access to resources, but five years post-closure, most women reverted to their previous income generating activities during the dry season, such as livestock or selling labor or firewood. In some instances, sustainable benefits for women were undermined by traditional gender dynamics, such as chiefs or other men taking over women's livelihood activities post-closure.
- **Flexibility:** There was limited evidence that the project improved communities' ability to adapt to shocks or uncertainty, although some autonomous adaptation (e.g., repurposing assets, informal learning) and VSLAs modestly supported coping capacity.
- **Connectedness and feedback loops:** Communication pathways and partnerships, especially with local government, were weakly established, and no strong feedback mechanisms were observed that would support climate-resilient outcomes.

Conclusions

Since the project ended over five years ago, sustainability of adaptation outcomes has been uneven and generally limited due to challenges in implementation, weak institutionalization, inconsistent asset performance, and insufficient enabling conditions. While some physical and ecological assets (particularly much-needed boreholes and buffer zones) and isolated livelihood practices persisted, the overall sustainability of outcomes was uneven and frequently fragile. Notable successes came from individuals who built on the knowledge shared by the project, but overall, the durability of benefits depended heavily on a combination of asset quality, accessibility, and community initiative, rather than on sustained institutional, financial, or technical support systems.

Asset quality, siting, and completeness were decisive factors in determining both immediate use and long-term sustainability. Some infrastructure failures occurred early and were not

addressed, leading to loss of benefits, and in some cases, worsening conditions relative to baseline. Although project implementers saw community consultation as a key strength of the project, some communities expressed disappointment that their voices were not heeded when it came to quality of construction and siting.

Weak integration across outcomes limited the project's ability to translate planning, water access, and livelihoods into sustained resilience gains. The project's theory of change assumed interlinkages that were not fully realized in practice, limiting the project's ability to deliver compounded resilience benefits.

Limited capacity building, weak ownership for shared assets, and insufficient follow-on resources and partnerships undermined sustained use of assets and livelihoods. Additionally, the absence of clear sustainability strategies and communication left communities uncertain about responsibilities and where to turn for continued support.

The project made limited contributions to long-term climate resilience due to the low sustainability of livelihoods and fragile water systems. Although some improvements in water access and short-term livelihood gains were observed, the limited scale and sustainability of these outcomes constrained their contribution to climate resilience.

The project objective to enhance the resilience and adaptive capacity of rural communities in northern Ghana to climate impacts on water resources and livelihoods remains highly relevant. Fieldwork highlighted the climate vulnerability of visited communities, where even a small shock can derail lives and livelihoods. Identifying and implementing effective and sustainable strategies for enhancing adaptive capacity and climate resilience in the face of worsening climate impacts remains paramount.

Lessons learned and recommendations

For the implementing entities, project teams, the Adaptation Fund, and other adaptation funders

Lesson #1: High-quality construction, appropriate siting, and provision of complete asset packages are essential preconditions for sustained use and adaptation benefits. Ownership is enhanced when local needs and knowledge are privileged.

Associated recommendations:

- Strengthen monitoring and quality assurance mechanisms, ensure asset packages include all necessary complementary inputs, and repair assets that fail during implementation.
- Prioritize siting decisions that balance technical feasibility with community feedback.

Lesson #2: Sustained outcomes require capacity building, clear ownership and benefit-sharing rules, and a clear sustainability strategy with local partners. Limited local government participation during implementation leads to limited post-project support.

Associated recommendations:

- Provide sufficient training to ensure communities have the knowledge to continue new practices.

- Establish ownership rules for shared assets and benefit rules for group-based livelihood activities.
- Develop and clearly communicate a realistic sustainability strategy with support pathways and responsible institutions.
- Pursue more deliberate strategies to engage local NGOs and local government institutions from the outset.

Lesson #3: Sustained outcomes require durable livelihood systems and reliable water access as adaptation outcomes are conceptually interdependent and need explicit operational linkages.

Associated recommendations:

- Continue to prioritize climate-resilient design of water infrastructure and livelihood interventions.
- Design and operationalize clear linkages between planning, infrastructure, and livelihoods.

Lesson #4: Effective ex post evaluations of sustainability and resilience are predicated on high quality evaluations and the availability of sufficient baseline data.

Associated recommendations:

- For mid-term evaluations, ensure communities are consulted and results are shared with relevant stakeholders.
- Ensure quality of final evaluations for ex post evaluability, including submitting underlying supporting materials.
- Ensure evaluations allocate sufficient time for implementers and evaluators to consolidate learning and establish two-way feedback loops.

For the AF-TERG on methods

Lesson #5: Spending multiple days in each community and relying on a highly qualified, gender-diverse national team to lead fieldwork yields especially rich, nuanced, and candid insight. Community validation sessions are a valuable exercise to address divergent views, confirm findings, and share learnings.

Associated recommendations:

- Continue to require evaluation teams to collaborate closely with highly qualified national consultants and encourage teams to engage gender-balanced local field assistants.
- Develop targeted data collection training materials for fieldwork teams.
- Provide sufficient resources to enable this locally led approach.
- Add 2–3 sites for counterfactual data gathering.
- If relevant, ensure that field teams receive conflict- and trauma-responsive training.

1 Project Information



Caption: Sign outside agro-processing center supported by the Adaptation Fund project in Tumu, Upper West Region.

The Adaptation Fund financed the ***“Increased Resilience to Climate Change in Northern Ghana through the Management of Water Resources and Diversification of Livelihoods”*** (GHA/MIE/Water/2012/1) project implemented by the United Nations Development Programme (UNDP) and the Government of Ghana (GoG). This project sought to enhance the resilience and adaptive capacity of rural livelihoods to climate impacts and risks affecting water resources in Ghana's northern regions. The project was approved by the AF Board in May 2015 and was launched in May 2016 with the expectation to improve water resource management and long-term planning to effectively address the underlying drivers of water resource degradation and stimulate investments, while taking into account and trying to reduce the impact of climate change on surface and groundwater sources and livelihoods. The expected implementation period was May 2016 to April 2020, however due to funding disbursement delays and the COVID-19 pandemic, the project received a no-cost extension to December 2020, albeit with fewer communities reached and assets constructed or improved than planned.

1.1 Project summary table

Table 1 presents basic project details obtained from the project proposal, mid-term evaluation, and final evaluation.

Table 1. Project Summary Table

Project Information	
Project/Programme Category	Regular project
Country	Ghana
Regions	Northern, Upper East, Upper West and Savannah
Title	Increased resilience to climate change in Northern Ghana through the management of water resources and diversification of livelihoods
Adaptation Fund Project ID	GHA/MIE/Water/2012/1
UNDP Project ID	4952
Implementing Entity	United Nations Development Programme (UNDP)
Executing Entity / National Partners	Ministry of Environment, Science, and Technology ⁴ (MEST)
Adaptation Fund Financing	USD 8,293,972
Government of Ghana Co-financing	USD 750,557
Project Start Date	April 2016
Project Closing Date (Proposed/ Actual)	April 2020/December 2020
Project Final Evaluation Date	October–December 2020 Report submitted March 2021

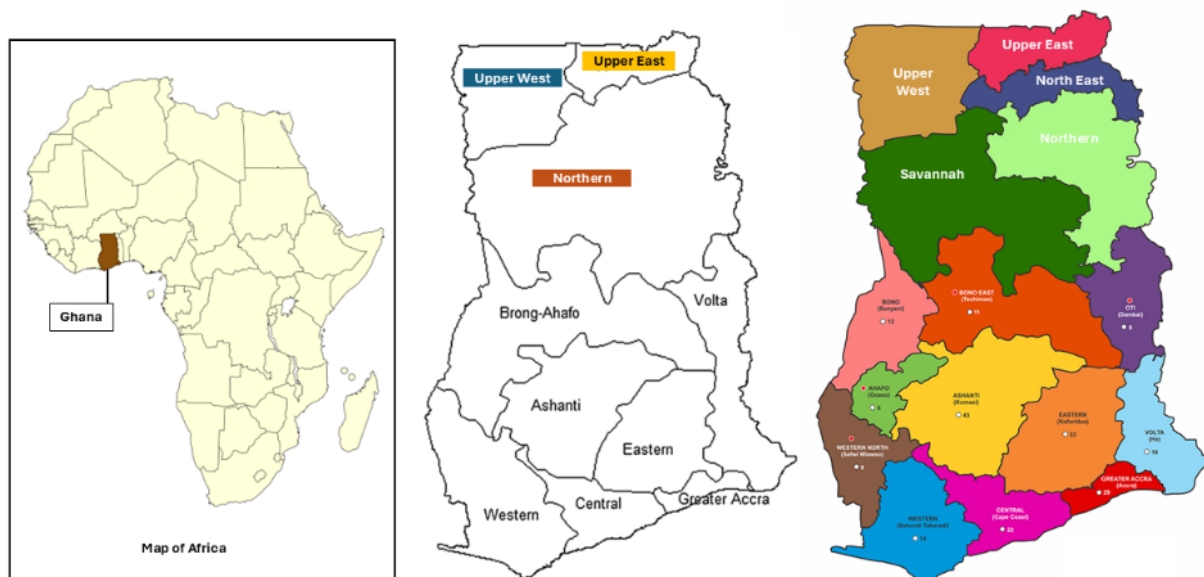
1.2 Summary of project justification

The main objective of the project was to enhance the resilience and adaptive capacity of rural communities in northern Ghana to climate impacts and risks on water resources and livelihoods. The project focused on the Volta River System, which contains the White Volta, Black Volta, and Oti Basins, and which spans roughly 70 percent of Ghana's land area. Activities were implemented in a total of 10 districts across four⁵ northern regions within the Volta River System, as shown in Figure 1: two in the Northern Region, one in the Savannah Region, four in the Upper East Region, and three in the Upper West Region.

⁴ At the time of project appraisal, MEST was known as Ministry of Environment, Science, Technology, and Innovation (MESTI).

⁵ The current Northern and Savannah Regions formed one unified region at project design and were split into two regions during project implementation. Thus, the project originally targeted three regions.

Figure 1. Maps of the Project Areas



Source: Final evaluation, 2021. Recreated for legibility by the evaluation team.

Note: The middle graphic shows three regions in 2016, while the right graphic shows the new Savannah region established in 2019.

Northern Ghana is the driest part of the country, receiving less than 1,100 millimeters of rainfall annually at the time of project design. Climate projections also indicated further declines in rainfall volumes alongside increasingly erratic patterns of rainfall.⁶ These regions were also identified as the most vulnerable to drought and the least equipped to adapt to climate impacts due to low socioeconomic development and heavy dependence on rain-fed livelihoods, such as agriculture and forestry.

The project recognized the disproportionately high difficulties that poor farmers in northern Ghana face in managing climate risks. Increasingly unpredictable rainy seasons undermine farmers' ability to plan crop production, which in turn threatens household food security. This was especially concerning given that 10–34 percent of the population in the target districts was food insecure at the time of project design.⁷ With a large share of Ghana's population relying on agriculture for their livelihoods, the destabilizing effects of climate change on rainfall patterns posed significant risks to income stability. Consequently, the project sought to take on these challenges from multiple angles. It emphasized improved water resource management to reduce vulnerability to climate variability, while also promoting livelihood diversification to lessen dependence on climate-sensitive agriculture.

The project aligned closely with Ghana's national climate change adaptation and development frameworks and national initiatives focus on building resilience across agriculture, infrastructure, and coastal zones. These include the National Climate Change Policy (NCCP, 2013), National Adaptation Strategy (NCCAS, 2012), the National Adaptation Plan (NAP, implemented 2020–2025), and Ghana's

⁶ Source: Project proposal, 2015.

⁷ Source: Project proposal, 2015.

Updated Nationally Determined Contributions (NDCs). Key priorities identified in these plans include:

- Climate-smart agriculture.
- Early warning and disaster risk management systems.
- Mobilizing climate finance for sustainable development.
- Promoting resilient livelihoods, inclusive urban planning, and protection of women and vulnerable groups.

1.3 Summary of project strategy

1.3.1 Project objectives and components

The primary objective of the project was to enhance the resilience and adaptive capacity of rural communities' livelihoods to climate impacts and to vulnerabilities affecting water resources in the northern regions of Ghana. This was expected to be achieved through improved water access, strengthened institutional capacity, and enhanced coordination of integrated water management that supports rural communities in diversifying their livelihoods.

The project consisted of three components:

- **Component 1: Water Resource Management and Planning Under Climate Change.**
- **Component 2: Community-level Implementation of Climate Resilient Water Resource Management Activities.**
- **Component 3: Diversification of Livelihoods of Rural Communities Under Climate Change.**

1.3.2 Project intended impact

The project pursued three outcomes, the first on basin-level planning, the second on local water resource management, and the third on livelihood diversification (see Table 2). Collectively, project activities sought to enhance the adaptive capacity of 50 communities in 10 districts (93,909 direct and indirect beneficiaries total) to climate risks through institutional and individual capacity strengthening and awareness raising, investments in physical infrastructure, and livelihood diversification activities. The intended outcomes align with Strategic Outcomes 2 (institutional capacity), 3 (individual awareness and knowledge), 4 (infrastructure), and 6 (livelihoods) of the AF's Strategic Results Framework (SRF).

Table 2. Project Components and Contribution to AF SRF

No.	Component	Intended Project-Level Outcome	Fund-Level Outcome	Cost (Million US\$)*
1	Water Resource Management Planning	Outcome 1: Improved basin level management and planning of water resources,	Outcome 2: Strengthened institutional capacity to reduce risks associated	\$0.364

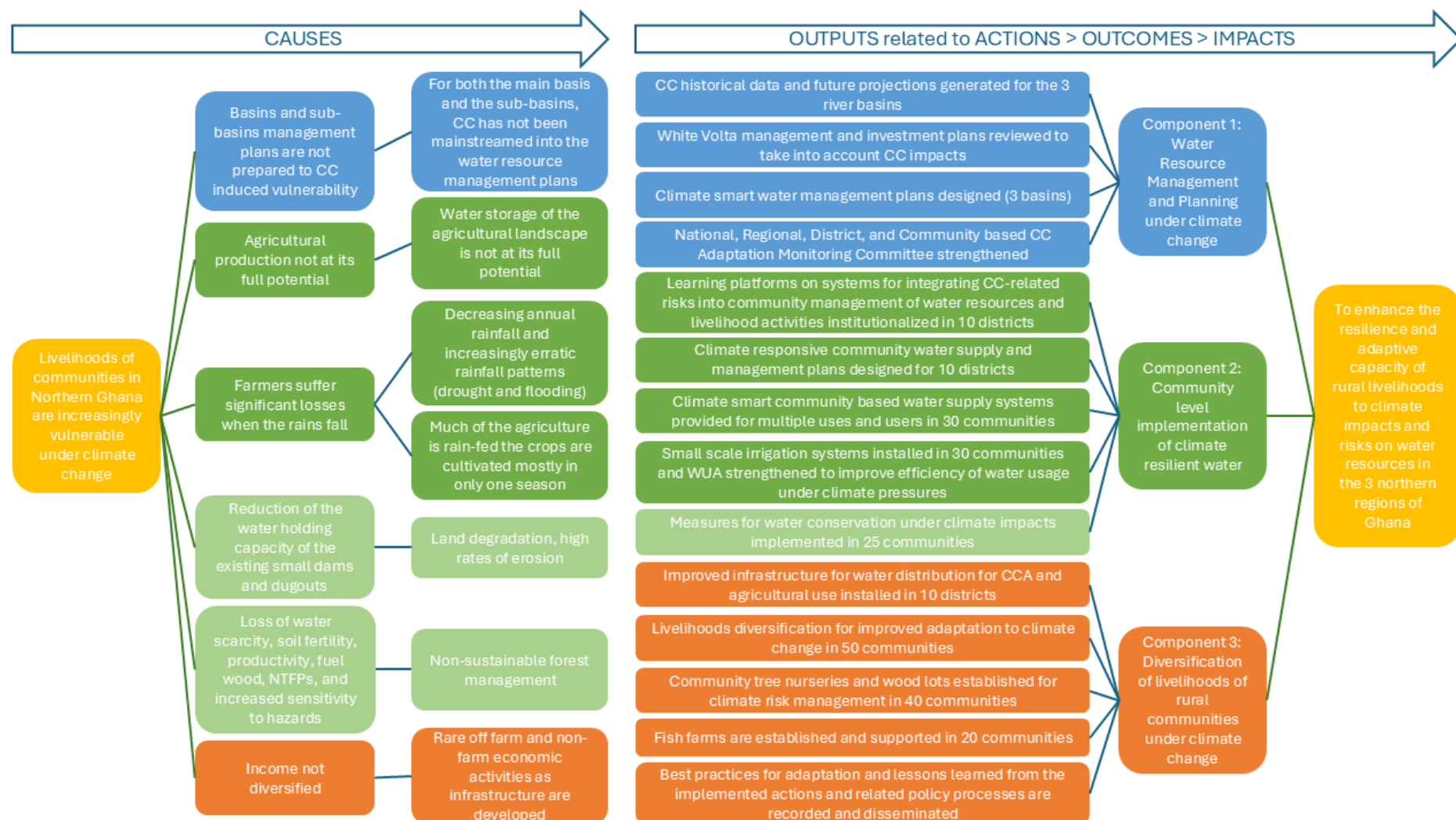
No.	Component	Intended Project-Level Outcome	Fund-Level Outcome	Cost (Million US\$)*
		taking into account climate change impacts on surface and groundwater sources	with climate induced socioeconomic and environmental losses	
2	Community Level Implementation of Water Resource Management Activities	Outcome 2: Climate resilient management of water resources by at least 50 communities in northern Ghana	Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level Outcome 4: Increased adaptive capacity within relevant development and natural resource sectors	\$4.496
3	Diversification of Livelihoods of Rural Communities	Outcome 3: Enhanced diversification of livelihoods under climate change by at least 50 communities in northern Ghana	Outcome 6: Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas	\$2.251

*Project component costs at appraisal. Project fund utilization was 84.48% at the time of the final evaluation, including project cycle management fee. [Source](#): Final evaluation, 2021; Project proposal, 2015.

1.3.3 Theory of Change

While the original project proposal did not include a Theory of Change (ToC), one was developed by the Mid-term Evaluation team and confirmed by the Final Evaluation team, as shown in Figure 1 below. One key consideration is not clearly represented in the ToC but emerged from the Final Evaluation and scoping interviews: that is, the interlinkages and inter-dependencies among the outcomes. For example, the Final Evaluation found that enhanced water resource management and planning at the basin- and sub-basin level (Outcome 1) should create a supportive enabling environment for community-level water management and conservation (Outcome 2), but that those theoretical interlinkages were not demonstrated. There was insufficient empirical evidence that basin planning was actively used by local governments or communities and that implementation experiences informed basin policy processes. Similarly, enhancing climate-resilient water supply (Outcome 2) was identified as theoretically linked to the effectiveness of some new climate-resilient diversified livelihoods (such as dry season gardens and fish farming) (Outcome 3); this interdependency was highlighted in interviews. These interlinkages are highly relevant also for the Theory of Sustainability discussed in Section 1.3.4 further below.

Figure 2. Theory of Change



Source: Mid-term evaluation, 2019. Recreated for legibility by the evaluation team

1.3.4 Theory of Sustainability

A Theory of Sustainability describes the pathways through which project outcomes are expected to deliver long-term benefits after project closure, including the institutional, financial, technical, and social elements needed for adaptive sustainability. A Theory of Sustainability for each project outcome has been derived from the Theory of Change and sustainability strategies articulated in project documents, sustainability projections from the final evaluation, and initial interviews with government, project, and other representatives.⁸ The Theory of Change was designed for three Outcomes below (see Figure 2 above).

Outcome 1: Improved basin level management and planning of water resources, taking into account climate change impacts on surface and groundwater sources

Sustainability of Outcome 1 requires that the water management plans reported as developed and adopted⁹ were ultimately implemented by the Water Resources Commission. The plans, which were generated by GoG teams, were grassroots based, prioritizing risks within the basins and sub-basins as well as documenting water quantity and quality and recommending investments. Successful implementation of the plans requires sufficient capacity within government agencies to understand climate risks and how to address them in water management, as well as sufficient budget allocation and expenditure for climate-resilient water management activities at basin and sub-basin levels. It also requires effective water resource governance, including through the sustained functionality of Regional Climate Change Adaptation Monitoring Committees at regional and sub-basin levels.

Benefits of producing downscaled climate projections could be maintained by using this new information to inform other climate-informed planning efforts. Gains in improved water resource planning and management could be further sustained or even scaled through the use of the management plans to focus and leverage investment and/or partnerships, such as research institutions using improved knowledge or donors investing in increased numbers of boreholes, water harvesting, or other water access approaches.

Outcome 2: Climate resilient management of water resources by at least 50 communities in northern Ghana

The sustainability of community-level climate resilient management of water resources depends on the continued functionality of water infrastructure, the existence and effectiveness of local operations and maintenance arrangements, and evolving patterns of water availability and use, as well as whether communities understand water use and supply-related climate risks.

Dams (also referred to as dugouts in project documentation), along with boreholes and, sometimes, irrigation systems (e.g., pipes, canals, watering cans), will need to continue to be operational and provide sufficient and consistent water supply for agricultural and domestic use. Sustained dam/dugout operations will require high-quality engineering design, siting, and construction, and capacity and resources to address potential technical failures, erosion, and siltation,¹⁰ and to avoid damage from flooding or crocodiles. Dam/dugout buffer zones will need to continue to reduce evaporation and enhance water holding capacity, including through planted trees, whose survival depends on continued community benefit (e.g., mangoes, shea, and teak that also provide fruit and wood for communities). Water quality will need to be maintained to ensure sustained and safe

⁸ MEST and UNDP were engaged through interviews, in lieu of a collective Theory of Sustainability co-creation process.

⁹ There was terminal evaluation proof that they were 'validated' at the national government level, supported by basin plan proof they had been produced as per Adaptation Fund funding as of 2018, during implementation. Source: Germane Black Volta and Oti Basin plans and sub-basin plans for our northern areas were received February 2026 from MEST.

¹⁰ Source: Peasant Farmers Association of Ghana (PFAG), 2023.

water use, avoiding pollution from illegal gold mining or farm pesticide or fertilizer runoff. Boreholes will also need to continue to be operational and provide continuous water supply, avoiding technical, hydrogeological, and management failures, as well as conflict about water access and use.¹¹

Sustaining the functionality of water infrastructure will require sufficient financial and technical mechanisms for regular asset maintenance. Financial mechanisms could include continued community payments into local Village Savings and Loan Associations (VSLAs)¹² or local level water and sanitation agencies budgeting for maintenance and repairs. Sufficient technical expertise in water infrastructure repair will also need to be locally accessible.

Outcome 3: Enhanced diversification of livelihoods under climate change by at least 50 communities in northern Ghana

Sustaining the benefits under Outcome 3 requires that water infrastructure implemented under Outcome 2—including dams/dugouts (and their buffer zones), boreholes, and irrigation systems—remains functional and continues to provide access to sufficient water for livelihood activities including dry-season farming, fish farming, and tree nurseries. If water infrastructure has not been adequately designed to account for projected climate risks, or if an increase in promoted water-dependent livelihoods substantially increases water demand relative to supply (potential maladaptation risk), there are risks that water availability may be reduced for other needs or that achieved livelihood outcomes will not be sustained if water is allocated to address other needs.

For livelihood benefits to be sustained, community members who adopted these new livelihood practices must also continue to maintain them (or to evolve or expand to other livelihoods) due to perceived social, economic, and environmental benefits, including sufficient productivity and access to markets. Community members must also have sufficient access to utilities (e.g., electricity), as well as access to and financial means to reinvest in necessary inputs (e.g., land tenure rights,¹³ raw material of shea nut; seedlings for tree nurseries; fish stock, feed, and cages for fish farming; seeds, fertilizer, and pesticides for dry season farming; protective equipment for honey harvesting) to maintain their new livelihood activities. Protective measures for some livelihoods (e.g., fencing or fire breaks to protect dry season farming areas) must be effective to avoid destruction by livestock grazing or arson. Community members must also have sufficient capacity—or durable access to capacity support, such as through NGOs or private sector partners—to continue to pursue their livelihood activities after project closure (e.g., sufficient knowledge of when and how to harvest honey, skills and/or resources to repair equipment for agro-processing).

As noted earlier, the evaluation team also examined the hypothesis that combining improved, well-managed water sources (i.e., project outcomes 1 and 2) with support for diversified livelihoods (i.e., project outcome 3) makes communities more resilient to climate change than either intervention alone. Given the increasing incidence of droughts or floods in the project intervention areas, and given the diverse uses for water (e.g., domestic use, agriculture, power generation, transport, industry, fisheries), climate adaptation cannot be addressed solely by improved management of water resources, but also requires diversified livelihoods. In scoping interviews, project counterparts explained that introducing water-dependent livelihoods was expected to motivate community members to more sustainably manage water resources. At the same time, this strategy risked encouraging over-use of water resources, which was mitigated by introducing other livelihoods that

¹¹ Source: Benyarku, and Walraevens, 2025.

¹² VSLAs are self-managed, community-based, micro-finance groups that enable members to save money and take out small loans when needed. Some communities received new VSLAs, while others already had VSLAs.

¹³ The Final Evaluation noted that "a land tenure system that favors continuous crop fields for supply of services" is a principal cause of climate vulnerability in the Northern regions. Source: Final evaluation, 2021.

are less water dependent (e.g., agro-processing, beekeeping). With this in mind, the evaluation team examined the sustainability and resilience of livelihoods (Outcome 3) based on the presence or absence of improved water resources and their management and conservation (Outcomes 1 and 2).

1.3.5 Sustainability ratings at final evaluation

In the Final Evaluation, sustainability was considered **Likely**.¹⁴ The Final Evaluation did not provide outcome-specific sustainability ratings, however, and the supporting evidence for this overall determination focused primarily on Outcomes 2 and 3, with no discussion of the likelihood of sustainability of Outcome 1 nor how national water management policy would link to regional, district or local levels.

The Final Evaluation's positive sustainability projection was based on the following findings and assumptions:

- **Increased productivity and income generation from dry season farming** through irrigation and controlled water use. Dry season farming has become the preferred smallholder farming practice, indicating positive expectations for both community ownership and capacities.
- **Integration of project activities with existing government programs, suggesting expectations of sustained partnership and resources.** The Final Evaluation anticipated that dry season farming would be integrated into the government's programme of planting for food and jobs (PFJ), which could provide the needed support for fencing, water supply and inputs for communities to sustain the livelihood diversification. Similarly, small-scale shea nut processing and shea butter production plans and cereals and grains milling plants established by the project "could be packaged as bundled projects to benefit from the governments flagship programme of One District One Factory (1D1F) for sustainability. Likewise, the maintenance of [...] small dams and dug outs constructed or rehabilitated by the project under the government's one district one dam policy and projects."¹⁵
- **Financial mechanisms for continued repairs and maintenance, indicating both ownership and resources.** At project close, communities were making monthly financial contributions to Village Saving & Loan Associations (VSLAs) to meet repairs and maintenance needs for project-established infrastructure.

¹⁴ Likely is the highest rating on the final evaluation's four-point scale of likely (4), moderately likely (3), moderately unlikely (2), and unlikely (1).

¹⁵ Source: Final evaluation, 2021. The relevant basin and sub-basin plans were received from MEST in February 2026.

2 Evaluation Objectives, Methods, and Limitations



Caption: Women's focus group discussion in Zaazi, Northern Region.

In 2022, the Technical Evaluation Reference Group of the Adaptation Fund (AF-TERG) launched a multi-phase approach to ex-post evaluation of Adaptation Fund (AF) interventions to develop and encourage the use of fit-for-purpose evaluation tools and approaches, and to enhance planning and monitoring, evaluation, and learning capacity across the Fund. In October 2025, the AF-TERG commissioned an ex-post evaluation of this AF-funded project in Ghana using the framework and methodology captured in the 2025 *Toolkit for the Ex Post Evaluation of Adaptation Interventions (Ex Post-EAI)*.

The evaluation followed the process laid out in the Ex Post-EAI toolkit. First, the AF-TERG selected the project based on an initial evaluability assessment and commissioned the evaluation, including bringing on an independent evaluation team (ICF) to deliver the evaluation design, data collection and analysis, and reporting. The AF-TERG and the evaluation team held a kick-off meeting with MEST and UNDP in December 2025 to discuss the objectives, approach, and timeline of the evaluation. After kick-off, the evaluation team prepared an Inception Report and conducted deskwork, scoping interviews, and fieldwork preparations. From 29 March to 12 April 2026, the evaluation team conducted field-based data collection in eight project sites across three of the four implementation regions. Following the completion of fieldwork, a representative of the AF-TERG who joined the fieldwork held a debrief meeting with MEST and UNDP in Accra to share emerging

findings. This report presents the complete findings based on deskwork and fieldwork methods, data synthesis, and triangulation.

2.1 Evaluation objectives

The evaluation aims to assess the adaptive sustainability and resilience of the three outcomes delivered by the project and to understand the factors that have influenced their persistence or transformation since project closure. The key objectives of the evaluation are to:

- Assess changes in project outcomes (positive and negative) since the final evaluation was conducted in 2020.
- Identify enabling and constraining conditions that have influenced the sustainability of adaptation outcomes since project closure.
- Analyze how sustained outcomes contribute to enhanced local resilience, especially in the context of climatic and other possible shocks.
- Determine what, if anything, emerged from local efforts and other pathways to sustain results (also known as emerging outcomes), including any unintended or maladaptive results or evidence of scale-up by other organizations.

Two additional goals of the evaluation are 1) to meet the learning needs of UNDP and GoG regarding replicating future activities based on what has worked well or poorly in the vital water sector in light of rising climate variability and impacts, and 2) to inform participating communities and partners of what the team learned in the ex-post evaluation process.

Building on learning from other AF-TERG ex-post evaluations, the evaluation team also examined the hypothesis that combining improved, well-managed water sources (i.e., Outcomes 1 and 2) with support for diversified livelihoods (i.e., Outcome 3) makes communities more resilient to climate change than either intervention alone (see also the theory of sustainability in Section 1.3.4).

2.2 Evaluation methods

The evaluation drew upon both qualitative and quantitative data collected through a variety of desk- and field-based methods. The team triangulated evidence gathered during the deskwork phase with evidence collected during fieldwork to develop a comprehensive evidence base for the final evaluation report.

2.2.1 Deskwork methods

During the preparation and deskwork phases, the ex post evaluation team engaged project stakeholders (see list in Annex 1) through key informant interviews (KIs), undertook extensive review of the final evaluation and other core project documents, and conducted external research on the project context since closure. See Annex 3 for a full list of documents consulted. These efforts informed a preliminary assessment of sustainability by outcome and driver and as well as a heightened understanding of the implications for primary data collection through fieldwork.

The team undertook a detailed desk review of the final evaluation, supplemented by consultation with the lead evaluator and MEST in early 2026 to clarify methodological approaches and data limitations. These discussions confirmed that the final evaluation (conducted during the COVID-19 pandemic) relied primarily on desk-based analysis, with limited and largely confirmatory use of field data. Given these limitations (see also Section 2.3 below on Limitations), the project team expanded its preparatory activities to identify additional documentation and supporting materials, such as lists and spatial locations of improved dams, and photographic evidence of project assets at

completion. The evaluation team also reviewed MEST's 2023 report¹⁶ on its field mission to 16 project sites in Northern and Upper West regions, which included four of the sites visited by this evaluation and provided further photographic and observational evidence on the status of selected project assets.

KIs were also conducted with regional/district EPA offices and the Water Resources Commission outside of the fieldwork mission. A total of eight EPA officials were contacted for KIs prior to fieldwork, of which four participated.

The evaluation team also administered an online survey targeting NGO partners involved in implementing livelihood activities under Outcome 3, with the aim of triangulating NGO input with fieldwork observations and collecting data about communities not involved in the eight fieldwork sites. Of 46 NGOs contacted, 12 complete responses were received, including four from NGOs that had implemented activities in the fieldwork communities. However, following a detailed review, the evaluation team found that responses from the four NGOs representing fieldwork communities diverged substantially from observation during site visits by the ex post evaluation team.¹⁷ These discrepancies reduced confidence in the accuracy, reliability, and generalizability of the survey data. Therefore, the survey data were excluded from the analysis. A more detailed assessment of these inconsistencies is provided in Annex 5.

Image 1. Evaluation Team Meeting with EPA Deputy Director, Tamale



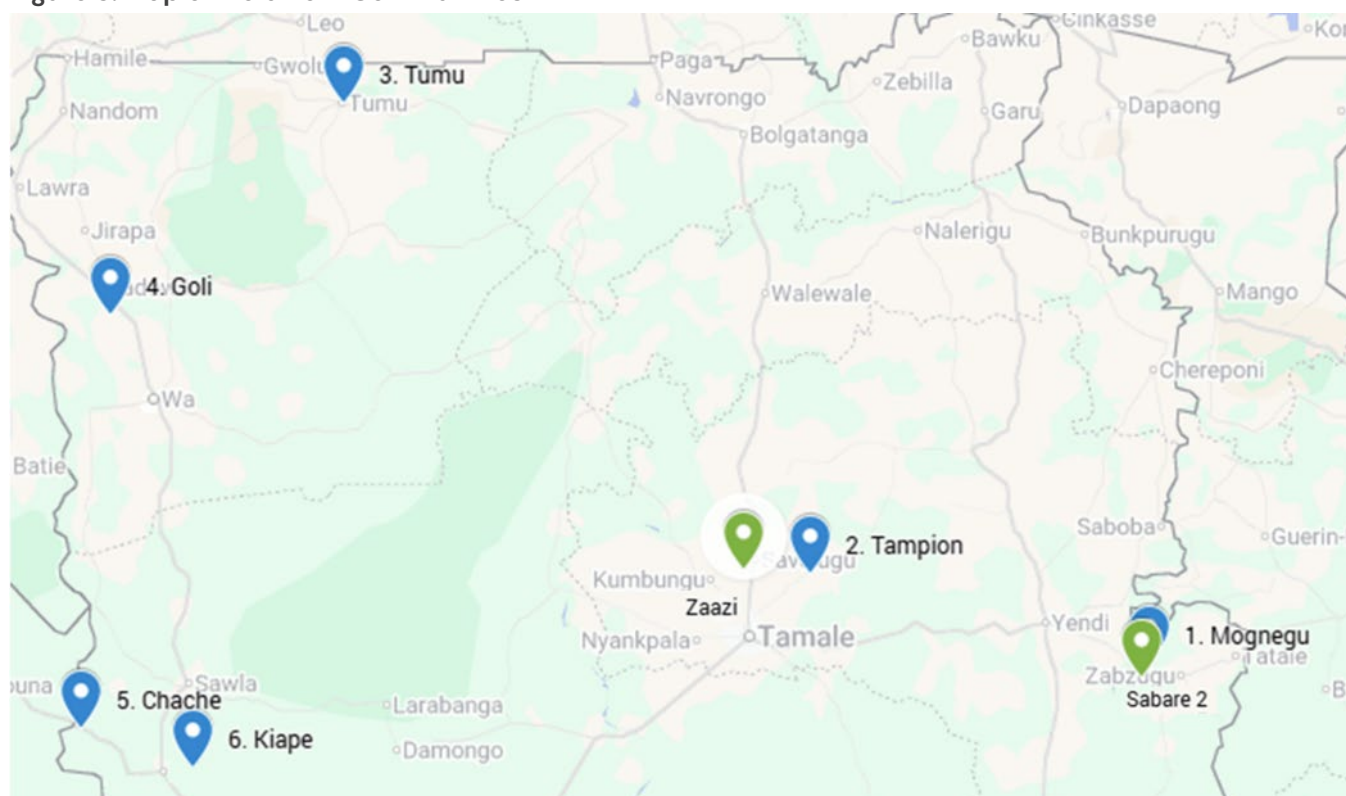
2.2.2 Site selection

Building on the deskwork phase, the evaluation team developed a purposive sampling strategy to select communities for fieldwork. Consistent with the purpose of an ex post evaluation, which focuses on assessing the sustainability of documented results rather than re-evaluating missing data of project outputs and outcomes at final evaluation, the team did not attempt to recreate or validate data that had not been independently verified through fieldwork by the final evaluation. Instead, site selection relied primarily on available photographic evidence and supporting materials provided by the final evaluator from a consultant's visit in late 2020 and MEST's 2023 field visit. These materials were used as the primary sampling frame, with assets depicted assumed to have been functional at the time of project completion; sites were revisited based on 2023 and 2026 context (see below).

¹⁶ MEST. 2023. *Field Visit to Beneficiary Sites Under the Adaptation Fund Project 'Increased Resilience to Climate Change in Northern Ghana Through the Management of Water Resources and Diversification of Livelihoods' (13–21 July 2023)*.

¹⁷ The evaluation team theorizes that these discrepancies may have occurred due to survey respondents assuming early results continued without confirmation, even during later implementation; confusing the AF project with other development projects in the area; limited institutional memory; or limited engagement with the communities after project closure leading to assumptions, rather than knowledge, about current conditions. Some responses were partially correct or wholly incorrect, but no responses from fieldwork areas were wholly correct. This led the evaluation team to extrapolate that because it was not possible to verify NGO perceptions from sites we did not visit, we could not rely on those responses either, and we eliminated survey responses as a source of data.

Figure 3. Map of Fieldwork Communities



Note: Six selected communities in blue, plus additional 'buffer zone' communities shown in green.

Site selection used a purposive sampling strategy driven first by **availability of photographic evidence of water and livelihood assets at completion**. The final evaluator provided photographic evidence of many water and livelihood assets in 23 communities, which was used as the sampling starting point. From these 23 communities, the evaluation team purposively selected 8 sites based on the following criteria:

- **Presence or absence of water assets and buffer zone activities:** The evaluation team intentionally selected both sites that received water assets (dams/dugouts and boreholes) under Outcome 2 and those that appeared to have not,¹⁸ enabling testing the hypothesis that having increased water supply alongside improved livelihoods leads to more local resilience. Two other communities were selected precisely for the lack of improved water resources to gauge the viability of diversified livelihoods without improved water access. The evaluation team originally planned to visit 6 communities across 3 regions, but this sample was expanded to include 2 more communities with buffer zones following a site recommendation from MEST (see Figure 3).
- **Intensity of livelihood activities implemented:** Selection favored communities that participated in multiple livelihood schemes (e.g., fish farming, dry season farming, agro-processing, and beekeeping).
- **Inclusion of all known activities:** Selection ensured that all project outcomes were covered, based on best available information. Other activities were found during site visits and may have been part of the project (e.g., VSLA or water tanks), but were not originally included in the sampling given dearth of original targeting information.

¹⁸ Photographs and lists of boreholes did not always both confirm the existence of project boreholes at project end, thus the fieldwork both confirmed the existence of water assets put in by AF's funding, and their state of functioning.

- **Exclusion of unsafe areas and coverage of geographic and ecological diversity:** Two communities in Upper East region that had been initially selected (due to presence of buffer zones) were ultimately excluded due to civil unrest and two more were added in Savannah region to conform to expectations that three regions would be visited—also ensuring geographic and ecological diversity.
- **Timeline:** Practical considerations also informed final site selection: communities also had to be accessible within the 15-day fieldwork window.

This approach ensured that communities selected were evaluable and had benefitted from multiple project components. This sampling strategy was designed to ensure that findings are both robust and generalizable across the full project area. The final sample covered three of the four regions targeted by the project, with at least two communities selected per region.

The evaluation team also noted during site selection that two of the selected communities (Chache and Tampion) may have been included in government flagship initiatives, such as One District One Factory (1D1F) and One Village One Dam (1V1D), respectively. While this was not a primary selection criterion, the team considered it a potential opportunity to assess whether such programs contributed to the sustainability of project outcomes. However, no evidence was found during the evaluation to suggest that these initiatives had been implemented in or had materially influenced outcomes in these communities.

2.2.3 Fieldwork methods

During fieldwork, the team engaged with a wide range of community members to understand experiences and perceptions of resilience changes since project closure. A variety of participatory methods were used to capture these perspectives, including large focus group discussions (FGDs), using tools such as seasonal calendars, ranking activities, followed by more individual KIIs and transect walks. These approaches generated testimonies, estimates of the perceived benefits of different livelihoods, and some quantified information that would not be available through secondary data (e.g., frequency of climate shocks or uses of VSLA savings). Transect walks, in particular, enabled the team to visit, photograph, count, and assess the condition of physical assets established during the project and evaluate how well they had been maintained since closure. The photos were valuable as they identified AF's assets to differentiate them from assets such as boreholes that were provided by other projects or NGOs that were/were not working.

The evaluation team prioritized evaluation methods that would allow substantial consultation of stakeholders at the local level—recognizing that [valuing local voices](#) is crucial to accurately assessing both sustainability and resilience.

Across fieldwork methods, [the evaluation team consulted with over 200 local community members, leaders, and NGO representatives, 50 percent of whom were women](#). These consultations gathered valuable insights on the unique successes and challenges faced in each community, allowing for a rich evidence base to inform the evaluation findings, conclusions, and recommendations. See Annex 1 for a breakdown of participants by method.

At each site, community validation sessions were conducted with key respondents before departure. These sessions used structured and provocative statements to confirm and verify findings, clarify inconsistencies, and expand on previous inputs. They also supported the learning objective of AF ex post evaluations. For instance, these discussions helped clarify differences in knowledge and gender roles across groups, such as in Kiape, where men reported technical issues

with dam infrastructure that women were unaware of, and in Mognegu I, where women reported being solely responsible for financing borehole repairs. Gender roles were brought up across many community FGDs and were further discussed in the validation and feedback sessions (see also Section 3.2.3).

The evaluation used five fieldwork methods to collect data around a series of ex-post research aims, as displayed in Table 3. Insights gathered from these methods were systematically recorded and analyzed alongside other data, contributing to a holistic understanding of sustained outcomes and their enabling conditions. These fieldwork methods were used to assess the sustainability and resilience through Outcomes 2 and 3; Outcome 1 was assessed primarily through national- and regional-level interviews as described earlier.

Image 2. Key informant interview in Tumu, Upper West Region



Table 3. Qualitative fieldwork tools and ex-post research aims

Line of Inquiry	Large FGD ¹⁹	KIIs	Seasonal Calendars	Rankings	Transect Walks
Shocks to water and livelihoods			●	●	
Participation by gender in trainings	●				
Presence and continuous use of assets	●	●	●		●
Proof of livelihoods (e.g. machinery for milling grain, making soap, garden areas, fish cages in dams) ²⁰			●		●
Extent livelihood has survived and generates income	●	●		●	●
Proof of water conservation measures (e.g. trees at dam, vegetated embankments at dam)		●	●		●
Training around water management and climate adaptation (if found) ²¹		●			
Barriers to activities continuing (e.g. land tenure, theft, arson, flooding)	●	●	●		●
Resilience and maladaptation evidence	●	●	●	●	●
Replication / scaling		●			●
Drivers of livelihoods – water		●		●	●
Drivers of livelihoods – other e.g. electricity, land		●		●	●
Emerging outcome pathways		●			●

Large focus group discussions (FGDs) were used to explore collective experiences, perceptions, and narratives around the project's outcomes and their sustainability. At each site, large FGDs were conducted that were open to all interested participants, with group sizes typically ranging from approximately five to 25 individuals depending on community participation. Participation was voluntary, resulting in self-selection of respondents. These large discussions were complemented by smaller, gender-disaggregated group sessions used to conduct ranking exercises and seasonal calendar analysis.

¹⁹ Large focus group discussions used seasonal calendars, climate shock timelines through rankings, although they are separated for clarity.

²⁰ This supplemented and confirmed photographic evidence (2020, 2023) or lists without photographic evidence of assets by the project

²¹ District officers were asked about trainings given on water management linked to outcome 2, and communities separately verified. No project documentation had a list of topics covered, so capacity retention could not be evaluated.

Key informant interviews (KIIs) focused on assets and capacities related to water resource assets and their management and livelihood interventions. Conducted with select community members (e.g., women for agro-processing) and local leaders (e.g., assembly members), KIIs allowed for more targeted inquiry into how project outcomes have evolved on the ground, how they are perceived by those directly affected, and what factors have contributed to their sustainability or decline. All interviews were conducted using semi-structured guides tailored to each stakeholder group. Interviewees were informed of the evaluation's purpose and scope, assured that participation is voluntary, and that their responses were treated confidentially. Interview notes were lightly transcribed during the interviews and securely stored afterwards. Analysis was conducted using content and pattern analysis methods to identify recurring themes and generate insights.

Ranking exercises were done in all FGDs in all communities and were used to understand community perceptions of the relative importance/ownership and sustainability of different project activities or outcomes, especially related to livelihoods.²² Participants were asked how much livelihoods helped them, using a common Ghanaian process by taking 10 stones and having respondents allocate them by proportion to yield a ranking. Based on piloting the ranking exercise with a woman farmer, the evaluation team also used this method to understand the importance of different water sources for livelihoods (e.g., during the dry season). Unfortunately, few livelihoods remained active at the time of the evaluation, making it difficult for respondents to compare current conditions with benefits experienced during implementation.

Seasonal calendars were used to explore how project outcomes, such as agricultural practices, water availability, or livelihood activities, have evolved over time and across seasons during and since project closure in 2020. This tool helped participants map out key events (e.g., a difficult and irregular drought in 2023/2024), stressors (e.g., disruptive climate shocks), water availability, and coping strategies throughout the year, offering insights into the timing and sustainability of adaptation benefits. It also helped determine whether potentially maladaptive coping strategies to water scarcity have arisen. See Annex 6 for seasonal calendars produced by each community.

Transect walks were conducted with community members and local partners to observe physical infrastructure, land use changes, and environmental conditions, thereby providing an opportunity to ground-truth reported outcomes, identify unintended effects, and understand spatial dynamics of sustainability. While all community members were invited to participate, typically only a smaller number joined these walks. During the walks, the field team confirmed and photographed the state of the assets built and used and discussed the causes of their sustainability and resilience with participants. Climate shocks identified by communities through seasonal calendars were also discussed in detail.

2.3 Limitations

Table 4 presents specific limitations that the ex-post evaluation team faced, the ultimate impact of the limitation on the final ex post evaluation, and the mitigation measures taken.

²² It was expected to be particularly important for livelihoods as the community survey conducted at project completion indicated that some of the livelihoods supported by the project may represent small proportions of overall household income, which could limit their contribution to household financial resilience.

Table 4. Limitations and Mitigation Measures

Limitation	Impact	Mitigation measures
Weak M&E and baseline data	Med	This challenge was identified in the final evaluation and in subsequent communication with the lead final evaluator. The team followed up with UNDP, GoG, and the final evaluator to request all supporting data to build an understanding of status at closure, although contradictions remained in terms of inventories, locations, and numbers of assets and performance of those assets at project close. Overall, insufficient and inconsistent data in the final evaluation (especially between many secondary and few primary sources) meant that the ex post evaluation had to rely on primary fieldwork to fill these gaps and strengthen the evidentiary base. The team confirmed details in the selected sites and the state of the assets during fieldwork through KIs and transect walks. The final evaluation was particularly sparse and conflicting on project approach and results related to income (reporting 30% higher income levels without using a measurement tool) and gender equality and social inclusion. The ex post team attempted to fill these gaps through the NGO survey and fieldwork, which indicated that most groups were mixed-gender, with few activities explicitly targeting women, aside from VSLAs, which themselves received limited support. While an ex post evaluation cannot recover data that was not originally collected, the team used retrospective accounts to assess change over time, including comparisons between participation during implementation and the continued application of knowledge and practices. Communities reported that women often self-selected into activities such as agro-processing, where they had prior experience, and in some cases assumed responsibility for financing water-related maintenance, reflecting existing gender roles.
Difficulty securing timely participation from certain groups of key stakeholders	Low	The evaluation team experienced delays in obtaining project information, asset lists and locations, and contact details for key stakeholders, but ultimately was able to secure available data and key interviews. Still, the team faced challenges given that contacts from the implementation period were not always available or reachable due to both changes in positions and lack of contact information, and participation from local government institutions was limited. Contact was also made more challenge by changes in region and district delineations, meaning that district officers in 2020 were suddenly in 'new' districts while project documents had them in previous districts.
Difficulty identifying which infrastructure was funded by the project	Low	Investments were mostly traceable among the eight fieldwork sites through several means: photographs of assets from MEST or the final evaluation that could be compared to what the ex post team observed first-hand (and were useful in the absence of maps or geospatial data for some asset locations); AF/UNDP signage at many of the community assets photographed; dams were only 1 per community, and AF only improved some aspects of them so these were identifiable; communities mentioned follow-on or scaled-up programming in the intervening years from 2021–2026 but they were few.
Language barriers	Low	Knowing that myriad local languages are spoken in Northern Ghana, the ex post team hired two local interpreters in each region based on the majority language spoken, with experience in rural livelihoods and field research.
Ethnic insecurity and strife in	Low	Ethnic strife was absent throughout the project areas except in two regions. MEST and partners on the ground were consulted to exclude areas of insecurity from fieldwork (Upper East), which would threaten the field

Limitation	Impact	Mitigation measures
northern Ghanaian regions		team's safety. Chieftaincy insecurity necessitated replacing Upper East visits to Tili Azupunpuga and Kuka-Natinga in Bawku West and Bawku Municipality which has been a high-risk conflict area for some time, with Kiape and Chache in Bole. The substituted sites were otherwise similar except for buffer zones missing in Savannah, which the team supplemented with two additional sites after MEST consultation. While Chache has experienced some conflict in past years—offering the team the opportunity to consider how conflict affected sustainability—it is not considered a security risk area.
Disagreement over interpretation of findings, or lack of credibility of results	Low	Validation sessions were held in each community to ensure proper interpretation; the fieldwork and these sessions were led by the national evaluator, a highly experienced field research and farmer who is very familiar with the region. Unreliable data were excluded based on the validation from the analysis; for example, NGO survey responses were compared to what was found during fieldwork, deemed unreliable, and excluded. The evaluation management team conducted quality assurance to ensure that the evidence gathered was sufficient to draw conclusions based on careful triangulation across tools (including gendered FGDs) and all data gathered.

3 Findings



Caption: Abandoned borehole in Tumu, Upper West Region. In addition to not functioning, the borehole is far (1.7 kilometers) from the community and located near a "hooligan hideout."

3.1 Sustainability and sustainability ratings

This section first discusses the extent to which project outcomes have been sustained since completion and assesses the drivers of sustainability. It then provides sustainability ratings, summarizing the findings on sustainability for each outcome.

3.1.1 Sustainability by outcome

OUTCOME 1: Improved basin level management and planning of water resources taking into account climate change impacts on surface and groundwater sources

Findings under this outcome should be interpreted cautiously. Evidence to inform this sustainability assessment was notably scant,²³ and the absence of evidence does not necessarily mean that sustainability is present or absent.

Climate-informed integrated water resource management (IWRM) plans and water management boards remain in place in the Black Volta River but not in the Oti River Basin.

The Black Volta Basin Board, established by the project in 2017 to sustain the water catchment conservation measures, is still functioning, according to interviews; it was recently re-constituted following the change of government administration and held its first meeting of its second board. Multiple government interviewees also confirmed that some components of the Black Volta Basin IWRM plan have been implemented, including establishing seven sub-basin governance structures. That said, another key informant shared the alternative perspective that:

"In spite of the high quality of the basin and sub-basin plans, there was no evidence they were ever used much less now in spite of threats of contamination and water quality issues in the Black Volta from mining and chemicals from farming."

The Oti River Basin Board has not been continued due to challenges in the basin, although more details were not available.

Other partners have emerged to help finance activities in the IWRM investment plan, but a substantial funding gap remains. Post-closure, the government has reported using the Black Volta Basin investment plan as the basis for discussions with private sector stakeholders, donors, and government agencies to seek financing. Some direct investment has been made in IWRM activities by the Water Resources Commission, Hilton Foundation, and The Nature Conservancy (for nature-based solutions and restoration at community levels, guided by sub-basin plans). In addition, a World Bank-financed landscape restoration and small-scale mining project ([GLSRSSMP](#)), launched in 2022, has helped expand beyond the two sub-basins (Dapola and Buie) targeted by the AF project. The World Bank investment includes activities focused on developing integrated sub-basin landscape management plans and micro watershed management plans at the community level, working through both district and community structures.²⁴ In 2026, the Federation of the Red Cross / Red Crescent Societies also allocated funding towards "early action flood readiness activities in Ghana."²⁵ The evaluation team also observed investments in the Black Volta basin across the border from Chache, in Cote d'Ivoire.

Government interviewees indicated that a significant investment gap remains, however. One key external informant explained that competing national programs (e.g., IVID) and shifting development agendas reduced the government's prioritization of basin plan operationalization, despite persistent underlying risks like contamination from mining and pesticides. The localized and limited operationalization of the strategy may also explain why the field evaluation team found little verifiable evidence at

Image 3. Community members collecting water from a borehole in Sabare 2, Northern Region



²³ Findings under this outcome are based primarily on a limited set of interviews with government, project, and academic respondents.

²⁴ An interview suggested that these activities build on AF project-supported IWRM plans, although the World Bank project appraisal document does not reference AF-funded basin and sub-basin management plans (despite overlapping intervention areas) in discussions of its integrated watershed management approach to planning.

²⁵ <https://reliefweb.int/report/ghana/ghana-flood-simplified-early-action-protocol-annual-report-2025-mdrgh022>.

community level of use of IWRM plans were used after project close (e.g., through informing routine district-level planning, budgeting, or operational decisions related to climate-resilient water management in communities).

Project-established climate adaptation monitoring committees are no longer operational. Interviews suggested that the committees (established from regional to district to community levels) were no longer constituted, although some of their functions may have been mainstreamed into regional environmental management committees. As ad hoc committees, they were not institutionalized and thus did not have staying power.

Basin-level IWRM in the intervention area continues to be highly relevant. Climate impacts and variability are increasing, reducing the rainfall season while simultaneously contributing to higher intensity rainfall—with significant impacts for rural agricultural communities in Northern Ghana. Key informant interviews, community focus groups, and literature²⁶ point to the need for improved transboundary water management at the basin scale between Ghana and Burkina Faso. Recurrent flooding events have been linked to upstream dam releases from Burkina Faso; these events breached project-supported dams and resulted in severe impacts on grain and fish farming livelihoods, as well as the physical safety of communities. In 2024, respondents reported that nine individuals from Chache died during a flooding event, and community members did not recall any early warning. Better understanding the interaction between climate change and groundwater is also a priority for IWRM in the region, according to interviewees, in order to determine whether groundwater could be used as an irrigation source for dry season farming.

OUTCOME 2: Climate resilient management of water resources by at least 50 communities in northern Ghana

Outcome 2 has been partially and unevenly sustained: while community-level water infrastructure has persisted in some locations, the institutional and collective management capacities needed to sustain climate-resilient water governance have weakened or dissipated since project closure. Several project-supported water infrastructure assets remain functional and continue to deliver important benefits at community level, while several assets are no longer operational in other communities, as summarized in Table 5. Across all sites visited, the institutions responsible for local-level water management (such as EPA and district authorities) were not consistently involved in project implementation and did not play a key role post-closure. Project implementers did not specify who owned the assets, leading to confusion. Communities generally expected the district authorities to be the owners because they are in charge of community development at the local level, but their engagement has been limited. As a result, Outcome 2 sustainability rests primarily on surviving infrastructure and community coping mechanisms rather than on embedded climate-resilient water management practices. Some buffer zones were effective in supporting the longevity of water resources, while others were not, given that they were planted too far away to have de-siltation effects; still others were planted as woodlots for fuelwood.

²⁶ [https://chrhs.watson.brown.edu/sites/default/files/Reports/Bagre Water Spillage in Ghana_Research Paper.pdf](https://chrhs.watson.brown.edu/sites/default/files/Reports/Bagre%20Water%20Spillage%20in%20Ghana_Research%20Paper.pdf).

Table 5. Water Asset Sustainability by Community

Community	District	Region	Dam / Water Source	Buffer Zone	Borehole(s)
Tampion	Savelugu (now Nanton)	Northern	AF-improved dam		
Zaazi	Savelugu	Northern	Non-AF-improved dam		*
Mognegu I	Zabzugu	Northern	NA, only River		
Sabare 2	Zabzugu	Northern	NA, only River		
Chache (Cheche)	Bole	Savannah	NA, only River		
Kiape (Chiape)	Bole	Savannah	AF-improved dam and new canal		
Tumu	Sissala East	Upper West	Non-AF-improved dam		*
Goli	Nadowli	Upper West	AF-improved dam collapsed *		

Legend:

- High (assets still operational at the time of fieldwork)
- Medium (assets partially operational or operational for most of the time post-closure)
- Low (assets either operational only during implementation or for a very short time post-closure)

* Fieldwork evidence suggested that this infrastructure was not operational at project close, although this was not known prior to community visits by MEST in 2023 or the evaluation team in 2026.

Durability of water assets varied across communities, with boreholes generally better sustained than dams rehabilitated or upgraded through the project. Project-supported dams showed mixed performance. The evaluation team visited three of the 10 dams rehabilitated by the project prior to project completion. Two rehabilitated dams in Tampion and Kiape continue to function, although both leak. Tampion's embankment failed during implementation and reinforcements were made, which proved effective, while Kiape's embankment has held since

rehabilitation prior to closure in 2020.²⁷ In contrast, the dam embankment in Goli broke only one month after construction due to sub-standard design,²⁸ leaving the community worse off than before implementation. Community members reported environmental damage, loss of fish farming investments, and reduced capacity to cope with dry-season uncertainty. These accounts were corroborated by district-level stakeholders, who confirmed that no funds had been allocated for dam repair during implementation (unlike Tampion) since project closure. Pumps and irrigation pipes are also often necessary to move water from dams to garden sites, but the sustainability of these was variable. Irrigation hoses and

Image 4. Functioning Borehole in Kiape, Savannah Region



pumps in Mognegu I and Sabare 2 no longer worked, while these assets were maintained in Zaazi (see also discussion below on dry-season gardening).

Communities also reported increasing pressure on dams from multiple uses, including livestock watering, silt extraction, use of dam water in the dry season after boreholes dried out, and

²⁷ Data gaps complicated assessment in Kiape. The community was not listed among dam rehabilitation sites in official lists, and photos from the final evaluation showed only a canal. However, fieldwork confirmed that both an embankment and a canal were built under the project and continue to function, although both are leaking. Kiape was also the only site where watering cans were mentioned by community respondents.

²⁸ The Goli community had requested enforcing the embankment with iron rods but reported that the contractor was not willing to proceed with this approach. The 2023 MEST visit attributed the collapse to crocodiles.

informal water collection for construction. When boreholes failed, some communities resorted to dam water for domestic consumption as a last option, despite health risks. Notably, dams are rain-fed and vulnerable to drought.

Boreholes were operational in three of eight communities, and partially operational in another three; in the remaining two communities, evidence suggested that the boreholes were not operating at project close, and they stayed non-operational. In Zaazi, for example, one borehole functioned only one week before failing, while another required repeated repairs and has since stopped working. In Mognegu I, boreholes produced water of limited quality, reducing their usefulness, while in other communities, assets performed well but still required frequent repairs. One of Tampion's boreholes is working, while the other is not. Communities attributed borehole failures and declining functionality to a combination of financial constraints for maintenance/repairs, poor siting, and inadequate depth, as discussed further below.²⁹

Fieldwork confirmed that buffer zones remained partially intact in most visited communities.

Tree planting was the primary buffer zone strategy, and trees remained in several communities, especially where fencing at least partially protected buffer zones, such as in Goli and Kiape. In Goli, trees have not been cut despite fencing that was partially broken and the collapse of the dam. Most fences had fallen in Tampion, Tumu, and Sabare 2. In Sabare 2, the broken fence led to encroachment on the buffer zone, with people poaching poles and firewood. In contrast, the team did not observe signs of Tumu or Tampion's buffers being harvested, although part of Tampion's buffer was destroyed by flood at the planting stage.

In Zaazi, a strip of project trees had matured, providing a welcome windbreak and possibly decreasing erosion. Community members credited the AF project with introducing this knowledge, which they

Image 5. Buffer Zone in Sabare 2, Northern Region



found beneficial to keep wind and water erosion in check. Recognizing these benefits, individuals took the initiative to plant trees (including a few mango) on their personal lands, especially those located closer to the dams. Trees were planted in Tumu as a "green fence" and helped the gardens stay intact, but were not intended to buffer water assets. Community members reported that buffer zones in Kiape and Sabare 2 had somewhat decreased siltage and erosion; however, community women's ongoing practice of collecting and selling the silt represents a disincentive to maintain the buffer zones that prevent or reduce siltation. Some community members value the increased income from selling silt more than the buffer zone. Ongoing encroachment into the buffer zone is likely to lead to tree felling and increased siltation.

In many cases, trees had been planted as woodlots, which also improved access to wood and pole supply for the community. In Tumu, woodlots appear to have been the main objective, as

²⁹ Boreholes require regular maintenance and access to spare parts and repairs. Community consultations suggested that quality of siting and construction was also a contributing factor for boreholes breaking down. For example, in some communities, the pipes were far from the water table, which can contribute to stretching and breaking; when pipes break for this reason, adding more pipes is a costly repair.

the planted area was not fenced and the distance from the dam suggested that it was not intended as a buffer zone. No stakeholders were able to speak to sustainable felling levels for these planted areas, and no tree nurseries were found, limiting the potential for re-planting. In Zaazi, some individuals planted trees as woodlots on their own farms after seeing the beneficial effect the project demonstrated. Notably, the evaluation team found almost exclusively drought-resistant acacia species (used for wood, fodder, fuelwood and some medicinal uses), and very few economic trees, contrary to what the final evaluation and Stakeholder B suggested had been planted (e.g., shea butter for agro-processing, mango for fruit and teak for wood). This may be partly explained by the project's tree planting efforts both for buffer zones and woodlots, which were sometimes co-located, as noted by Stakeholder J.

Where water assets remained operational and accessible, especially year-round borehole access, households experienced sustained benefits. In communities such as Sabare 2, Kiape, Chache, and Goli, boreholes were accessible and functional, and households experienced continued benefits in terms of reduced time burden (primarily for women and girls), improved water quality, and more reliable access for

"Now we have good portable water to drink. Our children used to move from school to this town for water but now that we allocated one of the boreholes a little bit closer to the school it has helped in improving education in our community."

— Goli men's focus group

domestic needs. Pumps between the dam and dry-season garden in Zaazi provided inspiration for youth who have transferred the knowledge by now using pumps (borrowed from the garden or bought anew) to their fields. Dams were used for irrigation (where pumps worked and pipes were long enough to reach gardens) and for uses such as livestock watering, or agricultural inputs, occasionally drinking water when boreholes were not enough, or even for construction. Sometimes when water was needed, borehole water was also used for animals, which led to creating the same unhygienic, dirty conditions around the boreholes as the community described in the Tampion dam (i.e., where animals were watered frequently but also defecated at the borehole site). In Mognegu I, as mentioned above, declining functionality meant that boreholes produced salty, muddy, or smelly water, limiting their benefit for community households as such water is not fit for human consumption and only used for construction, watering animals, or mixing agricultural chemicals.

Other working boreholes in Chache and Tumu were considered too far away from settlements or productive sites to be of use. Chache's women must pay for tricycles to transport water over 2km to their communities and the agro-processing center while in Tumu, the abandoned borehole is so far and surrounded by dangerous youth to make it inaccessible to women.

Where buffer zones worked as intended to decrease siltage, the combination of water assets and buffers was powerful when they were sustained. In Kiape, the community validation session confirmed that "Natural measures, including planted trees and vegetated embankments, have remained intact and are effectively supporting water retention while improving soil stability around the boreholes and dam." One community praised the cooling effect of the trees.

In several cases, boreholes dried up during the dry season, precisely when reliable access was most needed. Stress on already fragile systems intensified during dry periods. Water scarcity led communities to introduce water rationing measures, such as locking boreholes for part of the day, limiting quantities collected, or prioritizing vulnerable groups such as elderly people and children. These strategies reflect pragmatic local adaptation, but also signal that systems are operating at or beyond their limits and ill-equipped to respond to increasing climate pressure. In Mognegu I, community members stressed the dry-season insufficiency:

"We still face water scarcity in the dry season. It is usually the dry season that the boreholes develop faults due to high demands on it."

The functionality of water infrastructure has relied largely on ad hoc repairs and community coping rather than sustained management systems or institutional support. Across nearly all communities visited, boreholes required repairs during or after project implementation, with costs frequently borne by communities themselves. Although some communities received guidance to charge user fees for water, most chose not to do so on equity grounds, arguing that water is a basic necessity even for surrounding communities, although they locked the borehole several times a day to ration water. In Tampion and Zaazi, respondents reported no charging of companies for dam water use. In Tampion, individuals were originally charged a small fee, but this practice was stopped for reasons unknown, and the chief has supported "with his own money" in critical moments.

Given the lack of resources, communities sought non-traditional methods for maintenance. In Zaazi, for instance, community members salvaged spare parts from a non-functioning borehole to keep the other AF-funded one operational. While this demonstrates local initiative, it also reflects the far distances to obtain purchasable spare parts, absence of structured maintenance systems, consistent technical support, or partnership arrangements. Communities also employed coping techniques as described above, such as dry-season water rationing.

These challenges were compounded by limited community-level capacity and weak institutional follow-up. Few community members reported receiving training in borehole maintenance. Tampion was an exception, where trained individuals were responsible for maintaining the boreholes and the community contributed financially to repairs via water committees. Unfortunately, capacity weakened after one of the two trained individuals passed away.

Many communities did not know which institution or contractor was responsible for construction or follow-up. Communities like Mognegu I, Sabare 2, and Zaazi also reported that requests to district authorities or the Environmental Protection Agency (EPA) for assistance for larger, more expensive repairs frequently went unanswered, reinforcing the perception that responsibility for infrastructure upkeep had effectively devolved to communities without accompanying support mechanisms.

In Mognegu I, women reported collective local action to maintain boreholes without external support from EPA. In several communities, respondents reported that they were unaware the project had formally closed and continued to wait for promised repairs, spare parts, or upgrades years later—highlighting the absence of clear exit communication and sustainability planning. The evaluation team observed numerous non-functioning boreholes installed by other donors, underscoring a broader systemic challenge in sustaining rural water infrastructure.

Institutional coordination and capacity for climate-resilient water management has not been consistently sustained beyond the project period. The project intended to increase institutional capacity and strengthen coordination between climate adaptation committees, district authorities, and water resource users. Interviews with regional and district officers paint a fragmented picture. One of four officers reported continued participation in community and

Image 6. Damaged water pumping machine in Zaazi, Northern Region



regional adaptation committee meetings, while another described participation in such meetings as being linked to the World Bank's Ghana Sustainable Land and Water Management Project³⁰ that ran from 2014–2020, concurrently with the Adaptation Fund project, making contribution unclear. The remaining officers reported that management committees and other coordination mechanisms had ceased functioning shortly after project closure.

Training delivered during implementation appears to have had limited lasting effect. While some officers recalled participating in project-supported trainings, none reported systematic refresher training or integration of lessons into routine district planning processes. Moreover, the evaluation team lacked access to detailed training curricula or competencies developed, limiting the ability to assess whether institutional capacity knowledge was retained or transferred.

"There wasn't any continuation from the district or allocation of funds from the government to support the continuation of the AF projects."

— Stakeholder I

Consistent with these findings, the evaluation found no overt evidence of linkages between national plans (Outcome 1), district-level planning (Outcome 2), and sustained community-level water management practices (Outcome 2) or livelihood expansion dependent on water (Outcome 3). Beyond community efforts to repair existing boreholes, there was no evidence that Outcome 2 catalyzed new water management collaborations or expanded water resources through district-led or community-driven initiatives. Where additional water investments occurred after project closure, they came through one-off NGO interventions rather than through flagship government programs (e.g., 1V1D, 24-Hour Economy) or district government funding.

OUTCOME 3: Enhanced diversification of livelihoods under climate change by at least 50 communities in northern Ghana

Most climate-resilient livelihood practices were not sustained after project closure, with some variation by livelihoods. Agro-processing sustainability was mixed. In Tumu, agro-processing centers were frequently cited as a positive example, functioning beyond project closure and continuing to provide valuable opportunities for women to generate additional income and avoid outmigration during the dry season. However, in Mognegu I and Kiape, agro-processing equipment could not be fully utilized due to the absence of electricity hookups, rendering facilities largely idle despite the availability of machinery. In Chache and Tumu, agro-processing facilities with strong potential experienced disruptions due to conflict, withdrawal of NGO support, and low compensation for products requiring substantial labor.

Dry-season farming showed weak sustainability, despite the distribution of irrigation pumps. In Goli, for instance, missing or inadequate inputs and the collapse of supporting water infrastructure undermined continued cultivation. Elsewhere, challenges included hoses of incorrect specifications, seasonal water shortages, and a lack of technical guidance to adapt practices when conditions changed.

Image 7. Agro-processing machine in Kiape, Savannah Region



³⁰ <https://projects.worldbank.org/en/projects-operations/project-detail/P098538>.

Beekeeping has not persisted by groups in any location. In Tampion, some beehives are still present but have been abandoned due to lack of personal protective equipment (PPE) and the group capacity to harvest. In Kiape, some individuals still have beehives but are not operating as a group. Reported constraints included a lack of practical training, inadequate or poorly designed PPE, and weak access to markets, as well as unclear harvested honey ownership, limiting incentives for continued engagement.

Fish farming showed the weakest performance and was not sustained in any observed location.³¹ Interviews and field observations point to multiple contributing factors, including insufficient technical training, limited follow-up support, and reliance on water infrastructure that proved unreliable in practice. Men in Tumu men reported a good initial harvest, but fish farming was discontinued afterward because they had no instructions on how to restock fingerlings. In Tampion and Zaazi, fish stocks and equipment were stolen before harvest; the Tampion community also suspects that some fish were stolen. Tampion also experienced a low quality harvest because the fish could not grow well due to muddy water as the dam water level declined in the dry season.³² In Goli, the fish cages were washed away when the dam embankment broke.

Table 6. Livelihood Sustainability by Community

Community	District	Region	Agro-processing	Dry season farming	Fish farming	Beekeeping
Tampion	Savelugu (now Nanton)	Northern	*		*	
Zaazi	Savelugu (now Nanton)	Northern			*	
Mognegu I	Zabzugu	Northern	*			
Sabare 2	Zabzugu	Northern		*		
Chache (Cheche)	Bole	Savannah				
Kiape (Chiape)	Bole	Savannah				
Tumu	Sissala East	Upper West	**		*	
Goli	Nadowli	Upper West		*	*	

Legend:

 High (practices ongoing at the time of fieldwork)

 Medium (practices partially ongoing or ongoing for most of the time post-closure)

 Low (practices only ongoing during implementation or for a very short time post-closure)

* Fieldwork evidence suggested that this livelihood practice was not happening at project close, although this was not known prior to community visits.

** Tumu received two agro-processing units. FGD participants indicated that one had failed prior to project close, while the second one was reporting as partly maintained, hence the inclusion of an asterisk along with a medium rating.

Livelihood activities were largely dependent on improved access to water under Outcomes 1 and 2, and thus sometimes were hindered by the weak sustainability of Outcome 2 water assets. Eleven of the water resource management activities or assets failed during implementation and were not repaired. Section 4.1.2.4 below further explores this linkage between Outcomes 2 and 3.

Sustained livelihoods led to modest income increases among a few; where new livelihoods were not sustained, some community members turned to alternatives. While beehives were functional in Chache and Kiape, proceeds improved a few women's incomes, but the majority had no marked and sustained income improvements. In Mognegu I, householders reported that

³¹ Other communities felt they would have been more successful as they were already fishermen and requested fishing cages from the project, but did not receive them.

³² The community also reported that after the poor harvest, a local NGO removed the fishing materials.

70% of garden produce was initially used for consumption, thus reducing the need to sell other assets for food. However, these early gains were reversed when irrigation systems stopped functioning and access to buyers remained limited. Respondents reported insufficient income to maintain the irrigation pump, leading them to now focus on small livestock rearing during the dry season, including by using the low-quality borehole water for them.

In Zaazi, youth and women expanded irrigation practices by purchasing their own pumps after observing the benefits of project-supported dry-season gardening. However, this expansion was not the norm. In several locations, conditions necessary for increased income and scaling, such as reliable infrastructure, market access, and sustained support, were not put in place.

Village Savings and Loan Associations (VSLAs) emerged as a supporting factor for livelihood-related outcomes.

One of the more durable livelihood-related mechanisms observed during the ex post evaluation was the continuation of VSLAs, particularly among women's groups. VSLAs already existed in most communities, while AF project NGOs helped introduce VSLAs in two communities visited. VSLAs helped households manage income variability, pay school fees, and in some cases finance repairs to water infrastructure. Their continued operation appears less dependent on physical assets and more rooted in social organization and local ownership.

Image 8. Borehole in Mognegu I, repaired using VSLA funds



3.1.2 Emerging, unintended, and maladaptive outcomes

The evaluation team found few emerging outcomes; those that were identified were primarily involved adapting project resources for other purposes. For example, the Mognegu I community repurposed their project-constructed agro-processing building to a junior high school, since the building was well-constructed but did not have electricity to run the machines, which then subsequently disappeared. In Chache, women further diversified their livelihoods by using their honey proceeds to purchase small livestock such as goats. Post-closure, women agro-processor leaders in Tumu filled project implementation gaps by buying missing machines (milling and polishing) and finding experts to teach them how to meet consumer demands along their value-chain. Continued operation is partially at risk, however, because the women do not have assured access to machines, which are housed in a building owned by an individual who is currently allowing community use.

Image 9. Community member collecting dam water in Tampion, Northern Region



A few unintended project outcomes were considered negative or maladaptive, meaning that they have led to unintended negative effects on the environment and/or communities, potentially increasing vulnerability to climate change, exacerbating existing issues, or creating new risks. In a few communities, people are reverting to using unsafe water given insufficient potable supply. For instance, community members are using dam water in Tampion for cooking and even drinking, although cattle are defecating in it in the dry season. In Mognegu I, people are using salty or smelly water from the project borehole for watering their animals when there is no

other alternative. In Goli, the broken embankment destroyed dry season farming in the community, reducing an important income and food source. Changing siltation levels also have multiple implications for community's ability to cope. For instance, women in Sabare 2 are selling the growing siltage that is encroaching on the tree buffer line; as they remove the siltage, they risk expanding the encroachment area. Conversely, in Sabare 2, project activities reduced the amount of silt, which may affect the incomes of women who depended on selling it, although it was not clear by how much.

3.1.3 Factors affecting sustainability

The following section provides a deeper analysis of why outcomes were or were not sustained, drawing on the conditions that were expected to contribute to maintaining adaptation benefits, namely local ownership, capacities, partnerships, and resources.

DESIGN AND IMPLEMENTATION

The design process included local voices, but implementation decisions and constraints still undermined usability and ownership. Stakeholders J and K explained that community consultation drove decisions about what type of water infrastructure would be provided, where it would be located, and access parameters (e.g., livestock should be able to access water points). This design responsiveness aligns with the evaluation's community focus group discussions, highlighting the importance of reliable potable water for daily needs and livestock. Yet, these consultative processes did not fully prevent boreholes being placed far from households or productive sites, which reduced use and willingness to maintain them in some communities. Siting was also constrained by technical considerations (such as dry-season water discharge) and the need to place assets on communal land to avoid private control. Fish farming cages were not given to eager current fishermen but were introduced to new communities linked to dams, an approach that largely failed.

Budget and timing pressures also altered what could be delivered, creating trade-offs that weakened sustainability for livelihood-linked infrastructure. Stakeholders J and L indicated that delays in Adaptation Fund processes and disbursement caused implementation to begin later than originally anticipated, at which point input prices had risen, forcing prioritization decisions about what to deliver within available resources. One clear manifestation was the shift away from planned mechanized boreholes toward manual boreholes to reach more communities. This intentional technical trade-off expanded coverage but reduced the suitability of some assets for irrigation-dependent livelihood activities. Communities' recollections of promised support and delivery of less optimal options also caused them to view the project less positively years after closure.

Image 10. Broken Borehole Handle in Zaazi, Northern Region



Technology choices and uneven quality assurance created operations and maintenance burdens during implementation, leading to early failures and uneven post-project performance. Evidence across sites shows that many assets required repairs during or soon after implementation, and in several cases failed early without effective remedial action. Implementation quality issues also further constrained use, such as a project-constructed agro-processing facility that was structurally unstable. Community reports illustrate a recurring

pattern: where repairs were minor, communities improvised to keep assets functional, but where failures were structural or required technical expertise, functionality declined and sustainability was compromised. Communities were not trained on how to maintain assets.

Image 11. Broken dam embankment and diminishing dam water in Goli, Upper West Region



Examples from specific communities illustrate the sustainability implications. In Tampion, a dam embankment was constructed and fell apart before project closure, but was repaired and continues to function, albeit with leakage. By contrast, in Goli, the embankment collapsed and was not repaired, while Kiape's has mostly remained intact since construction although now both the dam and the canal are leaking. In Zaazi, one borehole functioned only briefly before failing, while another required repeated repairs and has since stopped working (see Box 1). In Mognegu I, the poor quality water produced by boreholes hampered usefulness, while in other communities, assets performed well but still required frequent maintenance. These patterns indicate that inconsistencies in construction quality translated directly into higher operations and maintenance demands that were not matched by sustained technical or institutional support.

Livelihood activities were frequently undermined by insufficient enabling support for capacities and inputs, and this lack of systemic approach hindered sustainability. Evidence from community interviews and field observations shows that many livelihood interventions lacked the complementary inputs and capacities required for sustained use. Beekeeping activities in Tampion, Zaazi, and Chache suffered from insufficient protective equipment, lack of hive stands, and limited practical training, contributing to premature failure in most instances. Fish farming faced similar constraints in Tampion, Zaazi, and Tumu. Communities reported inadequate training on fish propagation and cage management, difficulty accessing inputs such as fingerlings, and losses due to flooding or removal of equipment, resulting in the cessation of activities. Training and inputs were also lacking in several agro-processing and dry season gardening activities. In Goli, community members reported that irrigation materials and other promised inputs for dry-season farming were never provided. In Mognegu I and Kiape, agro-processing facilities were constrained by missing electricity connections and limited operational training, leaving equipment underused despite its availability. Women in Mognegu I explained:

"The AF promised to come back when we got electricity to connect it, but they didn't come back when we had the lights. However, we managed to operate it with a motor. What cause it to fail is that no individual had been trained to operate the agro-processing machines that the AF brought. As a result, the equipment remained unused, which ultimately contributed to its deterioration and breakdown due to prolonged abandonment."

Box 1. Quality shaping usability and sustainability of assets

The evaluation found that the quality, siting, and completeness of project-supported assets strongly shaped whether communities could use them as intended. Even where infrastructure was delivered, weaknesses in construction quality, placement, or follow-on support often limited functionality from the outset or led to early failure, constraining both immediate benefits and longer-term sustainability.

- In **Zaazi**, one borehole failed within the first week and was never repaired despite repeated community requests. A second borehole functioned only partially and required repeated repairs using salvaged parts from the failed unit. Community members reported lacking the technical knowledge and contacts needed to obtain spare parts or request formal repairs, and by 2025 the remaining borehole had also ceased functioning. Despite being located relatively close to town, no follow-up support was provided.
- In **Tumu**, two boreholes were reportedly located approximately three kilometers from the community, making them impractical for daily use and effectively unused, including for agricultural purposes. This highlights how siting decisions, even when technically justified, can significantly reduce actual usability and willingness to maintain assets.
- In **Kiape**, an agro-processing building was reported to be structurally unstable, shaking when machines were operated. Community members eventually stopped using the facility due to safety concerns, demonstrating how poor construction quality can render otherwise valuable investments unusable.
- In **Mognegu I** and **Tampion**, missing or degraded complementary inputs reduced the usefulness of otherwise viable water sources. Communities reported that hoses previously provided for irrigation were no longer available, making it difficult to draw water from dams to gardens. As a result, even where water was accessible, the absence of these connecting inputs limited the viability of associated livelihood activities.
- In **Sabare 2**, irrigation hoses provided by the project were too short to reach water sources. Farmers attempted a workaround by attaching them to old hoses but this was not sufficient to guarantee successful dry-season gardening across the entire community or sustain activities over time. Promises to provide longer water hoses and additional seedlings were not fulfilled and the community now uses the garden only during the rainy season.

Across these cases, asset quality and design issues were compounded by limited follow-up support and weak implementation continuity. The evaluation observed that insufficient time for implementation and learning, lack of provision of necessary or spare parts (e.g. long enough hoses for the irrigation pump) or technical support, and limited communication at project closure (including on who to contact for post-project maintenance support) all contributed to communities being left with incomplete or failing systems. In several locations, communities reported that they were unaware the project had ended and continued to expect assistance years later, underscoring the absence of clear transition and sustainability planning.

Sustainability was also weakened by lack of corrective action during project implementation, which led to unaddressed challenges at closure. Project feedback loops, including through its monitoring and evaluation (M&E) system, were insufficient to identify and address implementation challenges during the project lifecycle. Evidence across communities indicates that implementation challenges were visible during the project period but were not systematically identified and rectified before closure through adaptive management, despite available funds remaining at project close. The evaluation team found that nearly half of livelihoods and water assets had likely failed during or immediately after implementation, which was not reported in the final evaluation. This weakened results at final, which inherently leads to a lower likelihood of sustainability ex-post. The most prominent example was the collapse of the dam embankment in Goli just three months after it was improved, which was not repaired during the remainder of the project.

OWNERSHIP, POWER, AND PARTNERSHIPS

Where communities exercised clear ownership and initiative, some activities were sustained and adapted beyond the life of the project. Community ownership, self-empowerment, and partnerships supported continued use of assets in several sites. In Tumu, one agro-processing center continued operating after project closure because the community took full responsibility for it, paying for additional expertise and investing in additional equipment to complete the value chain. In Mognegu I, women organized to operate milling equipment, despite not receiving formal training, and in Zaazi, communities sustained the dry-season garden through collective use of irrigation equipment (although last year a leafy disease affected the vegetables). In Tampion, the sense of ownership extended beyond the community users to the leadership; the men's group reported that while community members contribute to the repair and maintenance costs of the boreholes through payments made to the water committee, "in some cases, when the situation becomes critical, our chief also supports with his own money."

"We have been maintaining the boreholes by the AF since 2017. We didn't even know the project has ended. What we did was report to the EPA that it was spoilt but they didn't come and we as a community repaired it."

— Sabare 2 Women's Group

Meanwhile, in Kiape and Tumu, community consultations indicated lack of ownership to sustain collective livelihood activities, like dry-season gardening and fish farming, and associated shared assets (e.g., irrigation pump), though some men and women continue to apply project training on gardening on individual plots. These examples demonstrate that where communities perceived assets as their own and had sufficient motivation and organization to act collectively, they could extend project benefits even in the absence of formal support. Also in Tumu, one agro-processing initiative (a mill) continued working while the other failed during implementation, demonstrating that ownership and continuity were not automatic across activities even within the same community context. Seasonality also influenced how communities used functioning assets. Women reported milling maize and soya beans throughout the year when shea nuts were not ready to be picked and using differential pricing for community members versus strangers to sustain operations. Community members explained during the validation and feedback session in Tumu:

"We don't have mouth to even talk of the embankment, it's like 'poge koruu si3 la poge paalaa' which means 'our old wife is far better than the new one we got married to.'"

— Goli resident

"Fish farming, beekeeping, and dry-season farming failed primarily due to lack of ownership and weak group management structures.... and despite recognizing the profitability of certain activities, community members remain reluctant to assume responsibility for managing shared assets."

Contested ownership, elite capture, and unequal power relations undermined sustainability and affected whether benefits were sustained equitably, particularly for shared facilities and group-managed assets. In several communities, ownership and decision-making authority over assets was disputed or unclear, which weakened incentives to contribute labor, fees, or maintenance. In Tumu, for instance, the community validation session concluded that "fish farming, beekeeping, and dry-season farming failed primarily due to lack of ownership and weak group management structures.... and despite recognizing the profitability of certain activities, community members remain reluctant to assume responsibility for managing shared assets."

Image 12. Agro-processing facility in Tampion, Northern Region



Evidence also indicates that project-supported assets were sometimes removed or controlled by actors outside intended user groups, including local elites, implementing partners, or authorities. For example, in Tampion, local district chief executive (DCE) authorities claimed ownership of an agro-processing facility (despite UNDP/MEST/AF project branding on the infrastructure) and wanted participants to pay for its use. A government follow-up visit attributed failure to a combination of faulty machinery and the unwillingness among intended users to pay agreed fees. As a result, the DCE has closed the facility.

Fish cages were also repossessed by an NGO in Tampion, as noted earlier. In Chache, the DCE supported the agro-processing initiative by giving "us an upgraded machine that can crack, and mill the nuts. He also gave us money to re-start and we came together again," after the community had to flee conflict and flooding late 2024 (see Box 2). Yet, the group also reported they sold some shea butter in 2024 "but we have not received any money. Our chief is the head of the agro-processing facility," and he kept it. In Tumu, the agro-processing facility is located in a private home, meaning access is subject to continued permission to enter the house. These dynamics reduced trust and weakened the incentive for communities to maintain collective systems.

Power dynamics also shaped day-to-day management and benefit-sharing. Beekeeping groups reported that leaders controlled revenues (e.g., proceeds from honey sales) without transparent accounting and that, at least in Mognegu I, those harvesting honey did not receive sufficient payment. In Tampion, low engagement in gardening combined with disappearance of key inputs led to decline, and one community member reportedly appropriated a shared water tank for private use after collective management weakened.

"It was deliberate [...] the boreholes needed to be located in communal land; if within the property of a given person or family, then they could claim ownership and control over the borehole."

— Stakeholder J

Notably, the evaluation did not encounter the land tenure conflicts anticipated in earlier project documentation. Instead, evidence suggests that land and trees—particularly buffer zones—were generally treated as communal resources, with prior community consultation helping to reduce resistance and support participation. This reflects a positive outcome of participatory processes, even where other ownership arrangements proved more fragile.

Box 2. Resilience, disruption, and uncertain pathways to recovery in Chache

The experience of Chache illustrates how power relations, partnership dynamics, and external shocks interact to shape both the fragility and resilience of project outcomes. While the project established an agro-processing facility and associated livelihood activities, the community's experience since then has been marked by cycles of support, breakdown, recovery, and disruption, revealing both the potential and limitations of the project approach.

In Chache, the agro-processing facility remained physically functional, and later improvements by another NGO strengthened its potential. However, early efforts to generate income through shea butter production broke down due to weak market arrangements and challenging power dynamics. One woman described the situation:

"We produced 120 bags of shea nut and the aggregator [...] took it. However, after waiting for so many months, they came back and gave each of the group members GH¢ 21. This amount cannot even pay for the cost of the nuts processed much less of the labor invested. This made the group angry and we all quit. The facility was then left without production even though the machines were working. [...] Also, we need the chief to give management of the facility to us the women. We have leaders but the chief still controls everything and there is nothing we can do."

Subsequent interventions highlight both the importance and limitations of partnerships. Support from local government helped restart activities temporarily, and a new NGO later rehabilitated the facility and installed a borehole nearby, addressing a critical constraint in water access. These efforts demonstrate that targeted, well-designed partnerships can restore functionality and create conditions for renewed activity. However, the coexistence of multiple actors with overlapping roles introduced coordination challenges, and community members reported ongoing uncertainty about how these partnerships would evolve.

External shocks significantly disrupted progress. In late 2024, ethnic conflict forced the entire community to flee across the border into Côte d'Ivoire, resulting in loss of assets, interruption of livelihoods, and, tragically, loss of life during displacement. Upon returning, households had limited financial resources to restart production and faced new constraints in accessing markets and inputs. As of 2026, agro-processing activities were only beginning to restart, and benefits from the facility remained limited. During fieldwork, the evaluation team also observed that the IE was actively conducting peacebuilding sensitization activities and supporting the community's recovery from the effects of the conflict.

Despite these challenges, one of the most durable outcomes in Chache has been the VSLA, which enabled women to rebuild after displacement by providing access to savings and credit. Women reported using VSLA funds to meet basic needs and re-establish livelihoods, highlighting the importance of locally owned financial mechanisms that can function independently of physical infrastructure.

Partnerships helped sustain or revive results in a few locations, but follow-on support was uneven and often external to government systems. Communities also described a broader lack of clarity about who "owned" assets after handover (see also below), and who to contact when assets stopped working, leading to abandonment. For example, community members in Sabare 2 reported several successful efforts to repair the water pumping machines but lack of clarity on where and who to seek support for repairs, as well as limited financial resources, led to abandonment of dry-season gardening. Local government officials, such as from district EPA offices, were mostly not engaged during project implementation, and thus, there were no systematic expectations about their support post-closure. In Zaazi, community members sought (but has not yet received) technical support from the Ministry of Agriculture to respond to crop

Image 13. Deteriorated dry-season garden fence in Mognegu I, Northern Region



disease affecting gardening outcomes, and the local government is exploring partnerships to restore boreholes and fences. In Mognegu I, local government facilitated restoration of all boreholes to functioning order, which improved water access for domestic use and supported women's food preparation activities. At the same time, also in Mognegu I, the garden became unused as infrastructure deteriorated, and appeals for government support went unanswered. As one villager said: "the EPA stopped coming, so we also stopped working in the garden."

Some communities also benefitted from new or continuing partnerships with non-governmental actors and

development partners. In Sabare 2, TreeAid established a new garden, building on training provided by the project, and in Chache, SOKO installed a new borehole, upgraded the roof, and added an additional drying area for the functioning agro-processing facility. In Kiape, the United States Agency for International Development (USAID) and European Union (EU) support expanded garden and plantation areas, and a continued partnership with a project-affiliated NGO led to borehole repairs. In Goli, USAID also established mechanized water piping to individual homes in Goli, prior to its closure in 2025. Sustainability was also supported in some cases by additional resources that were not identified in the final evaluations, such as water tanks that the evaluation team found in three communities, including Kiape where there was partial success in dry-season gardening and agro-processing.

Notably, the ex-post found that only a few NGOs that had originally provided livelihood training in the visited communities provided ongoing support to communities post-closure. Despite formal handover letters, many NGOs reported that they were not informed when the project ended, and no evidence was found that NGOs were integrated into sustainability planning processes in visited communities (e.g., to clarify partnerships with NGOs or options for continued support after closure). A few local NGOs (such as Bido, PureTrust, and A Rocha) continue to work in the project communities and possess valuable local knowledge, relationships, and implementation capacity. Their continued presence both serves to provide maintenance advice and monitor and incentivize communities to continue to use the intervention.

WATER ACCESS FOR SUSTAINABILITY OF LIVELIHOODS

Access to usable water emerged as a necessary but not sufficient enabling condition for sustaining water-

dependent livelihoods. By design, Outcome 3 was structurally dependent on Outcome 2: dry-season farming, fish farming, agro-processing, livestock, and other livelihood activities

assumed reliable access to water through boreholes and dams, and infrastructure to move water from the source to gardens. For activities such as dry-season gardening, fish farming, and agro-processing, lack of sufficient or reliable water access directly constrained productivity and sustainability. Respondents in Sabare 2, Tampion, Tumu, and Chache reported insufficient access to irrigation pumps and boreholes for dry-season gardening and agro-processing activities. Sustainability remains highly vulnerable to variation in water availability.

"Boreholes should have been located near the agro-processing facilities to serve both the women and nearby households. Instead, the facilities now incur additional costs to transport water by tricycle, while the boreholes remain."

— Tumu validation group

However, a correlation between project-provided water infrastructure and livelihood sustainability could not be readily established, given variable experiences and the presence of multiple water sources in each community. Communities could not always distinguish between boreholes provided by different actors and sometimes credited EPA or 'unknown NGOs' for boreholes from which they took water after the project-supported ones failed. Communities also showed variable relationships between the provision of project infrastructure and sustainability of livelihood outcomes. In Tampion, for example, dry-season gardening failed despite receiving a water tank, while it thrived in Zaazi where no water tank was provided. Sabare 2 received two water tanks for dry-season gardening but did not sustain gardening, and one tank was appropriated for individual use. Chache did not receive a water tank for agro-processing yet saw moderate sustainability, while Tampion, Mognegu I, and Kiape also did not receive water tanks for agro-processing and experienced low sustainability.

3.1.4 Sustainability rating

The overall sustainability rating is Moderately Unsatisfactory³³ five years after closure, in contrast to the sustainability rating of Likely assigned at final evaluation. Overall, the ex post evaluation found that only some—and sometimes few—adaptation benefits to the environment and communities have been sustained. Most diversified livelihoods were not sustained, due to the need for additional partnerships and capacities, as well as functional water assets to support livelihoods. The most durable benefits stem from select water assets and buffer zones, which continue to support daily household and productive needs. However, these gains remain fragile as water access during the dry season remains insufficient and is unlikely to help households withstand intensifying climate shocks (see next section on climate resilience). A few examples of maladaptation were also identified through ex post fieldwork, as discussed in section 4.1.2 above).

Table 7 summarizes the sustainability ratings by outcome, according to the guidance in the Ex Post-EAI toolkit. This approach assesses the extent to which conditions of sustainability (ownership, capacities, partnerships, and resources) are “sufficient,” as summarized in the table and discussed in more detail in the previous sections.

³³ In the Ex Post EAI toolkit, **Moderately Unsatisfactory** is assigned to projects with the following characteristics: “Only some of the project’s adaptation benefits to the environment and communities persist. Additional resources, partnerships, capacities, and local ownership of activities are needed to sustain positive results. Some of the project outcomes are maladaptive – meaning they have led to unintended negative effects on the environment and/or communities, potentially increasing vulnerability to climate change, exacerbating existing issues, or creating new risks. The Ex Post EAI uses a six point scale: Highly Satisfactory (6), Satisfactory (5), Moderately Satisfactory (4), Moderately Unsatisfactory (3), Unsatisfactory (2), and Highly Unsatisfactory (1).

Table 7. Sustainability Ratings by Outcome

Outcome	Sustainability rating	Summary basis of judgment	Ownership	Capacities	Partnerships	Resources
Outcome 1: Improved basin level management and planning of water resources, taking into account climate change impacts on surface and groundwater sources	Moderately Satisfactory (MS)	- Basin-level IWRM plans and Boards in place for Black Volta River but not Oti River. Some operationalization at basin and sub-basin levels, although no evidence at community level. - Project-established committees are no longer operational.	Black Volta Basin plan and Board still operational and owned by WRC; not sustained in Oti River	Limited evidence but fully functional Black Volta River Basin Board indicates some sustained capacities	Some development partners have emerged to implement Black Volta River Basin IWRM plan	Investment gap is substantial, but emergent partners have brought some resources
Outcome 2: Climate resilient management of water resources by at least 50 communities in northern Ghana	Moderately Unsatisfactory (MU)	- Some boreholes working due to community ownership - Most buffer zones intact and functioning contributing to reduced wind and water erosion - Dam improvements were only partially sustained (2 embankments are leaking and 1 failed) - Some evidence of water retention due to buffer zones and dam embankment	High ownership of assets that were working assets; low ownership of communal assets (e.g., dams) or unrepairable assets, with many flaws (leaks, erosion, broken boreholes). Buffer trees also being cut.	Communities exhibit some but limited capacities for maintenance, especially for boreholes	Some water partnerships with district level environment and agricultural offices in a few communities, but mostly no reliable partners	Dwindling resources, not available for major repairs
Outcome 3: Enhance diversification of livelihoods under climate change by at least 50 communities in northern Ghana	Unsatisfactory (U)	- Most livelihood activities failed, many before project closure - Capacities, partnerships, and resources were largely missing to maintain livelihoods post-closure	Especially for women participating in agro-processing and some VSLAs, ownership good, but other livelihoods weak.	Some capacities for new agro-processing machine uses; low capacities in failed livelihoods	A few partnerships with some new NGOs but very weak sustainability of past NGOs or government partners	Some individuals investing in new pumps, some women in new grinding machines, some in gardening; but few resources allocated overall as many livelihoods were not sustained

3.2 Climate resilience

This section analyzes how sustained adaptation outcomes (including emerging outcomes and maladaptation) have contributed to the resilience of the human–natural system, particularly in the face of climate shocks and stressors. It examines the system’s ability to adapt, absorb, and transform in response to change, using the five resilience characteristics: scale, redundancy, diversity and inclusion, flexibility, and connectedness and feedback loops.

3.2.1 Scale

SCALE refers to the impact on temporal or spatial scale needed for systems to maintain or change function and/or structure in the face of climate effects

Although the project aimed to influence basin and sub-basin climate-resilient water management, the evaluation did not observe any basin-wide or district-scale protective effects implemented in the communities. In a few sites, the buffer areas were large enough to improve ecosystem services; for example, in Kiape, planted trees alongside the pre-existing dam has decreased siltage. In Sabare 2, planted trees have contributed to decreasing Oti river erosion, although erosion has now started to increase in front of the buffer zone compounded by encroachment on the buffer zone due to tree-felling. Benefits are threatened by broken fences and woodcutting for fuelwood and poles. Most buffer zones were not close to dams or rivers, were relatively small in spatial scale (Zaazi), or were positioned to buffer gardens rather than protect water bodies.

The experience with the Tampion dam illustrates the importance of working at system scales to enhance resilience. Project activities focused on embanking one side of the dam in Tampion; since then, silt from farming activities on the other sides has filled the dam, reducing water holding capacity, and availability for domestic and agricultural needs, as well as increasing the flood risk. To try to decrease the siltage, the Chief forbade farming near the dam, forcing farm relocations and limiting the area available for dry season cultivation. The men's group interview adds important resilience context:

"We also planted a buffer along the east side, [but] there was flood that year and most of the strip was washed away. However, some [trees] survived but it is a bit further from the bank of the dam. We still face water retention issues as the water dries up in the dry season. Then it gets muddy when the cattle steps in, the crocodiles have a hard time finding enough water to hide in, and the community cannot use the water anymore. There is lot of siltation from the west side where the bank is rocky and at the north side where we have farmlands. The chief even banned ploughing at the north side so that the siltation can be reduced. The dam can overflow and become so wide in the raining season because only one side is embanked. The other three sides cannot be controlled."

This experience suggests that addressing only part of the water system, and not the intersection of ecosystems and livelihoods, may limit resilience benefits for both human and natural systems.

Image 14. Water pump hose running through dry-season garden in Zaazi, Northern Region



Scaling gains were largely driven by individual initiative and isolated external support. The demonstration effect was effective in Zaazi, for example. Due to the success of the pump in the dry-season garden, Zaazi's youth and women expanded irrigation practices by purchasing their own pumps after observing the benefits of project-supported dry-season gardening. They have continued to use irrigation pumps on their individual fields over the last three years, even now, in the face of steep diesel price increases in Spring 2026. Such demonstration effects were also seen in Zaazi with community members who planted trees after seeing their effect on quality of life due to the cooling effect of tree woodlots. However, these expansions were not the norm. In several locations,

conditions necessary for scaling, such as reliable infrastructure and market access were not in place. The evaluation team also found no evidence of scaling through government initiatives, such as 1 Village 1 Dam or the 24-hour Economy, despite reports of such from district officers. In at least one instance, an NGO partnership (SOKO in Chache) is expected to improve the profitability of agro-processing activities through improvements to the facility infrastructure, including mechanizing the borehole.

Project outcomes were not focused on the temporal scale needed to enhance resilience, such as increasing the speed at which human or natural systems respond to shocks.

3.2.2 Redundancy

REDUNDANCY refers to the contribution to increasing availability of resources, means, or options, or creating new ones, to support climate resilience

Reliable access to water is key for resilience to rainfall variability in rural areas, which has affected project communities in Northern Ghana through series of droughts, floods, and changes in rainfall timing. As large water bodies, dams' water levels are vital for farming, irrigated gardens, cattle, as well as potable water if boreholes dry out. Dams' structural stability and low siltation from surrounding countryside and farms are key to the resilience of communities. Boreholes appear to not be sufficiently deep to consistently reach groundwater and more locationally-specific, reachable by households for only as much as women can head-carry or tricycles can bring in drums and tend to be used more for household needs for drinking water and for cooking, cleaning, and when needed for livelihoods such as agro-processing and watering small stock such as goats and sheep.

Image 15. Community members discuss climate resilience in Chache, Savannah Region



Sustained adaptation outcomes such as boreholes and dams provided communities with access to redundant water sources, although boreholes sometimes dried up during the dry season, limiting resilience benefits. Where they were sustained, boreholes and dams increased the availability of water for communities, and where well-sited, made it easier for community members to access that water. In Goli, Kiape, and Tampion, women use the borehole water to prepare food for sale, and the improved borehole access has reduced the time girls spend fetching water.

Image 16. Functioning borehole in Goli, Upper West Region



As noted earlier, some boreholes dried up during the dry season—indicating a limited ability to withstand increasing climate pressures and contributing to dry-season water scarcity. In response, some communities adopted adaptive coping strategies, such as limiting borehole access for certain groups or reverting to less safe water sources. All communities reported long lines of women from their and nearby communities queuing for water, especially during the dry season, and most communities have had to regulate and ration borehole access when water is in greatest demand. When project-improved water sources failed, communities in Mognegu I, Sabare 2 and Chache relied again on water from the

Black Volta and Oti rivers that bordered their communities, while those in Kiape used water from a dam to one canal (Kiape was the only community given watering cans). Although access to water was rarely continuous or sufficient throughout the year, the availability of multiple sources enabled most households to maintain some level of access, with project investments contributing only partially to this outcome.

Because most livelihood outcomes were not sustained, they minimally contributed to diversifying livelihood practices or increasing income as a means of enhancing resilience to climate risks. Dry season gardens improved food security and nutrition (access to green leafy vegetables) in homes during the short time they were operational,³⁴ but no gardens visited were still producing vegetables at the time of the ex post—hence the contribution to resilience is minimal.

Dry season gardening, fish farming, and honey were the livelihoods that contributed most to increased savings or investments when they were functioning, but most of these practices stopped either during implementation or ex post. During focus group discussions, most community members estimated no additional income due to the project post-closure and/or the time of ex-post—although communities found this estimation challenging given that most livelihoods were no longer operational.

Sustained livelihoods remain highly vulnerable to climate shocks. Climate change and other shocks are adding uncertainty (drought, flooding, erratic rains, new leafy pests), destabilizing already precarious livelihoods and affecting production, according to community seasonal calendars. All

"[The lack of water] was really affecting our livelihoods because when we didn't have the boreholes, we also walked same distance to the river. We spent most of our time as women fetching water with our daughters. Now tricycles are used often. Also, the cost of water treatment has stopped and drinking water is clean and safe."

— Chache women's group

³⁴ In most communities, most of the dry season harvest was consumed at home, rather than sold.

communities visited report having experienced similar climatic shocks in their seasonal calendars, especially the worst recent year of 2023/24's cropping season (see also Box 3 below). Two communities reported that shea nuts have not been growing well due to the climate, limiting the potential for future success in shea butter production.

As a further consequence, project adaptation outcomes had limited influence on reducing reactive and potentially maladaptive coping strategies employed in communities in response to water scarcity. When men are unemployed in the dry season, they turn to distress sales of goats, sheep, and guinea fowl—practices that are continuing and also being employed now by women.³⁵ Project activities also did not provide sufficient livelihood or income benefit to curb seasonal outmigration. Most communities reported continued migration of young men to mines and urban areas,³⁶ reflecting limited increases in income for a small number of individuals still engaged in dry-season gardening and agro-processing. In Goli, women outmigration to work on others' fields reportedly increased due to the lack of dry season farming following the dam collapse. One positive case was identified in Zaazi, where community members reported increased participation of women in farming and decreased outmigration for seasonal labor on other farmers, but these gains are considered fragile given the broader pattern of livelihood activity failure in the community.

Image 17. Women sort groundnuts in Mognegu I, Northern Region



3.2.3 Diversity and inclusion

DIVERSITY & INCLUSION refers to the widening or deepening of the variety of actors and inputs working toward common goals, as well as the extent to which project outcomes support equity and inclusiveness

The project contributed to improving some women's economic activities and access to resources, but five years post-closure, most women remain reliant on non-project income generating activities during the dry season. Some adaption outcomes focused on women's participation, particularly agro-processing, dry-season gardening, and VSLAs. Activities were sometimes perceived as gender specific to and by women. For instance, some women left the fishing or beekeeping groups to join agro-processing and gardening as they noted the new activities did not fit their roles and experience, and they were not trained for the new roles. As one female respondent in Tumu explained: *"I was in the fishing group, but my role was only to be counted as a member. We were not trained. For [us] women, processing grains, cereals, and shea butter comes naturally, so I moved to where I felt comfortable."* Other project activity groups were mixed gender,

³⁵ This practice is seen as potentially maladaptive in Northern Ghana since more livestock use means more stress on water and other resources. See, for example: Madacki et al. (2025).

³⁶ In Northern Ghana, seasonal migration is seen as a risky coping strategy since many youth migrate to support illegal mining and sleep in the open.

contrary to stated intentions at design. For instance, project documents reported that beekeeping targeted women, but ex post fieldwork confirmed that men often participated.

In Mognegu I, women used VSLA savings to pay for borehole repairs, and in Sabare 2 and Tumu, women used these savings for school fees and petty trading. Tumu's successful women's agro-processing group was based on a strong, highly educated female leader. Women explained:

"Women are now the ones benefiting because it is only the agro-processing that is working. They have bought a miller (the project did not include a miller) and so all household flour is milled there at a reduced cost than the private mills. Some women now even operate the machines themselves by learning from the operators that the project introduced to them."

Zaazi reported increased participation of women in farming and decreased outmigration for seasonal labor on other farmers, although these gains are considered fragile given the broader pattern of livelihood activity failure in the community. In Goli, women outmigration reportedly increased due to the lack of dry season farming following the dam collapse.

However, most communities reported that women continued to rely on other, non-project income-raising activities during the dry season. This is significant because women in project areas reported earning about 80 percent of their incomes during this period,³⁷ when household rain-fed farming activities pause and they can pursue their own livelihoods; in contrast, men earn 70 percent of their income in the rainy season. The implication is that the project's focus on diversifying dry season livelihoods had greater potential to benefit women than men (see Box 3 below).

Post-closure, the project outcomes fell short of equity expectations, due to overall sustainability challenges (as discussed earlier) and entrenched gender dynamics. In Sabare 2, the dry season garden was reported as important for

Image 18. Women's focus group discussion in Goli, Upper West Region



women, but has not been sustained. Where

irrigation worked, and before the leafy disease hit last year, youth and women were creating new vegetable gardens at the dam site in Zaazi. Chache's honey harvest helped 4 of 7 women raise small livestock, but the agro-processing for most has not had a large effect on income, given the grain milling has slightly reduced operating costs because women did not have to go to other villages or towns to have their grain milled locally. When new livelihoods were not sustained, women reverted to their previous income generating

*"About 70% of the vegetable harvested from the garden went straight to our kitchens, which was a big win to us because it prevented us from selling other assets to buy some of foodstuffs we needed.... [although] Another issue was the lack of buyers for our vegetables. So, based on all this we could not make enough money to be able to maintain those assets.... When the irrigation pump was working, we were using it to face the dry season, but it's been three years since it last worked. **Now, during dry season, we focus on our livestock (sheep and goats) and use the [low quality] borehole water for them.**"*

— Mognegu I women's group

³⁷ Based on evaluation team seasonal calendar exercise; see table below.

activities, such as livestock or selling labor or firewood. The ex post found instances where sustainable benefits for women were undermined by traditional gender dynamics. For example, in some communities, chiefs or district officials took over agro-processing machines from women's groups post-closure, and in two communities, individual men took over dry-season gardens after the mixed-gender group fell apart, thereby limiting women's ownership.

Box 3. Climate shocks and seasonal livelihoods and food resources

Climate trends and shocks. Farmers reported increasing climate variability and declining predictability in seasonal patterns over the past decade. All communities experienced similar climatic shocks, including during the 2023/24 cropping season, when a mid-season drought prevented crops such as maize from tasseling, leaving them usable only as livestock fodder. Farmers noted that weather events are often localized and may go unreported unless widespread.

Traditionally, planting calendars were more reliable—for example, in Zaazi, May was typically suitable for planting yam and cassava due to consistent rainfall. However, farmers reported that rains are now delayed, with land preparation postponed and expectations shifting to more consistent rainfall beginning in June rather than April or May. Across communities, farmers highlighted growing uncertainty about planting and harvesting times, with one noting: "We used to harvest in October, but now the rains may stop in August, so we harvest more in September."

Crop types are broadly similar across regions, with maize, groundnut, soybean, bambara beans, and okra commonly grown. Yams were reported in the Northern and Savannah Regions but not in the Upper West Region. Despite increasing aridity, most farmers have not yet shifted to more drought-tolerant Sahelian crops such as sorghum or millet.

Livelihood seasonality. Women make 80% of their income in the dry season. Key sources include from picking, processing and selling wild fruits (e.g., shea, dawadawa, mango, tamarind), selling their own labor (e.g., threshing or deshelling groundnuts, or working on others' farm for harvest), or selling firewood. For example, women were deshelling the groundnuts to sell (Goli, Tampion, Zaazi) to be paid in nuts or cash.

In the rainy season, women's income comes from beans or vegetables (peppers, okra, tomatoes) they planted in their husband's farm (men traditionally own the land, and women help provide labor on the farm). As an exception, shea-processing can become 60% of women's income if they process between May–August, during the rainy season, if women can get days off from helping on the family farm (planting, weeding).

Overall, men make 70% of their income from the main crop in rainy season (yam, maize, millet, sorghum, cassava, soya, groundnuts). During the dry season, men's income is primarily from selling livestock or charcoal. In Mognegu I, for example, it is a seasonal strategy for trees to be cut down by community members for firewood and charcoal production. For men, 60% of their incomes came from selling the harvest of the cropping season and 40% from selling livestock, and mostly charcoal.

For more details, see the seasonal calendar from Zaazi in Figure 4 below and for other communities in Annex 6. Zaazi was selected for representativeness across all 8 communities; it shows some reliance on functioning water assets and farming, but also insufficient water and reliance on the only AF-supported garden that was still in use.

Figure 4. Seasonal calendar for cropping, water access and incomes in Zaazi, 2023/2024

Activity/Water Access	2023										2024	
	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb – Mar
Raining season farming	Land preparation by men. It rained some days but was not consistent enough to plant.	The rains should have started. Time to plant yams, cassava, and early corn.	Good month for past 4 years to plant all crops but failed this season.	Irregular rainfall. Crops fell to fruit and were wasted on the field. Stalks were used as firewood or eaten by livestock. For 40 days, it did not rain and by September, the rains had stopped.				Harvesting of failed crops. Groundnut was a little better. Start preparing land by the dam bank for dry season leafy vegetable farming. Mostly sell grains, beans from harvest			Peak of dry season. Leafy vegetables fetch good money. Selling groundnuts can bring gains if you have more.	
Raining season water access	Peak of dry season so more pressure on boreholes. Used more dam water even to drink. Borehole was damaged at this time.	It rained often and community undertook rain harvesting and storing in clay pots, plastic barrels, etc. Used borehole water for drinking and other household purposes.					Harvested and cleaned land of residues to prevent fire.	Dry season farming. Used dam water for irrigation. It was mainly bucket irrigation before AF brought water through pumping machine and water hoses. Most use machine irrigation now.				
Dry season farming	No activities during raining season.							Dry season farming. Leafy vegetables grown and 90% sold as high prices make profits. Food from the rainy season was running out during peak– January through April but prompted to sell to get more money than raining season.				
Dry season water access	Borehole was often damaged. If was not repaired fast, community drank dam water.	Rain water was used more for household needs, borehole water for drinking. Dam water was not used so much during this time; if used, it was for washing, bathing. If boreholes were not repaired, drank dam water.					More dependent on boreholes now for drinking and other household needs. Dam water was used for construction and dry season farming. Community used dam water for everything if the boreholes all had given away due to pressure and inability to repair. Women started to hunt for water and spend most time on water than other activities like dry season farming, creaking seeds, and hoarding firewood.					
Incomes	High incomes for those with crops to sell. Mostly sold livestock to get more money for men.	Mostly from selling some of the harvest from raining season. Incomes from selling crops this period were about 40% as crops were cheaper. Women got about 70% of income from shea nut and processing from May through August. Also, women could sell vegetables that they planted on their household farms. School expenses and household feeding were the highest and priority. Gathered shea nut to sell or process independently from May through August–September, although there was not much shea on the landscape.					Sold some crops from raining season harvest. Sold leafy vegetables to get more money. Women got about 60% income here in January through March. The price of the same crops could increase 100% from January though March. VSLA loans came in handy for those who do not have crops or livestock to sell. VSLA loans helped through these difficult months. Families with a child in secondary/tertiary school faced higher fees and expenses. VSLAs loans mostly were used for school expenses. Men got 60% of their incomes from August when they started to harvest yams, peppers, and okra. January through March was focused on selling livestock, leftover crops, and hunting for men. 40% income was earned this way for men.					
Notes on this season	Community expects to plant yams and cassava as soon as the rains stabilize and are consistent. Some are still preparing the land. May is the good month to plant and they hope it works this year. The disease on the dry season vegetables started two years ago in the AF project garden. They used salvaged seeds and also asked for help from neighbors. They reported to Agricultural officers but no one has come to see it or offer a solution.											

	The leafy vegetable disease started in the AF garden 2 years ago. They community reported to the Agricultural Office. Officers came to take pictures and said they will get back to the community but over 6 months have passed now and they have not come back. Now community members still grow on individual plots. Those who are lucky, their crops escaped the disease before harvest, otherwise people lost all their leafy vegetables.
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Source: Produced by evaluation team based on a seasonal calendar exercise done with the Zaazi community during fieldwork.

3.2.4 Flexibility

FLEXIBILITY refers to the contribution to the system's agility in responding to uncertainty, effectively tackling challenges, and seizing opportunities

The ex post found limited evidence of project adaptation outcomes contributing to the agility of human or ecological systems to respond to uncertainty, effectively tackle challenges, or seize opportunities in the face of climate impacts. This is largely because many outcomes were not sustained; outcomes related to capacities that may help communities bolster flexibility in response to shocks were particularly weak. In Goli, for instance, community members reported that the failure of the dam in Goli negatively impacted their ability to cope with uncertainty.

Still, two notable findings are highlighted:

- **Some communities and individual demonstrated adaptability** in re-purposing some project assets or learning new skills independently to sustain livelihoods. As mentioned earlier, the Mognegu I community have converted their project-constructed agro-processing building to a junior high school. In Tumu, a women's group explained that:
"Nobody amongst us was trained. Some of us learned to operate the mills but we learned it by ourselves from the men who came to operate it for us."
- **VSLAs have proven effective in helping communities respond to uncertainty.** In Tumu, where livelihood outcomes were only moderately sustained, the community validation exercise still confirmed that "the project has significantly enhanced women's resilience, particularly through savings and access to credit for livelihood diversification." In Chache, the community had to evacuate in 2024–25 in response to deadly flooding and civil unrest, and relied on VSLA to help resettle in their community. In the community's own words:
"[The project] set up a VSLA for us. We save money there. [We make] money from different activities like selling dawadawa, shea nut, farming produce, selling labor to other communities to harvest or breaking groundnuts (de-shelling). We sell charcoal, firewood and anything that someone will buy or pay for. So we save money and you take from your savings or take a loan (max GH¢ 1000) for three months. That is what helped us to re-settle back after returning from exile in Ivory Coast."

*"The wild trees that supported the dam were removed where they made the embankment. Then they planted a buffer at the east side where they did not create an embankment. The dam has four banks, only one bank has the embankment... and the most painful aspect was that we took care of these [fish] fingerlings very well and it was almost ready for harvest and the water carried it away....
Our ability to cope with uncertainty is now in the negatives. Now those of us who stay during the dry season have no income. The project was good but it seems the implementation was wrong and we are pleading on [the project implementers] to bring back the contractor to reconstruct our dam for the Goli community."*

— **Goli community**

3.2.5 Connectedness and feedback loops

CONNECTEDNESS & FEEDBACK LOOPS refers to the contribution to communication lines, access to information, or partnerships to respond or adapt to climate impacts

Like flexibility, the ex post found limited evidence of connectedness and feedback loops to enhance climate resilience. Two factors largely explain this outcome. First, such loops were not well established at completion; for instance, communication pathways for local experiences to feed back into sub-basin or basin-level policy processes were not established. Second, interviews indicated that the project did not sufficiently engage local government officials in project design and implementation, nor in handover to ensure partnership (e.g., for maintaining communal infrastructure or enabling market access). The ex post evaluation did not find that any such connectivity emerged as an unintended outcome that could support this resilience characteristic.

Image 19. Community members participate in transect walk in Chache, Savannah Region



4 Conclusions



Caption: Transect walk during field visit in Tumu, Upper West Region.

Since the project ended over five years ago, sustainability of adaptation outcomes has been uneven and generally limited due to weak institutionalization, inconsistent asset performance, and insufficient enabling conditions. While some physical and ecological assets (particularly much-needed boreholes and buffer zones) and isolated livelihood practices persisted, the overall sustainability of outcomes was uneven and frequently fragile. Outcome 2 (water resource management) was partially sustained through surviving infrastructure, but systems for management and maintenance were largely absent and relied on community ingenuity; Outcome 3 (livelihood diversification) was largely unsustained, with most activities failing after (or even during) implementation. Notable successes came from individuals who built on the knowledge shared by the project, such as youth replicating project-demonstrated irrigation practices in their own fields or women using beekeeping income to diversify livelihoods further into small livestock. Overall, however, the durability of benefits depended heavily on a combination of asset quality, accessibility, and community initiative, rather than on sustained institutional, financial, or technical support

systems. These findings imply that sustainability cannot be assumed from infrastructure delivery alone; ownership, capacity, partnership, and resource conditions must be present.

Asset quality, siting, and completeness were decisive factors in determining both immediate use and long-term sustainability. Variations in implementation quality, asset siting, and provision of complementary inputs directly shaped sustainability outcomes. Some infrastructure failures (e.g., dam embankment collapse in Goli, borehole failures, inadequate irrigation systems) occurred early and were not addressed, leading to loss of benefits and, in some cases, worsening conditions relative to baseline. Even where assets remained functional, poor siting (e.g., distant boreholes) and missing inputs (e.g., irrigation hoses, electricity connections) limited usability and incentives for maintenance. Although project implementers saw community consultation as a key strength of the project, some communities expressed disappointment that their voices were not heeded when it came to quality of construction and siting. These findings indicate that implementation quality and completeness are central determinants of sustainability and cannot be treated as secondary considerations.

Weak integration across outcomes limited the project's ability to translate planning, water access, and livelihoods into sustained resilience gains. The project's theory assumed interlinkages between climate-informed IWRM planning at basin and sub-basin levels (Outcome 1), community level water management (Outcome 2), and livelihood diversification (Outcome 3), yet these linkages were not fully realized in practice. Limited evidence was found that basin-level planning informed local decision-making, and no sustained feedback loops connected community experiences to higher-level planning processes. Similarly, some livelihood activities were structurally dependent on water infrastructure, but inconsistent water access undermined their sustainability. These limitations reduced the project's ability to deliver compounded resilience benefits, highlighting a critical gap between design assumptions and implementation realities.

Limited capacity building, weak ownership for shared assets, and insufficient follow-on resources and partnerships undermined sustained use of assets and livelihoods. The evaluation found that capacity building was often insufficient or uneven, limiting communities' ability to maintain assets or continue livelihood activities. In many cases, communities improvised repairs or adapted practices, but lacked access to technical expertise, spare parts, or institutional support. Ownership arrangements for shared assets or group-based livelihoods were frequently unclear or contested, and in some cases affected by power dynamics or elite capture, reducing incentives for collective management. Additionally, the absence of clear sustainability strategies and communication left communities uncertain about responsibilities and where to turn for continued support. These factors collectively weakened sustainability even where initial outcomes showed promise.

The project made limited contributions to long-term climate resilience due to the low sustainability of livelihoods and fragile water systems. Although some improvements in water access and short-term livelihood gains were observed, the limited sustainability of these outcomes constrained their contribution to climate resilience. Most livelihood activities did not persist, reducing their role in diversifying income sources or buffering against climate shocks. Community resilience benefitted from redundant water access sources, but water systems remained vulnerable to seasonal variability, infrastructure failures, and increasing climate pressures—leading some communities to rely on coping strategies such as rationing or reverting to unsafe water sources. As

a result, the project's overall contribution to adaptive resilience was modest and unlikely to withstand intensifying climate variability, highlighting the importance of sustained systemic change rather than short-term gains.

The project objective to enhance the resilience and adaptive capacity of rural communities in northern Ghana to climate impacts on water resources and livelihoods remains highly relevant.

Fieldwork highlighted the climate vulnerability of visited communities, where even a small shock can derail lives and livelihoods. Communities are already employing adaptive coping strategies, such as rationing water access in the dry season, and some are turning to potentially maladaptive practices, such as harvesting silt and consuming unsafe water. Seasonal calendar exercises further emphasized how climate change is altering rainfall patterns, intensifying risks for reliable water access, food security, livelihoods, and extreme events. Identifying and implementing effective and sustainable strategies for enhancing adaptive capacity and climate resilience in the face of these worsening climate impacts remains paramount.

5 Lessons Learned and Recommendations



Caption: Abandoned beehive in Tampion, Northern Region.

This ex post evaluation surfaced important lessons for the design and implementation of future climate adaptation projects to enhance their long-term sustainability and contribution to climate resilience. Recommendations are aimed at (1) the implementing entity (UNDP) and project teams designing and implementing interventions with similar technical components, as well as the Adaptation Fund and other adaptation funders, and (2) the AF-TERG on methods.

5.1 For implementing entities, project teams, the Adaptation Fund, and other adaptation funders

LESSON: High-quality construction, appropriate siting, and provision of complete asset packages are essential preconditions for sustained use and adaptation benefits. Ownership is enhanced when local needs and knowledge are privileged.

Recommendations:

- Strengthen monitoring and quality assurance mechanisms during implementation, such as independent verification of infrastructure to ensure that local contractors provide high-quality construction. Ensure asset packages include all necessary complementary inputs (e.g., good PPE and stands for beekeeping, sufficiently long hoses to pump water into dry-season gardens, electricity access) such that assets are fully functional before project close. Repair assets that fail during the project implementation period.
- Prioritize user-centered siting decisions that balance technical feasibility with community feedback on accessibility and use.

LESSON: Sustained outcomes require sufficient capacity building to generate ownership, clearly defined ownership and benefit rules for shared assets and livelihood groups, and a clear sustainability strategy that engages local partners and identifies continued technical and institutional support beyond project closure. Limited local government participation during the project leads to limited post-project support.

Recommendations:

- Provide sufficient (e.g., longer, more thorough) training periods for communities receiving assets and diversified livelihoods, to ensure they have the knowledge to continue new practices after project close (e.g., how to restock fish ponds, how and when to harvest honey, how to repair equipment).
- Establish ownership rules for shared assets and benefit rules for group-based livelihood activities (e.g., how proceeds will be divided among group members, including community and group leaders). Doing so will set expectations, avoiding benefit capture or asset repossession by elites or more powerful group members.
- Develop a realistic sustainability strategy with support pathways and responsible institutions. Clearly communicate these plans to all communities, including instructions on which partners they can turn to for post-closure needs, such as asset repairs, spare parts, or marketing of products such as honey or shea butter.
- Pursue more deliberate strategies to engage local NGOs with strong community presence and local government institutions from the outset, including with clear roles in project

implementation, monitoring, and sustainability planning. Doing so will enhance the potential that partners provide post-project support.

LESSON: Sustained resilience outcomes require durable livelihood systems and reliable water access that can withstand increasing climate variability. Conceptually interdependent adaptation outcomes—such as climate-resilient IWRM planning, water access, and livelihoods—need explicit operational linkages to translate into sustained resilience.

Recommendations:

- Continue to prioritize climate-resilient design of water infrastructure (e.g., depth, redundancy, drought resilience) and livelihood interventions that are both climate-resilient and economically viable, including market access.
- Design and operationalize clear linkages between planning, infrastructure, and livelihoods, including establishing mechanisms for vertical integration (community–district–basin) and feedback loops to inform adaptive management and enhance resilience.

LESSON: Effective ex post evaluations of sustainability and resilience are predicated on high quality evaluations and the availability of sufficient baseline data.

Recommendations:

- For mid-term evaluations, ensure communities are consulted and that results are shared with funders who provide oversight for adaptive management and remediation plans to achieve intended results, including capacities transfer and asset completion.
- Ensure quality of final evaluations for ex post evaluability, with special attention paid to the evidence basis for evaluation ratings on outcome achievement. To support ex post evaluative research, outcome achievement ratings should reflect sufficient means of verification—drawing on systematic fieldwork rather than based solely on unverified project monitoring results. Ensure that underlying supporting materials are submitted alongside the final evaluation, such as project maps, geolocations of assets, lists of participants and implementing partners, key project outputs, and contact information for implementers and participants consulted.
- Ensure evaluations allocate sufficient time for implementers and evaluators to consolidate learning and establish two-way feedback loops, so that communities can share their views and implementers can share how implementation will be revised (at mid-term) and when project completion and sustainability strategy discussions will be held.

5.2 For the AF-TERG on methods

LESSON: Spending multiple days in each community and relying on a highly qualified, gender-diverse national team to lead fieldwork yields especially rich, nuanced, and candid insights about sustainability, gender, power, and resilience dynamics. Community validation sessions are a valuable exercise to address divergent views, confirm findings, and share learnings. Combining this locally led approach with training sessions led by, and daily debriefs with, the project management team ensures methodological rigor and close adherence to the evaluation objectives. This approach also supports a complementary objective of building local evaluation capacity.

Recommendations:

- Continue to require evaluation teams to collaborate closely with highly qualified national consultants and encourage teams to engage gender-balanced local field assistants to enable more extensive and gender-responsive data collection.
- Develop targeted training materials for fieldwork teams to ensure robust and consistent data collection. These materials could, for example, be developed by simplifying and adapting the existing evaluation team training to the specific project context.
- Provide sufficient resources to enable this locally led approach, which requires more working days to be spent in communities. .
- Add 2–3 sites for counterfactual data gathering with villages who were comparable but did not benefit from the intervention, to gauge their livelihood success and water access.
- If relevant, ensure that field teams receive conflict- and trauma-responsive training before they evaluate regions where conflict or climate-worsened trauma has occurred.

Annexes

Annex 1. List of Consulted Stakeholders

Key Informant Interviews

Organization	Individual	Role	Date
Independent	Antonio Arenas Romero	Lead Evaluator for Final Evaluation	13 January 2026
UNDP	Stephen Kansuk	Project Director	14 January 2026
UNDP	Paolo Dalla Stella	Cluster Head	4 February 2026
Ministry of Environment, Science, and Technology (MEST)	Peter Dery	Director of Environment	13 April 2026
MEST	Mohammed Gyimah	Deputy Director of Environment	29 January 2026
University of Ghana	Sadow Mark Yidana	Professor of Hydrogeology and Provost	4 February 2026
Water Resources Commission (WRC)	Mawuli Lumor	Acting Executive Secretary	21 May 2026
WRC	Joachim Ayiwe Abungba	Principal Basin Officer and Head of the Black Volta Basin	21 May 2026
Environmental Protection Agency (EPA)	Jima Loury	Technical Officer	Late April 2026
EPA	Musa Jafaru	District Officer	Late April 2026
EPA	Fabian Aberinga	Program Officer	Late April 2026
EPA	Wahab Salifu	District Officer	Late April 2026

Fieldwork Consultations

Name of community	Transect walks		Key informant interviews		Focus group discussions		Feedback & validation sessions	
	Male	Female	Male	Female	Male	Female	Male	Female
Mognegu I	8	2	6	1	17	24	2	3
Sabare 2	10	0	2	0	22	5	3	4
Zaazi	12	0	3	0	11	4	20	16
Tampion	2	0	1	0	12	14	4	8
Tumu	2	0	1	1	12	16	8	10
Goli	0	1	1	1	6	5	4	5

Name of community	Transect walks		Key informant interviews		Focus group discussions		Feedback & validation sessions	
	Male	Female	Male	Female	Male	Female	Male	Female
Chache	1	6	1	2	11	12	8	7
Kiape	2	0	2	0	10	22	8	14

Note: Due to significant double counting of participants between focus group discussions (FGDs) and feedback/validation sessions, totals are not displayed.

Annex 2. Project Results Framework

Indicator	Baseline	Target	Sources of verification
Outcome 1: Improved basin level management and planning of water resources taking into account climate change impacts on surface and groundwater sources			
Existence of historical and downscaled climate projections	No downscaled climate projections are in place	Downscaled and historical climate projections available for the White Volta, Black Volta and Oti Basins	Programme progress and technical reports
Revised White Volta management plan	Current plan does not address climate change impacts nor link clearly to community level	Revised White Volta Plan completed and adopted at inter-ministerial level	Programme progress and technical reports
Management plans in the Black Volta and five sub-basins in the White Volta and the Oti basins at ministerial level	No plans are in place	Black Volta and 5 sub-basin plans in the White Volta and the Oti Basins adopted at inter-ministerial level	Programme progress and technical reports
Three regional Climate Change Adaptation Monitoring Committees	There is no committee in place	Regional Climate Change Adaptation Monitoring Committees established in the three target regions	Programme progress and technical reports
Outcome 2: Climate resilient management of water resources by at least 50 communities in northern Ghana			
Number of communities in which management plans have been developed and are being implemented	Management plans are not in place. Lack of coherent and planned water management activities in communities.	50 community water management plans implemented by community institutions with at least 50% representation by women in place by end of programme year 2.	Programme progress and technical reports
Number of operational boreholes, dugouts/dams and rainwater harvesting systems	Communities have limited infrastructure in place for supply and storage of water	100 operational boreholes, benefitting at least 30,000 people (50% of whom should be women) Rainwater harvesting systems in place, providing water supplies to 50 community facilities	Programme progress and technical reports
Number of operational community scale irrigation systems installed	Very few communities have effective irrigation systems in place	50 operational irrigation systems, benefitting at least 2,500 farmers	Programme progress and technical reports
Outcome 3: Enhanced diversification of livelihoods under climate change by at least 50 communities in northern Ghana			
Number of operational community fish farms established	Few communities benefit from community fish farms	20 community fish farms established, benefitting at least 10,000 people (50% of whom should be women)	Programme progress and technical reports
Number of tree nurseries/wood lots established	Few communities benefit from community managed tree nurseries and wood lots, nor from bee keeping activities	40 community tree nurseries and wood lots, incorporating bee keeping, established	Programme progress and technical reports

Indicator	Baseline	Target	Sources of verification
Number of dry season gardening schemes for women established	Few communities benefit from effective dry season gardening	50 dry season gardening schemes for women established, directly benefitting at least 1,000 women	Programme progress and technical reports
Number of women led agricultural product processing schemes established	Few communities benefit from agricultural product processing	40 community level women led agricultural product (shea butter or honey) processing schemes established, directly benefitting at least 1,200 women	Programme progress and technical reports
Household income	More than 50% of the households in the target communities have income levels below the poverty line	At least 50% of the households in the target communities increase their income by 30% by the end of the project	Monitoring reports

Annex 3. List of Documents Consulted

Project Design and Progress Documentation

Project Document (Project/Programme Proposal), 2015.

Project Performance Report 1, 2017

Mid-Term Evaluation, 2018

Project Performance Report 2, 2018

Project Performance Report 3, 2019

Final Evaluation, 2021

Project-Related Documents Provided by Stakeholders

Adaptation Fund. 2017. A success story on the provision of water to the Zabugu Kpalugu Community. UNDP.

GPS Locations of Dams and Boreholes, provided by MEST in January 2026

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Annex 4. Evaluation Matrix

COMPONENT / OUTCOME/ OUTPUT	INDICATORS & TARGETS	FINAL EVALUATION INFORMATION		EVALUATION QUESTIONS (EQS) BY OUTCOMES with DATA SOURCE:		
		Actual	Data Source(s)	EQ1: Have the project outcomes been sustained since completion?	EQ2: Which factors have contributed towards – or detracted from – sustaining the project’s adaptation outcomes over time?	EQ3: How do the sustained outcomes contribute to local resilience?
Outcome 1: Improved basin level management and planning of water resources, taking into account climate change impacts on surface and groundwater sources						
IMPLICIT: Evidence of the use of the policy and planning (Outcome 1) to inform local water management & conservation (Outcome 2) ³⁸						
Output 1.1: Climate change historical data and future projections generated for the White Volta, Black Volta and Oti basins	Downscaled and historical climate projections available for the White Volta, Black Volta and Oti Basins	Historical and downscaled climate projections established	MTE Report / Project MTE Report / PPR- 3 (2019); Project Annual Reports including 2020 Annual Report_Draft), /Physical Progress Report (Annex 9) /Project Documentation; Project documentation and publications at MEST-AF website	Evidence of the continued generation of the policy and planning projections (Outcome 1) by the GoG for the White Volta, Black Volta and Oti Basins and sub-basin plans. Verification through technical reports as provided by GoG and KIIs w/GoG	Evidence of partnerships between national and local actors and resources allocated to producing the projections, disseminating them and meetings held, as evidence of the factors (driving) sustainability. Any evidence of trainings of new members of those in GoG at national and district level doing such coordination would show capacities were sustained Evidence through the survey and KII with GoG at national, and regional levels	Evidence of use of climate projections to inform water basin planning and coordination at transboundary, basin, and local levels. KIIs with GoG will probe for this and better understand why.

³⁸ In the design documents an implicit assumption was that the Outcome 1 planning and policy would inform and shape local water management in the local communities of the basins, but there was no data collected on the use of Outcome 1 locally.

COMPONENT / OUTCOME / OUTPUT	INDICATORS & TARGETS	FINAL EVALUATION INFORMATION		EVALUATION QUESTIONS (EQS) BY OUTCOMES with DATA SOURCE:		
		Actual	Data Source(s)	EQ1: Have the project outcomes been sustained since completion?	EQ2: Which factors have contributed towards – or detracted from – sustaining the project's adaptation outcomes over time?	EQ3: How do the sustained outcomes contribute to local resilience?
Output 1.2: White Volta management and investment plans comprehensively reviewed to take into account climate change impacts	Revised White Volta Plan complete and adopted at inter-ministerial level	The White Volta Management and Investment Plans have been developed under Water Climate Programme and Development Programme (WACDEP) project which was implemented by the Water Resource Commission and funded by DANIDA. The project obtained a copy of the report which was used to inform other interventions.	Same as above	Evidence of Outcome 1 planning and water coordination at the district level and that has informed local water management (Outcome 2). Verified through KIIs and survey feedback from GoG and UNDP and NGOs and local communities during fieldwork Evidence would be checking online for technical reports and as provided by GoG and KIIs w/GoG since 2020	As above, drivers such as Partnerships would be examined between national and local actors and Resources continuing to be allocated to producing the investment plans and if they were funded³⁹ disseminating them and meetings being held would be evidence of the factors (driving) sustainability. Further, any evidence of trainings of new members of those in GoG at national and district level doing such coordination would show capacities were sustained, Evidence through the survey and KIIs with GoG (especially WACDEP and WRC staff) at national, regional and district levels	As above, KIIs on whether there is evidence of these investment plans affecting White Volta management and ecosystems in the basin. Survey input and Kii interviews with GoG including WACDEP and WRC staff

COMPONENT / OUTCOME / OUTPUT	INDICATORS & TARGETS	FINAL EVALUATION INFORMATION		EVALUATION QUESTIONS (EQS) BY OUTCOMES with DATA SOURCE:		
		Actual	Data Source(s)	EQ1: Have the project outcomes been sustained since completion?	EQ2: Which factors have contributed towards – or detracted from – sustaining the project's adaptation outcomes over time?	EQ3: How do the sustained outcomes contribute to local resilience?
Output 1.3: Climate smart water management plans designed for the Black Volta and five sub-basins in the White Volta and the Oti River basins are adopted	Management plans in the Black Volta and five sub-basins in the White Volta and the Oti basins adopted at ministerial level	The water management and investment plans for the Black Volta and Oti river basins have been finalized and validated. The implementation of these plans is expected to result in improved water resource management and long-term planning to effectively address the underlying drivers of water resource	Same as above	Evidence of Outcome 1 planning and water coordination at the district level and that has informed local water management (Outcome 2). Verified through KIIs and survey feedback from GoG and UNDP and NGOs and local communities during fieldwork Evidence would be checking online for technical reports and as provided by GoG and KIIs w/GoG ⁴⁰ since 2020.	Evidence of drivers such as partnerships would be examined between national and local actors, and resources continuing to be allocated to implement the management and investment plans; if they were funded, ⁴¹ budget allocations and planning activities would be evidence of the factors (driving) sustainability. Further, any evidence of trainings of new members of those in GoG at national and district level doing such coordination would show capacities were sustained. Evidence through the survey and KIIs with GoG (especially WACDEP and WRC staff) at national, regional and district levels	KIIs on whether there is evidence of these plans affecting climate resilient basin management and investment, which is key for ecosystem resilience and local resilient to climate risks and shocks. KIIs on the impact of illegal gold mining on siltage and water quality. KIIs on linkages between basin and sub-basin level planning. Survey input and KII interviews with GoG including WACDEP and WRC staff

⁴⁰ Clarity is needed on the sub-basins, and which sub-basin committees were supported as names of the sub-basins varied in the TE. In the TE, five sub-basins committees were identified, namely, Noubiel, Dapola, Bamboi, Bui and Vonkoro for the Black Volta basin, although elsewhere in the TE the first two were named (Dapola subbasin (Black Volta); Bui subbasin (Black Volta)), along with two new ones: Gambaga subbasin (White Volta) and Nasia subbasin (White Volta). In January 2026, the ex post team received 2018 basin plans for the Black Volta and Oti basin and the Bui, Dapola, Gambaga and Nasia sub-basin plans.

⁴¹ There was no data in the TE confirming funding of these investment plans in 2020. Retrospective KIIs would be sought about evidence of funding since 2016.

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		Actual	Data Source(s)	EQ1: Have the project outcomes been sustained since completion?	EQ2: Which factors have contributed towards – or detracted from – sustaining the project's adaptation outcomes over time?	EQ3: How do the sustained outcomes contribute to local resilience?
Output 1.4: National, Regional, District and Community based Climate Change Adaptation Monitoring Committees established/adopted and strengthened (as envisioned by the National Climate Change Adaptation Strategy) in the three target regions	Three regional Climate Change Adaptation Monitoring Committees	The Regional, District and Community based Climate Change Adaptation Monitoring Committees have been established. Three regional training meetings, 10 districts level meetings and 50 community level engagements were completed. These trainings are expected to be done yearly.	Same as above	Evidence of continued committee functioning since 2020, and whether committee decisions may have led to change in Ghana's preparedness and resilience to climate shocks which happen annually (droughts and floods) in Northern Ghana during implementation and after the project closed. Evidence would be checking online for technical reports and KIIs would be sought with WACDEP and WRC and with Regional GoG staff at the three regions where fieldwork would be concentrated through calls or logistics visits pre-fieldwork.	Partnerships would be examined between national, regional, district and community-based Climate Change Adaptation monitoring committees Evidence of resources continuing to be allocated to meetings being held would be evidence of the factors (driving) sustainability. Further, any evidence of regional trainings continuing annually at national, district and local levels doing such coordination would show capacities were sustained. Evidence through the survey and KIIs with GoG at national, regional and district levels	Evidence through KIIs with GoG will probe to better understand how these committees could contribute to local resilience strengthening

COMPONENT / OUTCOME / OUTPUT	INDICATORS & TARGETS	FINAL EVALUATION INFORMATION		EVALUATION QUESTIONS (EQS) BY OUTCOMES with DATA SOURCE:		
		Actual	Data Source(s)	EQ1: Have the project outcomes been sustained since completion?	EQ2: Which factors have contributed towards – or detracted from – sustaining the project's adaptation outcomes over time?	EQ3: How do the sustained outcomes contribute to local resilience?
Outcome 2: Climate resilient management of water resources by at least 50 communities in northern Ghana						
Output 2.1: Climate responsive community water supply and management plans designed for 10 districts in northern Ghana	50 community water management plans implemented by community institutions with at least 50% representation by women in place by end of programme year 2.	This indicator was not achieved in time. But at the end of 2019, 4 sub-basin plans contained over 50 communities. No data available about the representation by women. WRC carried out training workshops within river basin catchment areas to educate the communities on water resources management issues relating to avoiding deforestation activities and illegal mining that	MTE Report / PPR- 3 (2019); Project Annual Reports including 2020 Annual Report_Draft, Physical Progress Report (Annex 9)/ Project Documentation; Project documentation and publications at MEST-AF website https://mesti.gov.gh/adaptationfund/ (https://mesti.gov.gh/adaptationfund/documents/communities)	Water supply and management plans at the community level were not evaluated at final evaluation in terms of use; no evidence in the final evaluation that Outcome 1 influenced or was influenced by these climate responsive community water supply and management plans Verification through technical reports as provided by GoG and KIIs w/GoG as well as through survey data and FGD and KIIs in communities probing for implementation of these plans and how they were used at the community, or even district levels, as well as evidence of community-level awareness of climate risks and how to address them in water management	Partnerships would be examined between district and local actors, and evidence of resources continuing to be allocated to implement the plans and meetings being held would be evidence of the factors (driving) sustainability. Use of these plans would be a mark of local ownership, and any absorption of new committee members (assuming natural attrition) would be a sign of both capacities to implement these plans and manage water. Evidence through KIIs with GoG and local FGD and KIIs in communities	Evidence that implementation of community water supply and management plans and changes in local behavior as a result of education on water resource management has led to local resilience Evidence from KIIs with GoG and local FGD and KIIs in communities

COMPONENT / OUTCOME / OUTPUT	INDICATORS & TARGETS	FINAL EVALUATION INFORMATION		EVALUATION QUESTIONS (EQS) BY OUTCOMES with DATA SOURCE:		
		Actual	Data Source(s)	EQ1: Have the project outcomes been sustained since completion?	EQ2: Which factors have contributed towards – or detracted from – sustaining the project's adaptation outcomes over time?	EQ3: How do the sustained outcomes contribute to local resilience?
		exacerbate climate impacts and vulnerabilities				
2.2.1: Number of operational borehole systems	100 boreholes were constructed and benefiting at least 30,000 people (60% of whom should be women).	145 boreholes were constructed and the community have full ownership of the boreholes and have started making monthly financial contributions towards	Same as above	Verification of these assets will be through community transect walks and KIIs about how they have been maintained (what funding, labor, technical expertise)	Evidence of resources and capacities for operations and maintenance ex-post and potential partnerships with local government agencies, NGOs, private sector, and other development partners; evidence of resources through locally led VSLAs or other community financing Evidence that community or farmer conflict (e.g., envy, resistance), or land tenure issues, may have detracted from sustainability Evidence through KIIs and local FGDs	Evidence of sufficient and continuous water access for domestic consumption and agricultural use such as for dry season gardening. Evidence that water access is improved during the dry season and provides a redundant source. Evidence that access to the water source is equitable and inclusive. Evidence from fieldwork FGD and transect walks with KIIs

COMPONENT / OUTCOME / OUTPUT	INDICATORS & TARGETS	FINAL EVALUATION INFORMATION		EVALUATION QUESTIONS (EQS) BY OUTCOMES with DATA SOURCE:		
		Actual	Data Source(s)	EQ1: Have the project outcomes been sustained since completion?	EQ2: Which factors have contributed towards – or detracted from – sustaining the project's adaptation outcomes over time?	EQ3: How do the sustained outcomes contribute to local resilience?
		the repairs and maintenance of the boreholes without relying on central government support.				based on operability.
Indicator 2.2.2: Number of operational dugouts (which are dam) systems	50 dams/dugouts serving as rainwater for harvesting and water storage systems in place, providing water supplies to 50 community facilities	10 dams were successfully rehabilitated under phase 1; and 5 additional will be completed by March 2021. This brings to a total of 15 dams that would be rehabilitated under the project.				
2.3: Number of operational community scale irrigation systems installed	30 operational irrigation systems	40 small irrigation systems, one each in 40 communities. Final evaluation states: "given the				

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		Actual	Data Source(s)	EQ1: Have the project outcomes been sustained since completion?	EQ2: Which factors have contributed towards – or detracted from – sustaining the project's adaptation outcomes over time?	EQ3: How do the sustained outcomes contribute to local resilience?
		absence of the revised planning of this outcome need to be analyzed carefully because there is no evidence provided by the team that the quantitative targets (50 irrigation systems) will be achieved on time despite the delays."				
2.4: Measures for water conservation under climate impacts implemented	30 buffer zones with fence created with effective water catchment/riverbank re-afforestation schemes to reduce siltation and	30 Buffer zones have been created. Over all 44,000 tree seedlings have been planted in 30 communities which were designated for woodlots/ plantations. These tree	Same as above	Evidence of vegetated buffer zones and surviving trees Verification of these trees and buffers zones will be through community transect walks and KIIs about how they have been maintained	Evidence of ownership of buffer zones through community benefit from economically beneficial trees (e.g., mango, teak) and through upkeep and respect for fencing and fire belts Resources and capacities to maintain buffer zones and fire belts were not part of the trainings mentioned in the final evaluation or other documentation. Nonetheless, the ex post will explore how resources and capacities have affected sustainability. Verification of these trees and any fire belts will be through community transect walks and KIIs about how they have been maintained	Evidence of improved ecosystem functioning through buffer zone sustainability Verification of these buffer zones (if found), and any fire belts will be through community transect walks and KIIs about how they have been maintained

COMPONENT / OUTCOME / OUTPUT	INDICATORS & TARGETS	FINAL EVALUATION INFORMATION		EVALUATION QUESTIONS (EQS) BY OUTCOMES with DATA SOURCE:		
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	evaporation losses as water conservation measures	planting will among others are secured from bush fires, encroachment and deforestation by farmers and livestock to reduce siltation in the watershed.				
NOTE: Output Indicator 2.5 and 3.5: Learning platforms on systems for integrating climate change- related risks into community management of water resources and livelihood activities in northern Ghana institutional in 10 districts will not be covered by the ex post. One video, photobook and newsletter were produced in 2017, making it outside of the evaluable 7 years.						
Outcome 3: Enhanced diversification of livelihoods under climate change by at least 50 communities in northern Ghana						
3.2.1: Number of dry season gardening schemes for women established	50 dry season gardening schemes for women established, directly benefitting at least 1,000 women	40 dry season gardening schemes for women established	MTE Report / PPR- 3 (2019); Project Annual Reports including 2020 Annual Report_Draft, /Physical Progress Report (Annex 9)/ Project Document	Evidence that dry gardening schemes continue to be implemented Verification through survey data and FGD and KIIs in communities probing for continued viability of these gardens. To the degree possible, communities will be asked to rank the livelihoods they participated in, probing for female representation and asking them to rate the extent to which food crops harvested were produced,	Partnerships within or outside of communities will be examined, and resources continuing to be allocated maintaining water sources and inputs for dry season gardens (e.g. seeds, fencing, tools including pipes and watering cans). Continued self-funding and gardening would be evidence of ownership. Evidence of government support through flagship programs, through KIIs at district level Evidence through survey responses and local transect walks and FGD and KIIs in communities	Evidence that dry season gardening has contributed to increased food security and/or income, and that income has been sufficient to enable households to cope with climate impacts Evidence that dry season gardening has contributed to reduced youth seasonal migration Evidence that benefits from dry season garden are equitable and inclusive Evidence through transect

COMPONENT / OUTCOME / OUTPUT	INDICATORS & TARGETS	FINAL EVALUATION INFORMATION		EVALUATION QUESTIONS (EQS) BY OUTCOMES with DATA SOURCE:		
		Actual	Data Source(s)	EQ1: Have the project outcomes been sustained since completion?	EQ2: Which factors have contributed towards – or detracted from – sustaining the project's adaptation outcomes over time?	EQ3: How do the sustained outcomes contribute to local resilience?
			ation; Project documentation and publications at MEST-AF website https://mest.gov.gh/adaptationfund/ (https://mest.gov.gh/adaptationfund/documents/communities)	consumed, sold, and what assets could have been purchased as investments or used differently. Evidence that new water supply infrastructure (Outcome 2) is sufficient and continuous for dry season gardening. KILs will be done during transect walks to explore whether the presence of improved water sources is a support and the absence of water sources is a barrier, or probe whether improved water sources that are oversubscribed or too distant (given land tenure issues the final evaluation noted) are no longer sufficient for gardening.		walks, FGD and KILs in communities.
3.2.2: Number of women-led agricultural product processing schemes established	40 community tree nurseries and woodlots, incorporating beekeeping, established	42 beekeeping schemes established in Phase I and 8 additional in Phase II, bringing the total to 50 communities (and Additional 25% communities benefitted from the	Same as above	Evidence that livelihood activities continue to be implemented Verification of these assets will be through community transect walks and KILs about how they have been maintained and, like the gardening, how many women participated and how the honey was produced, consumed, sold, and what assets could have been purchased as investments and if the hives have been	Resources and capacities are vital for operations and maintenance ex-post and potential partnerships regarding the honey value-chain will be explored. Ownership will be explored through how many women (vs men) still invest resources and labor into beekeeping Evidence through survey responses and local transect walks and FGD and KILs in communities	Evidence that livelihood activities have contributed to increased food security and/or income, and that income has been sufficient to enable households to cope with climate impacts Evidence that benefits are equitable and inclusive Evidence through transect walks, FGD and KILs in communities.

COMPONENT / OUTCOME / OUTPUT	INDICATORS & TARGETS	FINAL EVALUATION INFORMATION		EVALUATION QUESTIONS (EQS) BY OUTCOMES with DATA SOURCE:		
		Actual	Data Source(s)	EQ1: Have the project outcomes been sustained since completion?	EQ2: Which factors have contributed towards – or detracted from – sustaining the project's adaptation outcomes over time?	EQ3: How do the sustained outcomes contribute to local resilience?
		bee keeping schemes along the honey production value-chain, but Women want increased quota in beekeeping). Final evaluation also noted issues: PPEs are not sufficient (One per group). Lack of clear accounting and profit-sharing regimes by members of the and different groups in relation to their harvest. Colonization of beehives low in concrete hives compared		maintained.		

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		to wooden. Requesting replacement of concrete hives. Harvesting being done by other trainers, not beneficiaries, raising the question of insufficient training on harvesting techniques. In some communities, they would have preferred livestock to beekeeping because the men dominate the bee keeping. (low involvement not desirable)				
3.2.3: Number of women led agricultural	40 community level women led agricultural	24 community level women-led agricultural product	Same as above	Evidence that agro-processing facilities and associated equipment are still functioning and that communities are still processing and selling	Evidence of sufficient resources and capacities for operations and maintenance ex-post; evidence of partnerships with NGOs, private sector, or other partners to sustain benefits, particularly for value-chains (e.g., transport was mentioned as a barrier to market access).	Evidence that livelihood activities have contributed to increased food security and/or income, and that income has been sufficient to enable households to cope with

COMPONENT / OUTCOME / OUTPUT	INDICATORS & TARGETS	FINAL EVALUATION INFORMATION		EVALUATION QUESTIONS (EQS) BY OUTCOMES with DATA SOURCE:		
		Actual	Data Source(s)	EQ1: Have the project outcomes been sustained since completion?	EQ2: Which factors have contributed towards – or detracted from – sustaining the project's adaptation outcomes over time?	EQ3: How do the sustained outcomes contribute to local resilience?
Local agro-processing schemes established	Local agro-processing schemes established	(shea butter, groundnut and baobab) processing schemes established, primarily with women		agricultural products Verification of the facilities still being accessible to women and successful will be done via the survey, transect walks and KIIs	Evidence of government support through flagship programs, through KIIs at district level Survey will confirm operational agro-processing, and the fieldwork team will verify the presence of the machines and any maintenance in 2026 through transect walks and KIIs	climate impacts Evidence that benefits are equitable and inclusive Evidence that agro-processing is not over-demanding electricity and water resources Village-level transect walks and KIIs will confirm any effect (positive via income or negative via over-use of water)
Indicator 3.3: Community tree nurseries and wood lots established for climate risk management in 40 communities	40 community tree nurseries and wood lots, incorporating bee keeping, established	25 tree nurseries established benefiting over 400 direct beneficiaries in tree seedling establishment and marketing The final evaluation reports that the: overall performance of the community tree nurseries sector did not meet expectations due to	Same as above	Given poor performance, related outcomes will be de-emphasized. Evidence of tree nurseries still operational and generating income for communities	Evidence of ownership, resources, partnership, and capacities to sustain tree nurseries	Evidence that tree nurseries have contributed to increased income, and that income has been sufficient to enable households to cope with climate impacts Verification of these trees in the ecosystem will be through FGD, community transect walks and KIIs about how they have been maintained (what funding, labor, technical expertise). Given droughts and floods that have been climate shocks, the viability of trees will be examined for their effect on ecosystem resilience

COMPONENT / OUTCOME / OUTPUT	INDICATORS & TARGETS	FINAL EVALUATION INFORMATION		EVALUATION QUESTIONS (EQS) BY OUTCOMES with DATA SOURCE:		
		Actual	Data Source(s)	EQ1: Have the project outcomes been sustained since completion?	EQ2: Which factors have contributed towards – or detracted from – sustaining the project's adaptation outcomes over time?	EQ3: How do the sustained outcomes contribute to local resilience?
		poor market, and some seedlings have been destroyed due to flooding.				
Indicator 3.4 Number of operational community fish farms established.	20 community fish farms established	A total of 39 Fish farms in rehabilitated dams/dugouts have been established in 23 Communities. Some theft and loss of fish cages reported at final evaluation.	Same as above	Evidence of fish cages still in use and operational in dams/dugouts Verification of these fish farms survival through community transect walks and KIIs, especially in Tampion where there was flood damage, and theft of the cages will be done in communities and how they have been maintained will supplement the survey which will confirm if funding was taken from trees to fish farming and how the fish farms are surviving.	Evidence of fully functional dams/dugouts (e.g., no issues with siltation or water quality) Evidence of capacities and resources for maintenance and for post-harvest fish storage and market access. Evidence of continued theft or arson as a challenge to ownership. Verification through survey and KIIs along with transect walks and community rankings of livelihoods	Evidence that fish farming activities have contributed to increased food security and/or income, and that income has been sufficient to enable households to cope with climate impacts Evidence that benefits are equitable and inclusive Evidence of increase in stock/cages by participants. Scale-up or adoption by non-project beneficiaries could speak to sustainability, and can be asked about in the sites, especially those with dams/dugouts in the surrounding areas.
NOTE: Indicator 3.2.4: Household income and the econometric tool was never developed. The final evaluation states: "This indicator has been postponed due to the delays on the effective launching of livelihood related activities." The ex post evaluation will pursue a qualitative ranking of how income was used, but this outcome will not be covered by the ex-post.						

COMPONENT / OUTCOME/ OUTPUT	INDICATORS & TARGETS	FINAL EVALUATION INFORMATION		EVALUATION QUESTIONS (EQS) BY OUTCOMES with DATA SOURCE:		
		Actual	Data Source(s)	EQ1: Have the project outcomes been sustained since completion?	EQ2: Which factors have contributed towards – or detracted from – sustaining the project's adaptation outcomes over time?	EQ3: How do the sustained outcomes contribute to local resilience?

Annex 5. Survey Results Analysis

The evaluation conducted an online survey of non-governmental organizations (NGOs) involved in the implementation of project-supported livelihoods activities. The survey collected NGO perspectives on the durability of project results through questions about continuation of livelihoods activities and use of water assets. A key objective of the survey was to gather insights from a wider set of communities beyond the eight sites visited during fieldwork.

In total, **12 complete responses were received** from the 46 NGOs contacted. Of these, four responses were given by NGOs operating in communities visited by the evaluation team (Sabare 2, Kiape, Chache, and Mognegu I), while the remaining responses corresponded to communities not visited during fieldwork. One response was received from a fifth fieldwork community (Zaazi) but it was incomplete and therefore excluded from the analysis.

Unfortunately, the evaluation found that **the survey data lacked sufficient reliability and internal consistency to support analysis**. Across the four communities visited, survey responses frequently contradicted field findings or reflected inaccurate understanding of project activities and outcomes.

- **Sabare 2:** Two responses were received. One incorrectly reported that dry-season gardening had continued among most participants and referenced solar-powered pumps that were not part of the project, suggesting confusion with other interventions. The second response more accurately identified key barriers (e.g., lack of replacement hoses and pumps, and absence of livelihood continuation), but inconsistencies between the two responses diminished trust in their reliability, consequently limited utility.
- **Kiape:** The respondent reported limited knowledge of most project livelihoods except beekeeping, which they indicated continued widely. Fieldwork found that only limited beekeeping activity persisted. The NGO did correctly identify some contextual barriers (e.g., climate variability, road access, and market constraints), but overestimated livelihood sustainability and impact.
- **Mognegu I:** The NGO reported that agro-processing continued, whereas fieldwork confirmed that the equipment failed early in implementation and livelihoods did not persist, indicating outdated or inaccurate information.
- **Chache:** The respondent indicated that gardening activities had not continued, despite the fact that gardening had not been implemented in that community under the project.

Across all responses, NGOs consistently reported that women's livelihoods had improved more than men's. This was not corroborated by fieldwork findings, which showed mixed and limited livelihood gains overall, with the exception of broader benefits from boreholes and VSLAs.

Given this lack of alignment between survey responses and field observations, the evaluation concluded that the data could not be used to draw reliable conclusions about sustainability or resilience, particularly for communities not visited. As a result, the survey was not used as a primary source of evidence in the evaluation.

Annex 6. Seasonal Calendars

Zaazi

Activity/Water Access	2023										2024	
	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb – Mar
Raining season farming	Land preparation by men. It rained some days but was not consistent enough to plant.	The rains should have started. Time to plant yams, cassava, and early corn.	Good month for past 4 years to plant all crops but this season, it failed.	Irregular rainfall. Corns fell to fruit and were wasted on the field. Stalks were used as firewood or eaten by livestock. For 40 days, it did not rain and by September, the rains had stopped.				Harvesting of failed crops. Groundnut was a little better. Start preparing land by the dam bank for dry season leafy vegetable farming. Mostly sell grains, beans from harvest			Peak of dry season. Leafy vegetables fetch good money. Selling groundnuts can bring gains if you have more.	
Raining season water access	Peak of dry season so more pressure on boreholes. Used more dam water even to drink. Borehole was damaged at this time.	It rained often and community undertook rain harvesting and storing in clay pots, plastic barrels, etc. Used borehole water for drinking and other household purposes.					Harvested and cleaned land of residues to prevent fire.	Dry season farming. Used dam water for irrigation. It was mainly bucket irrigation before AF brought water through pumping machine and water hoses. Most use machine irrigation now.				
Dry season farming	No activities during raining season.							Dry season farming. Leafy vegetables grown and 90% sold as high prices make profits. Food from the raining season was running out during peak– January through April but prompted to sell to get more money than raining season.				
Dry season water access	Borehole was often damaged. If was not repaired fast, community drank dam water.	Rain water was used more for household needs, borehole water for drinking. Dam water was not used so much during this time; if used, it was for washing, bathing. If boreholes were not repaired, drank dam water.					More dependent on boreholes now for drinking and other household needs. Dam water was used for construction and dry season farming. Community used dam water for everything if the boreholes all had given away due to pressure and inability to repair. Women started to hunt for water and spend most time on water than other activities like dry season farming, creaking seeds, and hoarding firewood.					
Incomes	High incomes for those with crops to sell. Mostly sold livestock to get more money for men.	Mostly from selling some of the harvest from raining season. Incomes from selling crops this period were about 40% as crops were cheaper. Women got about 70% of income from shea nut and processing from May through August. Also, women could sell vegetables that they planted on their household farms. School expenses and household feeding were the highest and priority.					Sold some crops from raining season harvest. Sold leafy vegetables to get more money. Women got about 60% income here in January through March. The price of the same crops could increase 100% from January though March. VSLA loans came in handy for those who do not have crops or livestock to sell. VSLA loans helped through these difficult months. Families with a child in secondary/tertiary school faced higher fees and expenses. VSLAs loans mostly were used for school expenses.					

		Gathered shea nut to sell or process independently from May through August–September, although there was not much shea on the landscape.	Men got 60% of their incomes from August when they started to harvest yams, peppers, and okra. January through March was focused on selling livestock, leftover crops, and hunting for men. 40% income was earned this way for men.
Notes on this season	- Community expects to plant yams and cassava as soon as the rains stabilize and are consistent. Some are still preparing the land. May is the good month to plant and they hope it works this year. The disease on the dry season vegetables started two years ago in the AF project garden. They used salvaged seeds and also asked for help from neighbors. They reported to Agricultural officers but no one has come to see it or offer a solution. - The leafy vegetable disease started in the AF garden 2 years ago. The community reported to the Agricultural Office. Officers came to take pictures and said they will get back to the community but over 6 months have passed now and they have not come back. Now community members still grow on individual plots. Those who are lucky, their crops escaped the disease before harvest, otherwise people lost all their leafy vegetables.		

Mognegu I

Activity/Water Access	2023											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raining season				The rains usually start, land preparations and planting of grains like groundnut can begin	In 2023, by late May, the rains had not started, most lands were not prepared.	Planted maize, cassava, and other cereals. Women usually follow men to do farm work.	The rains stop for about a month mid-August to early September when maize tasseling. Maize was destroyed.	Harvesting of early maize, some early yielding crops. Yield was not so good due to stoppage of rain mid-Aug to early-Sept	Dry season starts early from October. Harvesting on-going. Bush fires started in December and burnt bee hives.			
Dry season	Peak of dry season. Bush fires almost every year. Burnt bee hives and unharvested crops. Some bush fires were intentional (arson).											
Water access	Pressure for water and more queues at boreholes. Boreholes broke down mostly due to high pressure and demand. Some started to fetch from Oti river (nearly 4km away)			Rains started and water pressure started to reduce	Mostly the raining season. Households harvested water for household use like cooking, bathing, and washing. Sometimes it was not good for drinking as many fell sick drinking it. Diseases like urinating blood were observed and linked by community to drinking harvested rain water.			Harvesting early crops from September as rains decline; November through December is the dry season. High dependence on boreholes started. Women started dry season farming when they had the AF garden.				
Incomes	Selling harvest, livestock for men. Women mostly sell labor threshing groundnut and other cereals for others, sometimes even going to other communities. Picking, processing and selling				Picking and selling shea nuts for women or processing independently. They can get GH¢ 1000/bag of shea nut in some seasons. Shea fruiting is declining as climate changes.							

	dawadawa (locust beans seeds) for women. Pick other wild fruits like mango for sale.		
Notes	- Women's income is higher in the dry season as they get dawadawa, shea nuts and processing, and selling labor helping others harvest or threshing harvest. Meanwhile men's incomes are high after their main crop harvest. Men also own livestock and sell them for money. Men often do not sell their labor to harvest or thresh, as it's the women's job. In the dry season, men usually laze about if they do not migrate to find better jobs and women look after the household with whatever income they get. - The seasons have been changing for over a decade now. The agricultural officers once in a while bring new seeds that yield early and farmers have to buy them to grow so they can get some good harvest. - The AF project helped women more with the dry season garden as that is when women can make their own farms. In the raining season, they accompany their husbands to farm.		

Sabare 2

	2024									2025			
Activity/ Water Access	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Raining season farming	No rains came as would normally be expected.		Rains came and community planted early corn (yellow variety; 60–90 days maturity)	Planted other crops like groundnuts, soya, yams, and cassava			Harvested early corn	Gathering harvest. Women sold labor to harvest and received part of yield or money. Women mostly were cracking seeds like groundnut and looking for firewood to store to be used in the raining season (fresh wood, dried by raining season). Also fishing on the river, as most women are fish mongers. Period for dry season farming but no irrigation. Men sit at home doing nothing.					
Raining season water access	Water harvesting. There was less pressure on boreholes. Managed boreholes by locking them when not in use. Borehole water was mostly used for drinking. River water was used for washing, bathing, cleaning, cooking						Dry season started	Dry season started late October. Boreholes were under pressure, some got faults. There was fighting among women from January–April to get access and rains did not start in March. Went back to river Oti water. Some even drank it at peak of dry season (January–March)					
Dry Season farming							Prepared land for dry season farming	Dry season farming period if there is irrigation but the machine and hoses are damaged. Men were at home doing nothing, some fished in river. There was construction of new houses/ patch old houses. Women were cracking seeds, seeking firewood to store.					
Dry season water Access							Middle November, dry season water pressure starts. Boreholes used for drinking and household uses. River water used for construction. Dry season started to peak from January. If rains do not come in March as often expected, the pressure on borehole increases.				Peak of dry season. Most pressure was on the boreholes. Damage was high during this time.		
Incomes	Mostly from fishing; fish mongering, selling harvest, and petty trading for women. VSLAs were very helpful to get loans but maximum GHC 1000. Not enough for school expenses, household feeding. Those who get some crop and livestock to sell in the dry season, then fetch more money than in the raining season. “Now we don’t do dry season farming so mostly less income in dry season for us here.”												

Note on other seasons	There has been irregular rainfall over 5 years now. They used to prepare the land in March and plant by April but the rains keep failing and they don't know when to plant again. They just wait. Now, almost every season, the rains delay in March, then there may be more in April. They are expected to last until November but it stops maybe in July, comes again and then stops finally in October. In 2024, there was flood that nearly washed the woodlot/buffer zone away but drought (delayed rainfall) is frequently affecting when to plant. If early yielding crops are not planted, then it will not mature before the rains stop again. The community only knows of the early variety for corn. The agricultural officers do not come. Even when community members have gone to their office, they will say they will come but never come.
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Tampion

Activity/ Water Access	2024												2025
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Water access	Taken from dam for drinking, household needs, and construction. Rains are not expected during these months. It can rain in March but not much. There was so much pressure on boreholes, with queues and fighting. It was the period when most boreholes were damaged. The dam dried up in 2024, but not the next year in 2025. This year (2026), there is still water, though it is shallow.			Some rains were not consistent.	Relied on rain water harvesting and storage for drinking, household use.					Dry season begins. Not much pressure on bore holes if all are working but often only few work. Pressure mounts from January. Women spend more time fetching water. Some depend on dam water for everything.			
Farming	Nothing done by men. Youth will migrate. Women find things to do like fetching firewood to sell, petty trading, etc.			Land preparation. Planted groundnut and early corn	Start planting most seasons	Farming activities	Early maize harvested	Farming activities	Harvest other crops	Harvesting other crops. Women do much work here. Some gather and bring the harvest. Some sell labor to harvest for other farmers.	Collecting firewood to sell, selling crops if they have more		

Incomes	Livestock, firewood selling, charcoal making and selling	Shea is not fruiting much since the last 10 years but when available, it starts from April collecting for sale or processing. They are now collecting Dawadawa (locust beans seeds) to process for sale.	Sell harvest if there is excess or if someone is in dire stress for money. Firwood, charcoal, livestock selling. Fetch wild fruits like dawadawa, baobab.
Notes	In 2024, the dam overflowed its banks in the raining season but the water was gone in the dry season due to high siltation. It became shallow, the castles step into them, and they turn to muddy water. The crocodiles cannot survive the shallow water and water pressure in the community increases especially for drinking.		

Tumu

Activity/Water Access	2022			2023									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Dry season farming in the AF garden	Prepared the land for dry season farming	Started planting okra, onions, peppers, and tomatoes				Harvesting started for some vegetables after two months, others need more.	Prepared own lands for raining season farming	Farming own lands for raining season. Mostly planted yams, cassava, groundnut, soya, beans, maize, and vegetables				Harvesting main season crops.	
Water access to dry season garden	Used dam water for irrigation using water pumping machine and water hoses. Borehole water were useless due to the distance from the garden.			The dam dried up in 2023 by this time due to severe drought.			Main raining season cropping were seriously affected due to intermittent droughts and floods within season.						
Food and incomes from garden			50% of crops from the AF garden were given to members, officers, and important people in the community for household use. 50% was sold and the money was used for repairs of machines and water hoses. Also was given to some members of group if they had emergencies like sickness.										
Notes	- The AF Garden group consist of 20 members, majority women, so they can do the dry season farming. The plot is 1.5 acres and is demarcated so that each member plants a crop on part of it. In the first year, the AF gave them okra, onion, and green pepper seeds but subsequently, each member planted whatever crop seed they had since they did not want to buy seeds. In 2023/2024, some planted okra, tomatoes, corn, beans and other crops that they had seeds for. - In 2024/2025, they did not plant the garden because the machine needed repairs, and also a member died and was buried on the land. - The machines and hoses still work and they will cultivate this year's dry season if the dam does not dry up.												

Goli

Activity/Water Access	2018												2019
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Raining season in 2018					Rains started in May. Land preparations	Major consistent rains started. Planted crops, yams, maize, cassava, beans, grains	Engaged in intense farming activities, weeding, stalking yams, and other activities.		Rains declined, some crops were ready for harvest such as early yielding maize	Engaged in harvesting, making yam barns, bringing harvest home			
Dry season in 2018	Peak of dry season farming at the dam site. Community members worked on individual plots. Anyone interested got a plot to farm								Harvesting major season crops		Bush fires started. Crops burned if still on the field. Dry season farming started.		
Incomes	For women, dawadawa harvesting, processing and selling, and wild fruits. For men, fishing in the dam, livestock selling, and hunting. Women got more income (80%) in the dry season than men (20%).				For women, shea nut and processing incomes. These could yield a lot if the woman had time but it competed with time to help husbands in the field.				For women, selling labor helping harvest and threshing for grains or money. Into the dry season, farming leafy vegetables. For men, selling some harvest, livestock. Men got most income here (100%) and women got about 10% as it depended on if they sold their labor or dry season vegetables.				
Dry season farming since 2019	- There was no dry season farming at the dam site. Individuals who used to benefit from dry season farming have lost that income. Women and men are now migrating to illegal mining areas to earn income. Women become stigmatized when they return, tagged as 'impure' - No more fishing at the dam, which affects men's income in the dry season - Shea fruiting is not good due to climate change. Women are not earning as much from it as they used to.												
Water access	AF boreholes within community are used for drinking and household use. Farm from farmlands to be used for dry season farming.												
Notes:	Community complain they are worse off than before AF due to the collapse of the dam.												

Annex 7. Project Outcomes and Status as Reported in the Final Evaluation

Outcome target	Rating at final evaluation	Description of outcome achievement from document review	Additional findings from fieldwork, as reported in the Final Evaluation ^d
Outcome 1: Improved basin level management and planning of water resources, taking into account climate change impacts on surface and groundwater sources			
1.1: Existence of historical and downscaled climate projects	Achieved	Downscaled historical climate trends and future projections developed for White Volta, Black Volta, and Oti river basins; Water Resources Commission and other relevant stakeholders now have access to these data	
1.3: Management plans ^a in the Black Volta and five sub-basins in the White Volta and the Oti basins at ministerial level	Achieved	Black Volta plan and 5 sub-basin plans in the White Volta and the Oti Basins have been fully developed and validated for adoption at the inter-ministerial level	
1.4: Three regional Climate Change Adaptation Monitoring Committees	Achieved	Regional Climate Change Adaptation Monitoring Committees (3 regional, 10 districts, and 50 community) are fully established and functional in the three target regions. To ensure effective implementation of the management plans, five sub-basins committees were established, namely, Nounmbiel, Dapola, Bamboi, Bui and Vonkoro for the Black Volta basin.	
Outcome 2: Climate resilient management of water resources by at least 50 communities in northern Ghana			
2.1: Number of communities in which management plans have been developed and are being implemented	Achieved	Four sub-basin plans covering 50 communities have been developed for implementation: Dapola and Buie sub-basins (Black Volta); and Gambaga and Nasia sub-basins (White Volta).	Insufficient empirical evidence that basin planning was actively used by local governments or communities, or that implementation experiences were feeding back into basin-level policy processes

Outcome target	Rating at final evaluation	Description of outcome achievement from document review	Additional findings from fieldwork, as reported in the Final Evaluation ^d
2.2: Improved infrastructure for water distribution for CCA and agricultural use installed in 10 districts	Achieved	145 boreholes (out of 100 planned) drilled covering 50 communities; communities have started making monthly financial contributions towards repair and maintenance	Most communities reported boreholes not operational, but full degree of non-operational boreholes not known; Tamale CWSA recorded non-satisfactory performance in some boreholes in Tampion; operational boreholes have been essential in providing water for dry season farmers and drinking water, to avoid river waterborne diseases
	Partly achieved ^c	10 dams rehabilitated (out of original target of 50) for rainwater harvesting and water storage systems; 5 additional dams were expected to be completed after the final evaluation, bringing the expected total to 15	Two (2) of the rehabilitated dams at Goli and Tampion developed a breach on one side of the embankments, destroying livelihood projects; footbridge at dam in Lamboya washed away and being repaired at time of final evaluation; most farmers have left Timonde dam site to farm at river side due to lack of space; Yidongo water supply valve for dam not repaired
2.3: Number of operational community scale irrigation systems installed	Achieved	40 small irrigation systems (out of 30 planned) in place such as watering cans, pumps and pipes, to facilitate dry seasoning gardening by women	
2.4: Measures for water conservation under climate impacts implemented	Achieved	44,000 tree seedlings planted in 30 communities, including around dams to reduce evaporation and extend holding capacity. Other buffers zones created and fire belts established	
Outcome 3: Enhance diversification of livelihoods under climate change by at least 50 communities in northern Ghana			
3.2 Livelihoods diversification for improved adaptation to climate change in 50 communities in northern region ^b	Achieved	40 (out of 50 planned) dry season gardening schemes for women established, with fencing for security from livestock grazing and adequate water supply schemes	Generally successful with increased yield where seeds and fertilizer were given; farmers showing preference for dry season gardening over rain-fed due to higher yields and income; also reducing youth migration during the dry season; district assemblies

Outcome target	Rating at final evaluation	Description of outcome achievement from document review	Additional findings from fieldwork, as reported in the Final Evaluation ^d
			aim to replicate the success under government program of planting for food and jobs; challenges related to canals drying up for irrigation, inadequate water supply from dams, and inadequate pest control
	Achieved	50 (out of 40 planned) beekeeping schemes established	Low colonization and productivity in concrete hives; insufficient training leading to some communities missing harvesting period; lack of clear profit-sharing by members of groups; harvesting being done by trainers rather than beneficiaries; need for more PPE; some women would have preferred livestock since men traditionally dominate beekeeping
	Achieved	24 (out of 40 planned) community level women-led agricultural product (shea butter, groundnut and baobab) processing schemes established	Most processing equipment installed but other equipment and electricity needed; urgent need for training on use of machines and maintenance
3.3: Community tree nurseries and wood lots established for climate risk management in 40 communities	Partly achieved	25 tree nurseries (out of 40 planned) established benefitting 400 people in tree seedling establishment and marketing	Did not meet expectations due to poor market; majority of seedlings not sold as expected; tree nurseries in Tampion destroyed due to dam overflow
3.4 Number of operational community fish farms established	Partly achieved	39 fish farms (out of 20 planned) established in rehabilitated dams/dugouts	Low success rate in most communities; fishpond in Goli had good harvest; fish cages in Tampion washed away by flood; another breached dam led to loss of cages; other communities had theft cases.

^a The final evaluation and initial interviews confirmed that Outcome Indicator 1.2 (the White Volta management plan) was developed under a different project funded by DANIDA. Therefore, this ex post evaluation will not trace the sustainability of this specific sub-outcome. However, the ex post will verify the extent to which the Black Volta and Oti Basin management plans were implemented.

^b These livelihood activities were expected to increase income for households in the target communities, but the final evaluation reported that formal data collection for that indicator was postponed "due to the delays on the effective launching of livelihood activities," noting that "it is also expected that beneficiaries of 'economic trees' will begin to reap the benefits within 3 years," suggesting that more time was needed to see results.

^c Due to several challenges, including the late release of funds from the Adaptation Fund and the COVID-19 pandemic, only 10 dams were successfully rehabilitated prior to project completion. The project was expected to end in April 2020, but the Adaptation Fund approved a No-Cost Extension, valid until 31 December 2020, allowing sufficient time to complete 5 additional dams. Subsequently, UNDP initiated procurement and signed contracts in August 2020, but construction was not finished at the time of the final evaluation conducted from October to December 2020.

^d As reported in the Final Evaluation and in supporting fieldwork documentation prepared for the Final Evaluation, as shared with the evaluation team by the final evaluator.