ADA consortium

CDKN Climate & Development Knowledge Network

SYNTHESIS REPORT

A longitudinal study on

locally-led water infrastructure investments in select arid and semi-arid counties in Kenya

2024

Contents

Front cover photo: Women fetching water in Mokori Rock © Adaptation Consortium

Photo 1: A watering point in Dambas, Wajir County © Adaptation Consortium

Acknowledgements

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List of abbreviations

ADA	Adaptation Consortium
ALDEF	Arid Lands Development Focus
ASAL	Arid and Semi-Arid Lands
CCAP	Climate Change Action Plan
CCCF	County Climate Change Fund
CCPC	Climate Change Planning Committee
CCU	Climate Change Unit
CDKN	Climate and Development Knowledge Network
CIS	Climate Information Services
DGIS	Dutch Ministry of Foreign Affairs
FGD	Focus Group Discussion
FLLoCA	Financing Locally-Led Climate Action
IDRC	International Development Research Centre
IPCC	Intergovernmental Panel on Climate Change
M&E	Monitoring and Evaluation
O&M	Operations and Maintenance
PCRA	Participatory Climate Risk Assessment
PWD	People Living with Disabilities
SADC	Southern African Development Community
SLM	Sustainable Land Management
SSN	SouthSouthNorth
UPVC	Unplasticised Polyvinyl Chloride
VIP	Ventilated Improved Pit
WCCPC	Ward Climate Change Planning Committee
WOKIKE	Womankind Kenya

Definition of terms

Functional: A functional water point is one that is operating as expected and serving the community well on the day of visit and within the last month.

Partially functional: A partially functional water point is one where some of the components are absent, broken or damaged, but there is still some water available to the community.

Non-functional: A non-functional water point is one where some or all the components are absent, broken or collapsed, with the result that water is not accessible or available to the community.

Not in use: A not-in-use water point applies to those water points that may not be in use due to seasonality and low rainfall, but are intact and functional during the wet season.

Executive summary

Arid and semi-arid counties in Kenya have increasingly faced challenges due to climate change, which have led to increased water scarcity across various counties. In response, the Adaptation Consortium (ADA) conceptualised and piloted a devolved climate finance model that facilitates the flow of climate finance to the local level to finance locally-led public good investments. This model, called the County Climate Change Fund (CCCF) mechanism, was piloted in the semi-arid counties of Garissa, Isiolo, Kitui, Makueni and Wajir.

Between 2012 and 2018, 114 investments were established across the five counties, 95 of which were water projects including boreholes, sand dams, water weirs, rock catchments, earth dams and water pans. The projects improved the livelihoods of the dependent communities, and their functionality remains a matter of interest to those communities.

In 2019, ADA conducted a functionality and governance study to assess 62 of the 95 water projects. This study involved a comprehensive examination of the key issues affecting the sustainability of these investments in the specific counties. In 2023, a longitudinal functionality and governance study was commissioned by the Climate and Development Knowledge Network (CDKN) to assess the same investments as the 2019 study by ADA.

The primary objective of the longitudinal study was to identify and assess the factors (challenges and successes) that affect the functionality and governance of the investments. Specific objectives included investigating technical issues, assessing community engagement, examining governance challenges, and analysing environmental factors impacting project sustainability. To do that, a mixed-methods approach was employed, combining focus group discussions (FGD), key informant interviews (KII) with videography and photography, and observation checklists for technical assessments. Field data was gathered that captured the perspectives of communities, site committees and relevant stakeholders. Analysis was then undertaken to derive recommendations.

The longitudinal study findings show varying levels of functionality and sustainability a decade after the first investments and five years after the most recent investments.

Of the 95 investments assessed, 38.7% were found to be functional, which was a reduction from the 51.6% that were functional during the 2019 study. The number of investments which were partially functional remained constant at 21%. Investments that were found to be non-functional increased from 14.5% in the 2019 study to 19.4% during the 2023 longitudinal study. The investments that were not in use due to seasonality and/or threats of insecurity were 21.0%, up from 12.9% during the 2019 study. The majority of the investments were either functional or partially functional. However, overall the functionality of the investments had declined since the 2019 study.

The principle of subsidiarity was applied to the investments, meaning that communities were involved in identifying, designing, implementing and managing investments. With support from local leaders, this has fostered a sense of ownership. The communities can provide insights on what issues need to be addressed and how to improve the sustainability of the investments.

Despite this, challenges that influenced the effectiveness, longevity and sustainability of the investments were identified and categorised into technical, social and governance issues. Technical challenges included technical failures that require more resources than the community could raise, such as pump malfunctions in boreholes. Governance challenges included insufficient training on water management practices and infrastructure maintenance, which hampered the site management committee's ability to operate projects effectively. In some specific sites, limited community involvement during project planning and implementation was identified as a factor that led to a lack of ownership and reduced project utilisation. Lastly, inadequate access to climate information was identified as a challenge that contributed to problematic siting of some investments, rendering them not useful.

This study of investments in water infrastructure in the ASAL counties underscores the importance of addressing technical, social and governance challenges when seeking to enhance the efficacy and sustainability of investments. Some of the recommendations identified include ensuring that climate investments strengthen the communities' resilience and improve their well-being no matter the season, and that they consider the likelihood of increased demand for resources and the socio-economic effects of the investments.

In addition, the climate information projections indicate that water stress will increase. Climate investments should therefore integrate restorative activities and management of water resource catchment areas to avoid issues such as maladaptation due to the depletion of a water source. Climate investments should make use of climate information and traditional and Indigenous knowledge to improve effectiveness, value for money and sustainability of the investments.

Resources should be allocated to support routine operations and maintenance as well as monitoring, evaluation, reporting and learning of climate investments to ensure their efficacy and sustainability. Community institutions require regular trainings and a phased membership change to ensure that institutional memory is preserved for effective investment management.

Addressing the identified challenges requires collaborative efforts among various stakeholders, including local communities, government bodies, non-governmental organisations and international partners. By implementing the recommendations in this study, stakeholders can contribute to resilient and lasting water solutions, ensuring the long-term well-being of communities in the face of climate change and water scarcity.

I. Introduction

Study background

The County Climate Change Fund (CCCF) mechanism is a devolved climate finance model that facilitates the flow of climate finance to the local level. It enables counties to mainstream climate change into existing planning and budgeting processes while providing communities – including women, marginalised and/or Indigenous people, people living with disabilities (PWD), and youth – the opportunity to identify, prioritise, make decisions on, implement, and manage public good climate investments. These investments can support communities' well-being and build their resilience to a changing climate.

The Adaptation Consortium (ADA)[1] conceptualised and piloted the CCCF mechanism between 2013 to 2018 in five arid and semi-arid land (ASAL) counties in Kenya: Garissa, Isiolo, Kitui, Makueni and Wajir. Through the CCCF mechanism, 114 locally-led public good climate investments were implemented across the five counties. Due to the challenges faced in ASALs, 95 of the investments that communities prioritised were related to water and were meant to improve accessibility to water for domestic and productive uses. The CCCF mechanism's management processes fostered closer engagement between stakeholders and the county governments, with positive results for county planning such as ensuring the voices of the vulnerable and marginalised (e.g. women and youth) are heard and included in county level climate adaptation and development decision-making. The success of the mechanism saw it being scaled out to the rest of the country, with 45 counties enacting climate change legislation and establishing climate change governance structures, such as Steering Committees, county Climate Change Planning Committees (CCPCs) and Ward Climate Change Planning Committees (WCCPCs) as of September 2023.

All 95 investments in water infrastructure across the five counties were completed in 2018. In 2019, six years after the first investment, and one year after the last, a functionality and governance study, assessing 62 of the 95 investments financed through the CCCF, was undertaken to ascertain the number of investments that remained functional and the factors influencing sustainability of the investments.[2] It was found that 74.2% of the projects were functional (fully or partially), 11.3% were not in use due to a long persistent drought and 14.5% were non-functional.[3] In 2023, 10 years after the first investments and five years after the last investments had been made, ADA, in collaboration with the Climate and Development Knowledge Network (CDKN) programme, conducted a longitudinal study which followed up on the functionality and governance of the same investments assessed in the 2019 study. [4]

This synthesis report presents the findings from the longitudinal study in the pilot counties and can serve to inform the scaling out of locally-led public good climate investments funded through the CCCF to other counties such as the Financing Locally-Led Climate Action (FLLoCA)[5] and other programmes.

Goal and objectives

The objectives of the 2023 assessment were:

- To assess the technical and functional status of the investments over time.
- To assess the governance, institutional and management context within which the investments operate and how this affects their functionality.
- To learn from the pilot investments and share these reflections with state and non-state partners and actors to ensure the sustainability of the investments.

Livelihoods and water resources in ASALs

Livelihoods of the rural populations in ASALs are deteriorating because of exposure to extreme heat and scarcity of water resources coupled with low adaptive capacity of the population to the impacts of climate change.[6] ASALs are characterised by low and erratic rainfall patterns that limit the soil's productive ability as well as its fertility. ASALs take up more than 40% of the global land area, and support approximately 2.5 billion people, 50% of livestock and 45% of agricultural production.[7] Therefore, ASALs are an indispensable ecosystem that supports human livelihoods.

In Kenya, ASALs cover approximately 89% of the country's total land area, with approximately 36% of the population living in these regions.[8] Of the 47 counties in Kenya, 23 have been classified as ASAL areas given their high vulnerability to climate shocks and hazards. Being a dry area, the main source of livelihood for the communities in ASALs is pastoralism and marginal farming whose contribution to family income and security is approximately 95%. Over the past years, Kenya has been experiencing erratic rainfall and temperature patterns leading to climate disasters such as drought and floods, which exacerbate the already unfavourable conditions in the ASAL regions.[9]

In 2012, the Kenyan government adopted a national policy on ASALs: The National Policy for Sustainable Development of Northern Kenya and Other Arid Lands.[10] The adoption of the ASAL policy marked an important milestone in the establishment of upscaling development in the ASAL regions. It strengthened other existing measures, such as the 2010 Kenyan Constitution and the Kenya Vision 2030, both of which aim to ensure that climate change adaptation is mainstreamed into sectoral as well as county development plans.[11]

Photo 2: A man fetching water from a shallow well dug on a water pan © Adaptation Consortium

Adaptation is one policy option for minimising the effects of climate change as the duration, intensity, extent and incidences of extreme weather conditions rise.[12] Therefore, adapting to climate change is necessary to protect the livelihoods and ensure food security for highly climate impacted populations. Given that adaptation is a dynamic social process, it follows then that implementing an adaptation strategy is subject to the social acceptability, adaptation choices and ability of the communities to make the most of their networks to benefit from valuable climate information.[13]

Different communities tend to adopt different adaptation strategies, based on their available and accessible assets.[14] For instance, strategies for adapting pastoral communities to changing environmental conditions may be different from those of farming communities. Therefore, it is important to give communities the opportunity to identify their risks and find ways of addressing them. The Participatory Climate Risk Assessment (PCRA), which initially started as the Participatory Vulnerability and Capacity Assessment (PVCA) under the CCCF mechanism, is a tool that aids communities to adapt to climate change by enhancing their capacity to recognise, evaluate and manage climate risks at the local level.

Counties across Kenya have conducted PCRAs that reflect a broad range of perspectives and insights, enabling them to develop targeted strategies that address the differentiated impacts of climate change on gender and livelihood practices. The five counties of Wajir, Garissa, Isiolo, Makueni and Kitui have conducted PCRAs that revealed that they all experience variability in rainfall patterns leading to reduced rainfall and increased temperature. Water scarcity is now threatening the already marginal agricultural, human and livestock production and impacting on well-being and livelihoods. Following the PCRA process, the counties each developed a Climate Change Action Plan (CCAP) which presents strategic frameworks for addressing the challenges and opportunities posed by climate change in their respective counties. Each CCAP provides a plan which highlights the priority sectors and outlines recommended climate change interventions.

In the ASALs, water is an important resource and is usually the most prioritised area of intervention. With the CCAPs in place, ASAL counties now have the opportunity to consider appropriate climate investments and to prioritise the delivery of water resources, considering water's role in the complex interactions between the land, environment and livelihood systems. Pastoralism and marginal farming are often the main livelihood options in ASAL areas and, as such, it is vital to ensure there is adequate water supply for livestock, agriculture and human consumption.

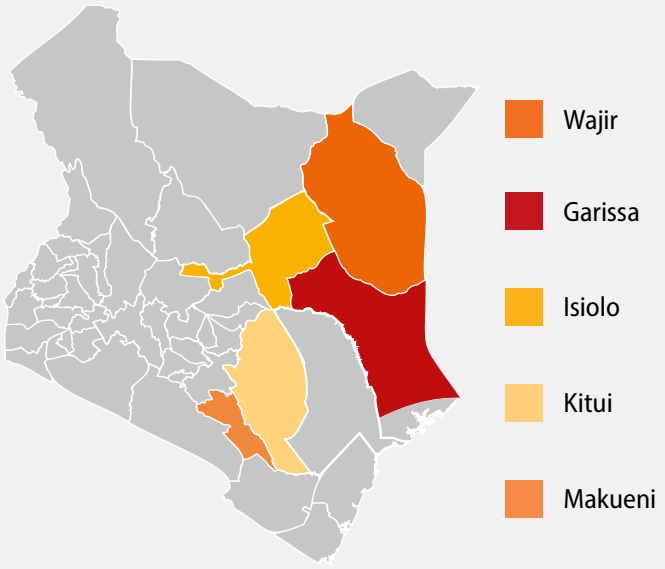
Photo 3: A young girl in Elben, Wajir, leading her animals to water © Adaptation Consortium

II. Methodology

Description of study area

The locations for the longitudinal study follow those of the 2019 functionality study, namely the counties of Garissa, Isiolo, Kitui, Makueni and Wajir, each offering a distinct socio-economic and environmental context within the broader ASAL context. Only the sites that had been sampled in the 2019 study within each county were revisited. Figure 1 shows the location of the study area.

Figure 1: Map of study area



Garissa County is one of the three counties in the north-eastern region of Kenya. The county borders the Republic of Somalia to the east. It is characterised by arid and semi-arid conditions and has a relatively hot and dry climate throughout the year. As such, heat stress, dry spells and drought are hazards that affect the livestock and agricultural production in the county. The major physical features are seasonal *laghas* (water ways) and the Tana River Basin on the western side.[15] The backbone of the county's economy is livestock production, with over 90% of the inhabitants directly or indirectly deriving their livelihood from livestock through nomadic pastoralism. Communities in Garissa also engage in agricultural farming through small-scale rain-fed agriculture, and large-scale agriculture through irrigation along the Tana River. The rainfall patterns and temperature have been changing due to climatic conditions. This has made the county prone to drought and flood emergencies, threatening livelihoods.

Isiolo County is in the central-northern region and borders three other counties in the study: Garissa, Kitui and Wajir. It is a generally arid and semi-arid area with low-lying plains. About 80% of the land is non-arable (22,000 km^2). Pastoralism is the main livelihood, with agro-pastoralism and crop farming also being practiced. Isiolo's population is vulnerable to changes in climate that expose them to climate risks such as drought and unpredictable rainfall, floods and the spread of water- and vector-borne diseases. These negative impacts have resulted in conflicts between agro-pastoralist and pastoralist communities, land degradation, desertification, scarcity of potable water and low livestock productivity.[16]

Kitui County, located in eastern Kenya, also has a predominantly arid and semi-arid landscape. It is characterised by more rugged terrain, with rocky hills and vast plains. Livestock rearing, particularly of goats, sheep, and camels, is a major source of livelihood for many residents, as is rain-fed agriculture. However, the limited availability of water and fertile land means that these activities are often characterised by low productivity and high vulnerability to climatic shocks. Water scarcity is a critical issue in the county, particularly during prolonged dry spells, which can lead to droughts and food insecurity.[17]

Makueni County is situated in south eastern Kenya and is the most southern of all of the counties considered in the study. It is predominantly agricultural, with rain-fed subsistence farming being a significant economic activity. The major physical features in the county include the volcanic Chyullu hills which lie along the south west border of the county in Kibwezi East and West sub-counties,

Mbooni hills in Mbooni sub-county, which host Mbooni north and south forests, and Kilungu and Iuani hills in Kaiti sub-county. The arid and semi-arid county faces climate challenges related to irregular and erratic rainfall patterns that make it prone to frequent droughts, which, in turn, affect its agricultural productivity.[18]

Wajir County is located north eastern Kenya. It borders both Ethiopia to the north and Somalia to the east. It also borders Garissa and Isiolo counties. The county is mainly made of plains and, unlike the other counties, has no natural water bodies. The communities in Wajir mainly practice livestock keeping as the main economic activity, with crop production, gum and resins harvesting, and honey production also being significant agricultural activities in the county. Wajir experiences frequent droughts, which negatively impact on livestock, crop farming, education, nutrition, access to water and pasture. On the other hand, unpredictable rainfall patterns sometimes cause flash floods, which damage infrastructure and may kill goats and sheep. The frequency and intensity of extreme climatic events has been increasing in the recent past, disrupting the livelihood of the communities.[19]

Study approach

The study focused on selected sites within communities where CCCF-funded water infrastructure investments had been implemented, such as boreholes, sand dams, earth dams, weirs and water pans. The diverse nature of these study locations provides an opportunity to understand the varying socio-economic, cultural and environmental factors influencing the functionality and sustainability of these investments in semi-arid regions.

Being a longitudinal study, the 62 investments that were visited during the 2019 study across the five counties were the same ones revisited and resurveyed. A description of the survey conducted in each county is provided in Table 1, along with information on the study dates, the number and kinds of investments visited, and the implementing partner.

Table 1: Summary of types of investments visited per county

County	Survey dates	Total no. of investments implemented	No. of investments visited during field work	Types of investments visited	Implementing partner
Garissa	24-27 October	5	5	Boreholes Pipeline distribution	WOKIKE, County government of Garissa
Isiolo	17-20 October	39	9	Rock catchment Sand dam Water pans Boreholes	MID-P, County government of Isiolo
Kitui	9-13 October	12	12	Sand dam Earth dam	ADSE, County government of Kitui
Makueni	3-7 October	15	13	Sand dams Earth dams Rock catchment Pipeline distribution	ADSE, County government of Makueni
Wajir	26-30 September	24	23	Boreholes Water pans	ALDEF, County government of Wajir
Total		**95**	**62**		

Inception meetings

Two-day inception meetings were held in each of the five counties between the months of September and October 2023. The inception meetings brought together community representatives of the WCCPCs, CCPCs, county Climate Change Units (CCUs), project investment committees and development partners supporting climate actions in each county. The aim of the stakeholder inception meetings was to define the study's boundaries and validate its approaches, including the study tools.

The WCCPC members used the opportunity to highlight the heightened water scarcity challenges they were facing due to the changing climate, and requested the county government and partners to work in partnership with them in identifying, designing and sustainably managing water investments that will strengthen their resilience towards climate change. The county actors expressed a commitment to collaborative efforts, recognising the need for a unified approach involving government officials, WCCPCs, community leaders, civil society organisations and other stakeholders.

During the meetings, the survey instrument that had been used during the 2019 study was presented and subjected to a consultative process where the questions were debated, decided upon and then adjusted as needed, but without negating the longitudinal nature of the exercise. The questionnaire was tested with a pilot study. Following the pilot, the questions were revised to ensure that they were pertinent to the study and the varying types of investments (boreholes, water pans, rock catchments, water weirs, sand dams, pipeline distribution and earth dams). A final version that would be utilised in the field was then decided upon.

The meetings concluded with an overview of the proposed timeline and methodology for the functionality study, fostering a shared understanding of the project's goals and strategies for ensuring the long-term success of water projects in each of the five counties.

Enumerator trainings

Following the inception meetings, a survey team consisting of a county water engineer, a county environmental officer and a staff member from ADA's implementing partner in each county was identified and trained. One-day training sessions for the survey team were conducted after each inception workshop in each of the counties. The trainings were instrumental in equipping the teams with essential skills and knowledge for the upcoming data collection phase. The sessions commenced with a comprehensive overview of the survey objectives and methodologies, ensuring a clear understanding of the exercise. Ethical and safeguarding considerations in data collection were emphasised, highlighting the importance of maintaining participant confidentiality, obtaining informed consent and ensuring respectful engagement with local communities during interviews.

The county teams also received detailed training on data entry rules, with hands-on guidance on accurate and consistent recording of survey responses using the provided Excel templates. To help the county teams write up their survey findings, an outline for the survey report was supplied at the end.

Data collection

Data collection employed a multi-faceted approach to ensure a comprehensive understanding of the factors influencing the functionality of the CCCF water investments. The primary methods employed included key informant interviews (KII), focus group discussions (FGDs), observations, and the documentation of visual data through photos and videos. Prior to the interviews and FGDs, consent was obtained through the signing of consent forms by respondents at each investment site. Interviews were conducted with key stakeholders, including community members, county officers and community leaders, to gather in-depth insights into the technical, social and governance dimensions of the water projects. FGDs were organised with distinct groups, including men, women, youth and

site management committees, allowing for an in-depth exploration of gender-specific perspectives and community-led investment management practices. The diversity of voices captured through these discussions enriched the dataset, ensuring a holistic representation of community experiences. Moreover, the responses from the three group discussions increased the validity of the data that was gathered.

The inclusion of observation techniques allowed the survey team to contextualise quantitative data with qualitative insights. Observations were particularly valuable in assessing the physical state of water infrastructure, identifying usage patterns, and gauging community dynamics around water sources. Furthermore, the documentation of visual data through photos and videos provided a powerful means to illustrate and communicate the conditions on the ground. These visual records not only serve as supplementary evidence but also facilitate a more compelling presentation of findings by capturing real-time contextual information. Overall, the combination of interviews, FGDs, observation and visual documentation ensured a robust and nuanced dataset, laying the groundwork for a comprehensive analysis.

Data analysis

The diverse dataset, comprising structured video interviews, FGDs, observations and visual data, necessitated a multi-faceted analytical strategy. Quantitative data, including numerical responses, were subjected to statistical analyses to discern patterns and trends. This involved employing descriptive statistics, such as frequency counts, to summarise key variables and identify any significant variations across different parameters.

Qualitative data from FGDs and observations underwent thematic analysis, allowing for the identification of recurring themes and the exploration of narratives within the community (an inductive approach), and from the investigators' prior theoretical understanding of the phenomenon under study (a deductive approach). The use of the deductive approach was enabled by an extensive literature review, which was done before data collection. Categorisation was employed to condense qualitative insights into manageable themes, facilitating a deeper understanding of the environmental, technical and governance factors influencing the investments' functionality.

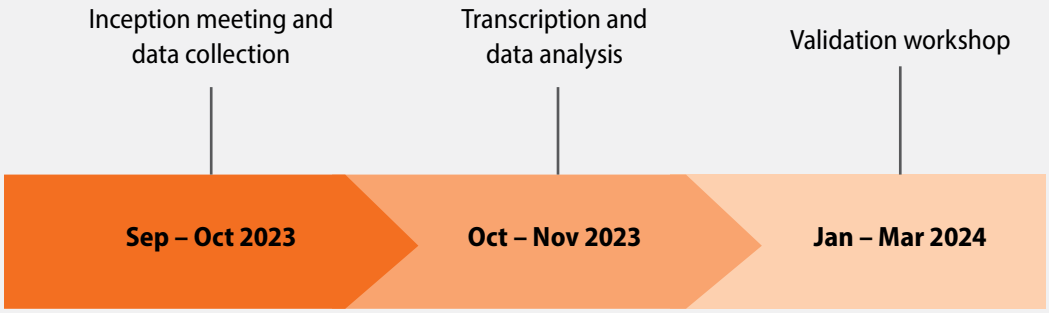


Figure 2: Process timeline

The integration of visual data, including photos and videos, played a crucial role in the analysis. Visual content was examined for contextual information, corroborating or enhancing findings from quantitative and qualitative data sources. This visual element not only provided a comprehensive understanding of the current state of water infrastructure but also continues to serve as a powerful tool for communicating findings to diverse audiences.

The triangulation of findings from different data sources strengthened the overall validity and reliability of the analysis. The results of this data analysis phase informed the formulation of key recommendations for enhancing the sustainability and functionality of water infrastructure investments in semi-arid regions that were included in a policy brief. The integration of both quantitative and qualitative insights ensures a holistic understanding of the challenges and opportunities, paving the way for evidence-based interventions and policy recommendations in the realm of water resource management in these vulnerable regions.

Photo 4: An enumerator administering a questionnaire to women at Kalikuvu Earth Dam
© Adaptation Consortium

Ethical considerations

- To obtain local ethics approval and clearance, a research permit was applied for and granted by the National Commission for Science, Technology & Innovation (NACOSTI). Doing so demonstrated respect for and adherence to local procedures and regulations as well as creating an environment where survey respondents felt confident and protected, hence more likely to provide honest responses.
- Obtaining informed consent from the participants involved first clearly communicating the purpose of the research, potential risks and benefits, and the voluntary nature of participation, after which a consent form was signed.
- During data collection, local communities were engaged in a culturally sensitive manner. A collaborative relationship was established with community leaders, ensuring that the research aligned with community needs and priorities. Local customs, traditions and decision-making processes were respected throughout the study.
- The study considered gender dynamics, ensuring that the study was conducted in a way that respected and promoted gender equality. The survey tool was structured to consider the perspectives of both men and women and provided equitable opportunities for participation in FGDs and decision-making processes.
- Privacy and confidentiality of the participants were safeguarded. To do this, no unnecessary personal information was collected, and any community data collected was stored securely. During analysis and reporting, data was anonymised to prevent the identification of individual participants.
- In terms of benefit sharing, any potential benefits to the communities were communicated. As much as possible, research findings will be shared with the community, acknowledging their contribution and ensuring that the knowledge generated is accessible and relevant to them.

Study limitations

Executing this study was not without its limitations. Firstly, the findings of this study may only be specific to the selected semi-arid counties in Kenya, and caution should be exercised in generalising the results to other regions or different socio-economic contexts. The unique characteristics of each semi-arid area may lead to variations in challenges and solutions.

Secondly, despite efforts to ensure inclusivity, community responses may be subject to biases based on cultural, linguistic or social factors. The study's reliance on community perceptions may introduce subjectivity and may not fully capture the diversity of perspectives within the communities.

The study may also be constrained by temporal factors. The study's timeframe may limit the ability to capture the full spectrum of dynamic factors influencing investments. Long-term trends and the impact of seasonal variations may not be fully addressed within the confines of the study's duration.

Moreover, the study operated under the assumption of relatively stable socio-economic and environmental conditions during the research period. Rapid changes in political, economic or environmental factors after the study may impact the relevance and applicability of the findings.

Lastly, technical challenges emerged during data collection, including issues with adverse weather conditions. Unpredictable factors such as sudden weather changes in Isiolo posed constraints on field activities and necessitated adaptive strategies to maintain the study's timeline.

Recognising these limitations is essential for interpreting the study's findings accurately and for informing future research efforts. Each limitation represents an opportunity for refinement and enhancement in subsequent studies, contributing to the iterative process of understanding and addressing the challenges associated with investments in the semi-arid regions of Kenya.

III. Study findings

Overview of the investment sites studied

Visits to 62 investments were carried out in five pilot counties. These investments mainly consisted of boreholes, water pans, sand dams, earth dams, pipeline distributions, rock catchments and a water weir. More details of the investments and their functionality are as shown in Table 2 below.

Table 2: Overview of the investment sites visited

SN	Investment	Year project was established	Sub-county	2019 status	2023 status	Comment
1	Ngai Ndethya Mega Sand Dam	2016/ 2017	Kibwezi East (Makueni)	Non-functional	Functional	Functioning, improved
2	Kwa Kilii Sand Dam	2016	Kibwezi West (Makueni)	Partially functional	Partially functional	Functioning, no change
3	Kwa Mutuku Earth Dam	2016	Kibwezi West (Makueni)	Functional	Not in use	Dropped
4	Kwa Atumia Earth Dam	2016	Kilome (Makueni)	Partially functional	Partially functional	Functioning, no change
5	Kwa Kyole Water Weir	2018	Mbooni (Makueni)	Functional	Functional	Functioning, no change
6	Kya Aka Sand Dam	2016	Mbooni (Makueni)	Functional	Non-functional	Dropped
7	Kwa Lai Sand Dam	2016	Kaiti (Makueni)	Functional	Functional	Functioning, no change
8	Masue Rock Catchment	2017	Makueni (Makueni)	Partially functional	Not in use	Dropped
9	Kaseve Pipeline Distribution	2016	Kilome (Makueni)	Partially functional	Functional	Functioning, improved
10	Ngaamba Water Distribution	2018	Kilome (Makueni)	Non-functional	Functional	Functioning, improved
11	Kwa Luli Sand Dam	2018	Kaiti (Makueni)	Functional	Not in use	Dropped
12	Ngutioni Sand Dam	2016	Mbooni (Makueni)	Functional	Functional	Functioning, no change
13	Kwa Ndambuki Sand Dam	2018	Kibwezi West (Makueni)	Functional	Functional	Functioning, no change
14	Kalikuvu Earth Dam	2016/2017	Kitui South (Kitui)	Functional	Partially functional	Functioning, no change
15	Ngomano Sand Dam	2016/2017	Kitui South (Kitui)	Functional	Partially functional	Functioning, dropped
16	Iiani Kwa Ndungu Pipeline Distribution	2016/2017	Mwingi West (Kitui)	Partially functional	Partially functional	Functioning, no change
17	Kaumbu/Mwinga Sand Dam	2016/2017	Kitui East (Kitui)	Functional	Functional	Functioning, no change
18	Kaayo Earth Dam	2016/2017	Kitui East (Kitui)	Not in use	Functional	Functioning, improved
19	Kyandeve Earth Dam	2016/2017	Kitui East (Kitui)	Partially functional	Non-functional	Dropped
20	Mikuyuni Earth Dam	2016/2017	Kitui West (Kitui)	Functional	Partially functional	Functioning, dropped

SN	Investment	Year project was established	Sub-county	2019 status	2023 status	Comment
21	Kwa Mboo Earth Dam	2016/2017	Kitui Rural (Kitui)	Not in use	Not in use	No change
22	Itukisya	2016/2017	Kitui South (Kitui)	Not in use	Not in use	No change
23	Kamuyuni Rock Catchment	2017	Mwingi West (Kitui)	Functional	Functional	Functioning, no change
24	Makithuri Earth Dam	2017	Mwingi North (Kitui)	Functional	Not in use	Dropped
25	Mutethya Nzaini Earth Dam	2018	Mwingi North (Kitui)	Partially functional	Non-functional	Dropped
26	Bula Traffic Goreale Pipeline Distribution	2016	Lagdera (Garissa)	Partially functional	Non-functional	Dropped
27	Shimbirey Borehole	2016	Balambala (Garissa)	Functional	Non-functional	Dropped
28	Nunow Borehole	2016	Balambala (Garissa)	Non-functional	Partially functional	Functioning, improved
29	Abaqdeera Pipeline Distribution	2016	Fafi (Garissa)	Functional	Partially functional	Functioning, dropped
30	Kamuthe Pipeline Distribution	2016	Fafi (Garissa)	Non-functional	Partially functional	Functioning, improved
31	Livestock Marketing Division Borehole	2016/2017	Wajir West (Wajir)	Functional	Functional	Functioning, no change
32	Adan Awale Water Pan	2016/2017	Wajir West (Wajir)	Non-functional	Non-functional	No change
33	Elben Water Pan	2016/2017	Tarbaj (Wajir)	Not in use	Partially functional	Functioning, improved
34	Wargadud Water Pan	2016/2017	Tarbaj (Wajir)	Functional	Not in use	Dropped
35	Basanicha Water Pan	2016/2017	Tarbaj (Wajir)	Non-functional	Non-functional	No change
36	Wajir Bor Water Pan	2016/2017	Wajir East (Wajir)	Not in use	Functional	Functioning, improved
37	Yatta Borehole	2016/2017	Wajir North (Wajir)	Partially functional	Functional	Functioning, improved
38	Bamba Water Pan	2016/2017	Wajir North (Wajir)	Functional	Partially functional	Functioning, dropped
39	Dadhantalai Water Pan	2016/2017	Eldas (Wajir)	Partially functional	Partially functional	Functioning, no change
40	Lakole Water Pan	2016/2017	Eldas (Wajir)	Not in use	Not in use	No change
41	Laghboghol Water Pan	2017/2018	Wajir South (Wajir)	Partially functional	Non-functional	Dropped
42	Buruka Water Pan	2017/2018	Wajir South (Wajir)	Non-functional	Non-functional	No change
43	Guticha Borehole	2017/2018	Wajir West (Wajir)	Functional	Functional	Functioning, no change
44	Lanqood Borehole	2017/2018	Wajir West (Wajir)	Partially functional	Functional	Functioning, improved

SN	Investment	Year project was established	Sub-county	2019 status	2023 status	Comment
45	Mansa Borehole	2017/2018	Tarbaj (Wajir)	Functional	Functional	Functioning, no change
46	Kutulo Borehole	2017/2018	Tarbaj (Wajir)	Functional	Functional	Functioning, no change
47	Dambas Borehole	2017/2018	Tarbaj (Wajir)	Functional	Functional	Functioning, no change
48	Harrade Water Pan	2017/2018	Wajir North (Wajir)	Functional	Non-functional	Dropped
49	Garakilo Water Pan	2017/2018	Wajir North (Wajir)	Not in use	Partially functional	Functioning, improved
50	Kilkile Borehole	2016/2017	Eldas (Wajir)	Functional	Functional	Functioning, no change
51	Basir Borehole	2017/2018	Eldas (Wajir)	Functional	Functional	Functioning, no change
52	Machesa Borehole	2016/2017	Wajir South (Wajir)	Functional	Partially functional	Functioning, dropped
53	Kulmis Borehole	2017/2018	Wajir South (Wajir)	Functional	Functional	Functioning, no change
54	Mokori Rock Catchment	2014	Isiolo (Isiolo)	Non-functional	Functional	Functioning, improved
55	RAAP Sand Dam	2015	Isiolo (Isiolo)	Functional	Non-functional	Dropped
56	Bibi Water Pan	2012	Garba Tula (Isiolo)	Not in use	Not in use	No change
57	Har Buyo Water Pan	2014	Garba Tula (Isiolo)	Partially functional	Not in use	Dropped
58	Belgesh Water Pan	2016	Garba Tula (Isiolo)	Functional	Not in use	Dropped
59	Manyangab Water Pan – Modogashe	2016	Garba Tula (Isiolo)	Functional	Functional	Functioning, no change
60	Urura Borehole	2015	Merti (Isiolo)	Functional	Not in use	Dropped
61	Yamicha Borehole	2015	Merti (Isiolo)	Functional	Not in use	Dropped
62	Kobbe Dadach Guracha Borehole	2016	Merti (Isiolo)	Non-functional	Non-functional	No change

Functionality status

The results in Table 2 are summarised in Figure 2, with two major categorisations of functional and non-functional investments, no changed, improved or dropped investment statuses.[20] An analysis of Figure 2 shows that sustainability is possible, going by the proportion (59.8%) of the investments that are still functioning 10 years after the first investments and five years after the last investments were put in place. That said, it is also worth noting the dynamics and changes. Only 19.4% of the investments had improved in status while 35.5% had dropped in status, with 13.0% of low status investments recording no change.

The functionality status of the investments, as determined by the survey teams in each of the five counties, is shown in Table 3. Among the investments, 38.7% were functional, which was a reduction from the 51.6% which were functional during the 2019 study. However, the number of investments which were partially functional remained constant at 21%. On the other hand, from the 2019 study, 14.5% of the investments were non-functional and this percentage had changed to 19.4% by the time of the current study. The investments that were not in use due to seasonality and/or threats of insecurity were 21.0%, up from the 12.9% in 2019.

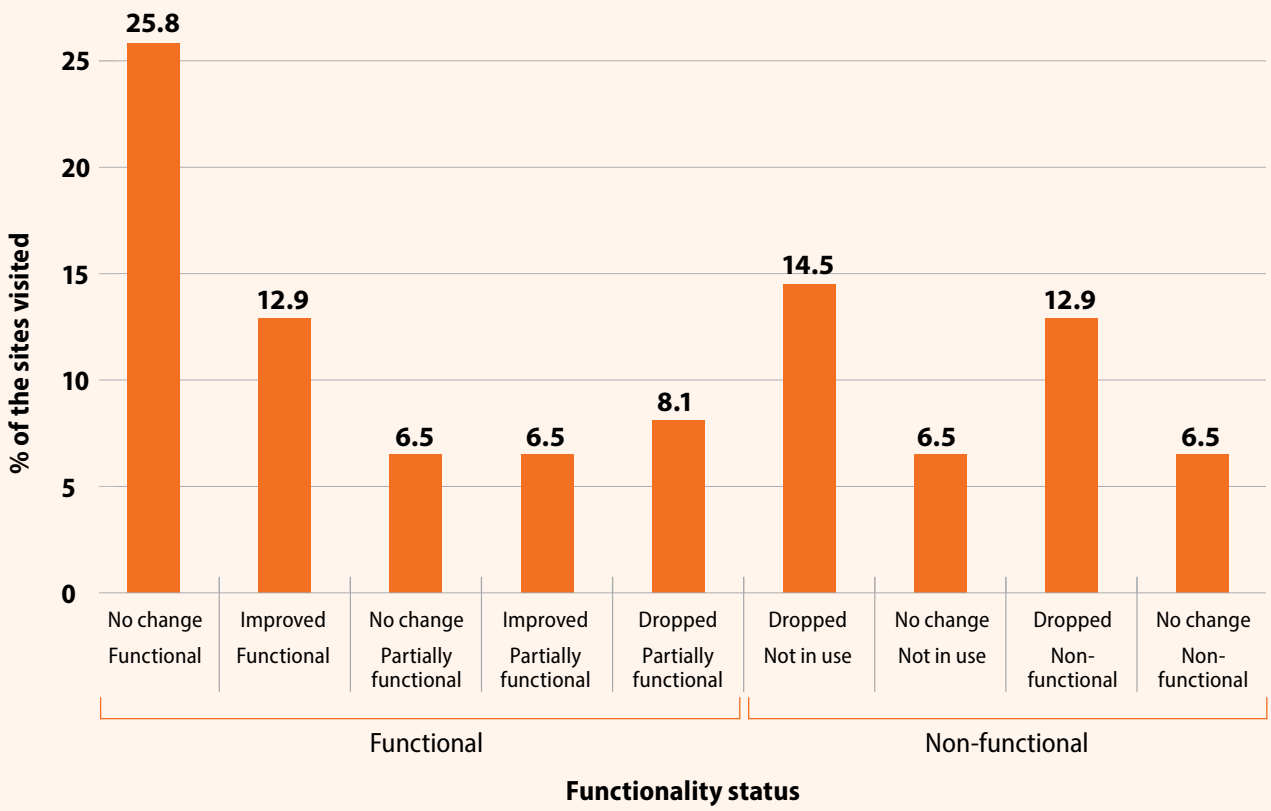


Figure 3: Overview of the investment sites visited

Table 3: Overall functionality status of investments

Study year	2019		2023	
Investment status	**Number of investments**	**Percentage of investments**	**Number of investments**	**Percentage of investments**
Functional	32	51.6%	24	38.7%
Partially functional	13	21.0%	13	21.0%
Non-functional	9	14.5%	12	19.4%
Not in use	8	12.9%	13	21.0%
Total	**62**	**100**	**62**	**100**

FUNCTIONAL

A project was deemed functional if the communities had access to water and the investment was performing satisfactorily. In the 2023 longitudinal study, 25 out of 62 investments were classified as functional, where "functional" means that in the 30 days prior to the date of the study visit, not one of these investments had experienced a breakdown. These case studies outline effective management and governance systems in addition to functional water systems in terms of the components used.

However, the majority of functional investments displayed indications of anticipated issues. This included silt build-up that would reduce the water harvesting capacity in the case of earth dams and water pans. To maximise capacity and guarantee that the inlets and outputs permit unrestricted water flow into and out of the pan or dam, these would need to be regularly desilted.

One of the concerns brought up in relation to boreholes was the possibility of a single genset[21] failing after extended use. This may have an especially negative impact on the overused boreholes because they are situated in drought-reserve areas where a lot of cattle congregate during dry spells. There was also a possibility of pumps and pipes breaking down due to ageing and environmental conditions, and they could require replacement in the near future to ensure the infrastructure's functionality.

Moreover, a couple of the structures, such the washrooms, water kiosks and troughs also had wear and tear and needed modest repairs or repainting.

Photo 5: Kwa Atumia Earth Dam © Adaptation Consortium

PARTIALLY FUNCTIONAL

When investments were deemed to be partially functional, it was typically because water was still available, but some infrastructure had collapsed or there had been inadequate upkeep. Among these were specific instances such as:

- The distribution line ageing from long service and an increase in population, necessitating the extension of the distribution line (Abaqdeera Pipeline Distribution).
- The water kiosk and the trough not in use due to lack of maintenance over an extended period (Kamuthe Pipeline Distribution).
- Vandalisation of the components, including the fence, gate, tap stand, cattle trough and ventilated improved pit (VIP) latrines (Mikuyuni Earth Dam).
- Washing away of one side of the sand dam wall by floods and expanding riverbank on the washed wall (Kwa Kilii Sand Dam).
- Damage to the dam fence. Sinking of the pit latrine (Kwa Atumia Earth Dam).
- A technical issue with the installed solar system (Machesa Borehole, Wajir).
- Structures present but systems not connected. Genset missing and tank damaged. Pan filled with silt and needs desilting (Garakilo Water Pan).

NON-FUNCTIONAL

In the case of non-functional investments, water was inaccessible to the population and the water point had not served its intended purpose for an extended period (over a period of three months). Some of the factors that led to non-functionality are:

- Poor rehabilitation by partners who added layers to the weir causing siltation of the sand dam together with leakages (Raap Sand Dam).
- Rocks causing problems during drilling and preventing a borehole from being established (Kobe Dadach Guracha Borehole). Water was saline at a possible alternative site.
- Use of an alternative easily accessible waterpoint resulted in the abandonment of the Bula Traffic-Goreale Pipeline Distribution, which, over time, rendered the pipeline, water kiosks and troughs non-functional due to lack of use.
- Vandalised fence and other components eroded by floods. Spillway not properly designed, leading to breaching of the dam wall (Mutethya Nzaini Earth Dam).
- Investment built on a road network. It was highly silted and unable to be used. A new investment, established by a different organisation, had also been set up adjacent to it. Dry pan due to poor workmanship and lack of maintenance. The infrastructure was later destroyed by huge floods (Basanicha).
- Water seepage in borehole rendering it non-functional (Buruka Borehole).

NOT IN USE

Some other investments were categorised as 'not in use' primarily due to seasonality. These were water pans and earth dams in Makueni, Kitui, Wajir and Isiolo that did not hold water at the time of the survey (during the dry season) due to low or inadequate rainfall. However, they were in good condition otherwise, and had been functional during the wet season. There were some boreholes in Isiolo that had been rendered 'not in use' due to security concerns, which had forced the local community to relocate and they had stopped using the borehole. Others were simply not used at the time because of alternative water sources that were nearby.

Photo 6: A non-functional project in Shimbry © Adaptation Consortium

IV. Discussion

Factors explaining the functionality status of investments

Public good climate investments in water infrastructure, including boreholes, sand dams and water pans, are critical for addressing water scarcity in ASAL regions in Kenya. This section describes the key issues that contribute to the partial functionality or non-functionality of the investments in the five semi-arid counties as revealed by the longitudinal study. The findings reveal multiple challenges, ranging from technical issues to community engagement, governance and environmental factors.

TECHNICAL CHALLENGES, OPERATIONS AND MANAGEMENT

Poor maintenance practices

Inadequate maintenance emerged as a significant factor affecting the functionality of investments. A lack of regular upkeep and failure to replace faulty components led to a decline in performance and eventual failure. Spare parts are often not easily accessible near to the investments and, furthermore, when water points do not make enough money from water fees, there is a shortage of money to pay for replacement parts in local markets or for the technicians who can install them.

Technical design flaws

Some water projects suffer from design flaws that compromise their functionality. Inappropriate siting, incorrect earth dam depths and designs, and inadequate sizing of water pipes, as was the case with Kilkile Borehole, resulted in insufficient water flow and supply or increased vulnerability to climate-related events, especially during the dry season.

Photo 7: Flash floods render roads impassable in Gotu, Isiolo County © Adaptation Consortium

Siltation in water pans and earth dams

Water pans, designed to collect and store enough rainwater throughout the dry season, are prone to siltation. Most water pans and earth dams had accumulated a degree of sediment that reduced their water storage capacities and hampered the infrastructure's ability to provide reliable water sources during dry periods. Siltation was observed in many earth dams and water pans across the study areas.

Poor siting of investments

Siting refers to the selection of the location for water investments. When this process is inadequately executed, it can result in a range of challenges that compromise the effectiveness and sustainability of the infrastructure. Poor siting decisions often stem from insufficient geological and hydrological assessments, which lead to the installation of water sources in unreliable areas. A number of investments, such as Kobe Dadach Guracha Borehole (drilling done in a rocky area) in Isiolo and Kya Aka Sand Dam in Makueni (sited on a road network), were incorrectly sited, rendering them non-functional or partially functional.

In cases of poor siting, water infrastructure may be susceptible to insufficient yield, as was the case with Kya Aka Sand Dam and Kwa Mboo Earth Dam, where the quantity of water extracted does not meet the demands of the community due to an insufficient inlet. Additionally, inadequate geological surveys may expose the infrastructure to geological hazards, such as subsidence or instability, further jeopardising its functionality. Moreover, poor siting decisions may lead to environmental consequences, such as habitat disruption or soil erosion, impacting the overall ecosystem. Therefore, meticulous consideration of geological, hydrological and environmental factors is paramount during the siting process to ensure water infrastructure projects are strategically placed, resilient and capable of meeting the long-term needs of the communities they serve.

These cases highlight the necessity of engaging and partnering with communities during hydrological, biophysical and meteorological assessments when planning and locating water-related projects. This covers groundwater assessment, water monitoring and use of climatic information services. This kind of data should be included in the planning and development of a project in addition to being crucial for locating and guaranteeing the sustainability of investments.

Over-extraction of water

Some of the factors that contributed to the over-extraction included increased demand for water due to increase in populations and expansion of economic activities. Such cases were observed in Kamuthe and Abaqdeera Pipeline Distributions.

Climate change was another factor that led to over-extraction of water resources. Prolonged droughts can exacerbate water scarcity and intensify the reliance on available water sources, especially in drought reserve areas as seen in Isiolo. Such climate-induced stresses on water resources amplified the risks of over-extraction as several herds could converge at one point during the dry season.

In addition, changes in land use, such as deforestation, or changes in agricultural practices increased the vulnerability of water sources to over-extraction, such as when using water for irrigation during the dry season.

COMMUNITY ENGAGEMENT AND OWNERSHIP

Inadequate community involvement

Water projects depend on community participation in planning, implementation and maintenance. In some cases, projects initiated without community consultation or involvement resulted in a lack of

local ownership, leading to neglect and underutilisation of the facilities. For example, in Kwa Mutuku Earth Dam, some community members felt that they were not adequately involved in the planning and implementation of the project. This led to conflicts and, later, abandonment of the infrastructure. In other cases, an investment was vandalised due to lack of ownership within the community.

Limited training and capacity-strengthening

The inability of the site management committees to maintain investments due to a lack of technical expertise was another prevalent issue that led to the partial and non-functionality of the investments. Committee members are not trained in technical artisan skills to do major repairs on the investments. Repairs that required specialised skills could not be done on time or were not done at all because the resource persons had to be sourced from afar, and this became very expensive.

The site management committee and the communities at large also often lacked the necessary skills to operate and maintain the water infrastructure. Insufficient training on water management practices, hygiene, proper record keeping, financial administration and technical aspects of the systems in most of the projects contributed to a decline in functionality over time.

It was observed that minor repairs were often done by the site committees, frequently with the assistance of local technicians, while major repairs were primarily handled by the county water departments.

GOVERNANCE AND INSTITUTIONAL CHALLENGES

Inadequate regulatory oversight

It was observed that weak regulatory frameworks and limited enforcement of water management policies contributed to the misuse and over-extraction of water resources. The regulations currently governing CCCF do not provide financial resources for oversight visits or oversight meetings beyond the investment phase. There is no provision for regular monitoring and evaluation (M&E) of the project, unless the community raises a concern. This, in turn, hampers the sustainability and durability of the water investments due to limited M&E of the investments' efficacy. While some households would only use the water for domestic and livestock consumption, others went ahead and used the water for irrigation. This led to unequal use, risking the depletion of the water resource, especially during the dry season. There is a need to regulate the use of the water for long-term sustainability.

Complex county administrative processes

One of the most mentioned challenges hampering the major repairs was the low response rate from the county governments. This was attributed to complex administrative processes and bureaucratic hurdles in the disbursement of funds, which delays project repairs. This, in turn, impacts the provision of critical water infrastructure and undermines the intended positive impact on the communities.

ENVIRONMENTAL FACTORS

Climate variability

ASAL regions are highly susceptible to climate variability. Prolonged droughts or irregular rainfall patterns were some of the major factors that rendered most projects as 'not in use'. When water sources cannot be replenished during dry seasons, it becomes challenging for projects like sand dams and water pans to meet the intended objectives.

Salinity

The salinity of water is another factor that contributed to the non-functionality of water investments, particularly in Garissa and Wajir where two boreholes had been abandoned as the water was not fit for human or livestock consumption.

In addition, it was noted that salinity accelerated the corrosion of infrastructure components such as pipes and pumps. Over time, the corrosive effects led to increased maintenance costs, frequent equipment breakdowns and, ultimately, the abandonment of investments.

Socio-economic impacts of the investments

The investments in ASAL regions have brought about significant social and economic benefits, playing a transformative role in the lives of communities, with notable positive impacts on gender dynamics. Some of the socio-economic benefits observed include:

- Improved well-being within communities due to access to reliable water sources through investments. Construction of additional infrastructure such as VIP toilets and installation of water taps has improved sanitation and enhanced hygiene practices, which has contributed to overall well-being.
- Gender-sensitive investments prioritise the involvement of women in decision-making processes related to water resource management. Traditionally, women have shouldered the primary responsibility for water collection. This study indicates that reliable access to water from water infrastructure investments has the potential to alleviate the time burden on women, allowing them to engage in other activities such as income-generating endeavours, education, or community participation.
- Availability of water sources and shared water points has fostered a sense of community cohesion. Shared responsibility and payment of water fees for management, repairs and maintenance of water infrastructure strengthens social bonds, promoting cooperation and mutual support among community members.
- When it comes to water users, women were found to be the major benefactors of the investments, mostly using the water for domestic purposes. As the major beneficiaries of the investments, their participation in the identification and decision-making processes for these investments is important for influencing policies and practices that directly impact their lives.
- The availability of reliable water sources has increased educational opportunities for the children. Improved access to water, particularly for domestic use, has enabled children to attend school regularly instead of spending hours collecting water sometimes before or after school, and in other times during school hours.
- In several areas, it was observed that investments in water infrastructure were supporting agricultural activities, enabling communities to cultivate crops and engage in livestock rearing. This increase in agricultural productivity enhances food security and provides opportunities for income generation.
- The establishment and maintenance of water infrastructure has created employment opportunities within the communities. When there are minor maintenance issues, local technicians are paid to carry out these repairs. Moreover, through construction, operation, or maintenance, the investments contribute to local job creation, fostering economic growth.

Environmental impacts of the investments

The investments in these arid and semi-arid counties have yielded significant ecosystem benefits, contributing to environmental sustainability and biodiversity conservation. Some key benefits that have emerged include:

- Habitat restoration and preservation have improved through interventions such as sand dams and water pans, which create microenvironments conducive to plant growth, attracting wildlife and fostering the regeneration of natural habitats.
- Soil erosion and degradation has been prevented through improved management practices. Projects like sand dams have helped retain water in the landscape, reducing the impact of erosive forces and promoting soil fertility. This, in turn, supports the health of ecosystems and contributes to sustainable agriculture.
- The restoration of ecosystems that support water availability for the investments enhances ecosystem services such as water purification, groundwater recharge and nutrient cycling. These services are vital for the overall health and functionality of ecosystems, benefiting both human communities and the natural environment.
- The provision of habitats for wildlife, particularly during the dry season when water availability attracts various species, contributes to the conservation of biodiversity and the overall health of the ecosystem.
- Practices such as afforestation, as observed in various sites around investments, and the restoration of degraded lands contribute to increased resilience against drought. Vegetative cover helps retain moisture, preventing water scarcity during prolonged dry periods and maintaining ecosystem functionality.
- The promotion of sustainable land use practices minimises the negative impact on ecosystems. By integrating water management with agriculture, livestock rearing and other land uses, these projects contribute to a more harmonious relationship between human activities and the natural environment.

The investments in semi-arid regions not only address climate change adaptation and water security but also deliver substantial ecosystem benefits. These projects showcase the potential for holistic and integrated approaches that align human development with environmental conservation, promoting the long-term health and resilience of both communities and ecosystems.

Asset maintenance

In some cases, site committees collect water fees or contributions from water users to pay for minor repairs. These repairs, such as plumbing, installing live fencing, maintaining gensets and plastering to fix small leaks are usually done by local artisans and technicians. The completion times for these small repairs varies depending on the level of the damage that must be repaired and the accessibility of replacement parts on the local market.

In certain cases, partners have helped with the repairs as well. For instance, Arid Lands Development Focus Kenya has repaired a lot of water troughs, piping systems, water kiosks and solar systems. The Yatta Borehole, solar panels and plumbing systems have all been repaired with help from the Wajir Water and Sewerage Company. In other cases, the county water departments are mostly responsible for the major repairs.

Table 4: Lessons learned in each county in prioritised thematic areas

Theme: Policy – county and national				
County	County-specific lessons	Recommendations for county and national government	Recommendations for development partners	Recommendations for community
Garissa	The legal and regulatory framework should provide for resource allocation that enables sustainable management of new and existing investments.	Both county and national level policies need to facilitate supportive resource allocation, in particular consistent budget allocation for operations.	Support policy reforms and harmonisation for the existing related policies, e.g. the county Water Act and CCA need to be reviewed to ensure they provide for resource allocation to manage investments after they are implemented.	Ensure communities' views are considered during policy reforms and harmonisation processes.
Isiolo	A policy framework exists at the county level but needs to be implemented. The Isiolo County rangeland management bill needs to be enacted and operationalised.	Lobby for the enactment of the county rangeland management bill. Strengthen capacity within county government for the bill to be implemented.	Support the reforms that mainstream climate change and rangeland management programmes to county level policies and priorities.	Advocate for the formalisation of existing customary practices, such as the Detha system, with regards to rangeland management.
Kitui	Although the Kitui Climate Change Act provides for county budgetary allocation to their CCCF, the county had not allocated any funds as of October 2023.	Strengthen capacity within the site/project committees to attain full functionality that is sustainable over time. Use an integrated, cross-cutting policy approach that catalyses the mainstreaming of climate change into county departments' development plans.	Share learnings from the implementation of the pilot phase of the CCCF that can be used to support the successful upscaling of the CCCF mechanism.	Request training on climate policies and the CCCF mechanism so as to be able influence the implementation of policies.
Makueni	The existing county-level policy and legal framework need to be *fully* implemented.	Strengthen the implementation of the existing policies at county and national levels. Mainstream the policy and legal framework into all sectors. Review the County Climate Change Fund (CCCF) Act to include all aspects of climate change governance in the county, i.e. to include monitoring and evaluation (M&E) and climate information services. Formulate national climate change regulations.	Align priorities to the national and county government policy frameworks. Include the county Climate Change Action Plan (CCAP) 2023 in their development agenda. Mobilise resources for community capacity-strengthening on the national and county policy. This would include development of outputs that are accessible and understandable to community members. Ensure newly-elected members in committees receive training and capacity-strengthening support around locally-led climate financing and leadership.	Request training on national and county policies that could be used to implement climate-resilient interventions in their communities.

County	County-specific lessons	Recommendations for county and national government	Recommendations for development partners	Recommendations for community
Wajir	There is an inadequate policy framework in place. It includes finance but lacks other components like environment and waste management. The CCCF Act is not in line with the national climate change legislation as the national legislation was reviewed in 2023, well after the CCCF was established.	The Climate Change Unit (CCU) in the county government needs to review the CCCF Act in line with updated national legislation. The CCU needs to increase the percentage of financial allocation to the CCCF. The CCU needs to review and publish the CCAP and the PCRA for public access.	Hold the county government accountable to implement the CCCF Act and policies fully. Form part of resource mobilisation efforts to ensure access to necessary monies (for example co-funding mechanisms). Assist with capacity-strengthening for policy development for CCU staff and community members (ward and site committees). Empower Ward Climate Change Planning Committee (WCCPC) so they know their role and are held accountable.	Provide training on national and county policies and acts to increase awareness amongst community members. Investigate ways to influence county government investments, especially around planning and budgeting.

Theme: Sustainability of investments				
County	County-specific lessons	Recommendations for county and national government	Recommendations for development partners	Recommendations for community
Garissa	There is a lack of asset management planning, integration of life cycle cost of infrastructure, or M&E after initial implementation and development of financing mechanisms and approaches.	County or national government need to ensure that sufficient funds are allocated for the ongoing upkeep of the existing infrastructure throughout its lifespan.	Support capacity-strengthening for county and communities on M&E.	Lobby for training in record-keeping and basic project management to strengthen their capacity to manage investments post implementation.
Isiolo	Unless there is a dedicated budget for major repairs and maintenance, projects are less likely to be sustainable.	Prioritise budget allocation for major repairs of existing infrastructure and partnership with water agencies mandated with water provision. Build capacity of the community, including water resource users associations.	Aligning interventions and maintenance and rehabilitation works to the county priorities. A good example in this regard is the rehabilitation of the Mokori catchment that was done by LVIA in 2022.	Strengthen community participation in water resource users associations.
Kitui	The Kitui CCCF regulations allocate up to 2% of the development budget for climate change, but an operational fund to manage investments is also needed.	Review the legislation to include resource allocation for an operational fund for O&M.	The development partners need to align their approaches with the county policies and plans to ensure sustainability through government institutions.	Advocate for community involvement and consideration of lessons learned over time in managing the existing investments to inform budgetary allocation procedures.
Makueni	The county policy framework guides the county government to allocate 2% of its development budget to climate financing under the structures set out in the CCCF mechanism. However, the allocated budget is not enough to fully finance all the climate investments as outlined by the Makueni County CCAP. A more participatory and inclusive approach in managing water investments will need to be developed and embraced to ensure sustainability continues and increases in the future.	The county government should strengthen integration of climate change into its programming and development work across all 10 departments. The county should further strengthen its partnership network to scale out its investments across the county.	Development partners should mobilise resources to assist the county government in financing climate change investments. Development partners should come together to develop a joint work plan to push implementation of the county action plan. The development partners should combine efforts with counties to improve county-based M&E frameworks and track functionality at county level annually in order to increase sustainability.	Encourage committee members to regularly meet, conduct site inspections, and implement repairs as soon as they are needed.

County	County-specific lessons	Recommendations for county and national government	Recommendations for development partners	Recommendations for community
Wajir	The CCU utilises technical officers from relevant departments to provide O&M services that have sustained the investments. For general and operational maintenance, the site committee members are trained to carry out O&M and are connected to where the available spare parts are, ensuring timely repairs and, by extension, the sustainability of the investments. Project sustainability is affected by the lack of available Climate Information Services (CIS) and the limited dissemination of climate information to the community. There is also a limited availability of funds (2% is insufficient), a lack of local ownership of projects, and issues created by seasonality (for instance, projects being abandoned because of the lack of water).	The county CCU needs to increase financial allocation to the CCCF factoring in funds for O&M and M&E. County or national government could help train locals on O&M. County or national government needs to encourage adequate community engagement to increase their ownership and, in turn, the sustainability of the projects. Prioritise restoration of water ecosystems that help to recharge water sources and focus on putting up investments that function both during the wet and dry seasons. Explore various means of disseminating climate information to ensure its use in siting and designing investments.	Development partners can help provide support for awareness creation and training for the community. Development partners can assist with CIS dissemination (through respective channels). Development partners can help benchmark between counties to support knowledge sharing of good practices. Development partners can support programmes that use landscape approaches to restore water ecosystems.	Lobby for training in O&M and project management skills. Actively participate and engage in restorative projects.

Theme: Governance				
County	County-specific lessons	Recommendations for county and national government	Recommendations for development partners	Recommendations for community
Garissa	There are gaps in governance where the water users association committee is neglecting their role in managing the water investment facility, leading to abandonment and a non-functional water project.	The county needs to align and work collaboratively with other institutional mechanisms and governance structures to facilitate effective planning, implementation, and management of water infrastructure projects.	Support capacity-strengthening for management of the water resources to enhance sustainability.	The community should strictly adhere to the provision of the water legislation in electing management committees and in consideration of term limits.
Isiolo	Governance should also look at inter-county conflict management and resolution. Capacity for M&E should be strengthened.	Work with counterparts in other counties for improved management and utilisation of established co-benefit schemes. Strengthen capacity for M&E.	Support the government in peace-building actions. Support capacity for M&E.	Community-based organisations, leaders, elders, chiefs and women representatives, etc., should lead and participate in peace building processes. Participate in M&E processes.
Kitui	Some investments were found to be non-functional due to the unavailability of water. Rivers had dried up as a result of the prolonged drought at the time and human activities upstream.	Collaborate with neighbouring counties to manage water ecosystems to increase accessibility to water and partner with non-state actors for water development. Use climate information to help determine site investments.	Collaboration between non-state actors and the county government is key in bringing additional resources, expertise and support for restoration of water ecosystems, and implementing and sustainably managing water projects.	For water projects to be successful, it is important to ensure active participation from the local communities in decision-making and project planning so that the project meets the specific needs of the target communities.

County	County-specific lessons	Recommendations for county and national government	Recommendations for development partners	Recommendations for community
Makueni	The county has a governance structure for CCCF investments where relevant stakeholders are involved in planning, design, implementation and management. At the design stage, climate-proofing and the principles of Sustainable Land Management in some cases need to be applied.	The water department should take full ownership for sustainability once water projects are handed over to them to help keep the projects running. For more sustainable management, the site/ sustainability committees need to be more empowered in the spirit of devolution and public participation to impartially oversee implementation and effectively budget in order to manage timely repairs on their own.	Development partners should collaborate to complement each other's projects, which might result in bigger impacts and better sustainability, rather than silo projects that sometimes duplicate each other's work.	The community should take full ownership and offer security to the projects. There should be no issues of mismanagement or vandalism.
Wajir	There is a need for proper project planning, budgeting and design. This should include adequate community participation, project identification and siting.	The CCPCs should strengthen the capacity to oversee the implementation of investments to ensure the service provider delivers the expected investments as per the budgeting and design standards. In addition, there should be training for the project management committee before the investment is handed over to them. Create the necessary processes for regular documentation and learning to improve existing systems. The county CCU should conduct regular joint monitoring and evaluation with the relevant departments.	Support sensitisation and awareness of the WCCPCs importance in participating in procurement processes. Support capacity-strengthening in investment management skills and monitoring for the project management committee.	Both ward and site committees need to participate in the procurement and implementation processes to ensure quality work is done. Committees need to monitor and keep accurate records for the implementation process by the service provider. Committees need to report any questionable activities to the county government and development partners without repercussions attached.

Gender and social inclusion based on use				
County	County-specific lessons	Recommendations for county and national government	Recommendations for development partners	Recommendations for community
Garissa	Ensuring community engagement in the PCRA process, such that the two-thirds gender rule is considered in decision-making processes, is important to ensure inclusion of women and other marginalised groups in the community in decision-making.	Engage local communities in the planning, implementation and maintenance of water infrastructure at the county or national level to help ensure success as they are the main beneficiaries of the investments.	Lobby, advocate for and strengthen the capacity of government institutions to develop and implement socially inclusive policies.	Lobby and advocate for women to be leaders in water management since the duty of water fetching in rural areas is the responsibility of women and they have a clear understanding of their needs.
Isiolo	Participation has improved, but there is still the need to strengthen gender and social inclusion, especially at the site committee level. For instance, there is improved participation of women in the Detha system, although this system was traditionally reserved for men only.	Sensitise and increase awareness for the community, including women and female members of water committees, on the importance of their participation in planning, decision-making and management of investments to ensure all views are considered in the investment's entire lifecycle.	Development partners can help support the capacity-strengthening of the community, including female members of water committees, on the importance of social inclusion.	At the community level, the active participation of women is essential. Women should participate in all responsibilities, from planning, to design, implementation and M&E.

County	County-specific lessons	Recommendations for county and national government	Recommendations for development partners	Recommendations for community
Makueni	At the project design stage, it is important to consider accessibility and utilisation of an investment by all. The CCCF mechanism allows for social inclusion in community structures and forums, and the views of all the members are considered. However, some of the investments are not accessible to people living with disabilities (PWD).	The county government needs to facilitate the improvement of the investments to allow PWD and other disadvantaged groups to access and utilise them. County government needs to ensure that their policies on inclusion are adhered to in the planning structures.	Development partners should adhere to the county and national government inclusion policies in their planning and project implementation to ensure that their projects allow accessibility to all, including those living with disabilities.	While planning for and designing public good investments, community members should always ensure that their views and aspirations are included so that the investments established are easily accessible by all community groups. Ensure views from any member are considered without any discrimination despite the gender, race or status.
Wajir	The design of the project sometimes affects the degree of accessibility for some user groups. For example, women cannot easily access water projects without a water kiosk nearby. As the Somali community is largely patriarchal, women are not automatically included in planning and decision-making. The ratio of household chores means that women are burdened by household roles and responsibilities, which can be exacerbated during the seasons (i.e. when it is dry and men travel to other areas for pasture and water). Lack of security limits women's participation in high-risk areas.	County government must ensure that the 30% gender rule is enforced. Technical staff in the county CCU need to comply with all policies regarding gender equity and social inclusion. Gender representation in decision-making needs to be considered when selecting service providers that develop and implement projects.	Advocate for gender inclusion during project planning and design stages. Create awareness on the importance and value of gender representation.	Ensure that there is full participation of women, youth, PWD and marginalised communities.

Photo 8: A woman washes her hands at a water trough in Wajir Bor Ward © Adaptation Consortium

V. Conclusion

This longitudinal study has assessed the functionality of five pilot CCCF investments in water infrastructure in the ASAL counties of Garissa, Isiolo, Kitui, Makueni and Wajir. It has revealed that whilst the levels of functionality of these investments were varied, going up in some areas and down in others, more than half of the investments are still functional eight to ten years after implementation. This demonstrates that applying the principle of subsidiarity to investments - where communities identify, design, implement, and manage investments - fosters community ownership and the sustainability of locally-led climate actions, strengthening communities' resilience to climate change and improving their well-being. Communities, through their local leaders and structures, and traditional systems of management, are well-sensitised and aware of the issues they need to tackle concerning the water infrastructure in their areas.

However, the study has also shown that challenges raised in the 2019 study still persist in some sites, and that these challenges remain varied and interrelated, ranging from technical, environmental, social and operational, to those related to governance. Some challenges were specific to particular county contexts and even particular sites such as transboundary conflicts over resources in Isiolo, and inaccessibility of water resources due to geological formations that hinder drilling in Kitui. Others were common to all counties such as the lack of routine operations and maintenance (O&M). Boreholes were found to be the more viable type of infrastructure and offered more satisfactory services to the communities than seasonal water pans. What follows is an overview of the key findings from all the study sites across the five counties.

On the technical side, issues appeared later in the investments' lifecycle due to limitations at the design stage such as the mismatch between water yield levels of some assets with demand, and access to and incorporation of climate information. Insufficient data to guide decisions and sufficiently climate-proof the investments was noted to have led to poor siting in some cases, causing non-functionality or leading to the need for frequent repairs. During the design of the investments, climate information was supposed to be used to guide the decisions, but the climate information available at the time was not adequate for purpose, so some of the sites were improperly selected. Siltation of water pans was common across all counties. An integrated, ecosystem-based approach to implementation could have helped solve some of the problems associated with siltation of the dams. In this regard, landscape restoration components need to be introduced upstream of the dams to protect the dams from siltation.

Insufficient infrastructure maintenance was found across all sites. At the county level, there is no dedicated budget allocation for O&M of existing climate projects under the legislations establishing CCCF. Community management committees do not have access to the type of resource allocation needed to support the routine O&M of the investments. Therefore, major repairs are put on hold due to a lack of funds and accessibility of spare parts.

Challenges related to governance aspects of the investments supported by the CCCF were also revealed. This ranged from committee management gaps and regulatory lapses to coordination issues. Transparency and accountability on the part of the local level implementation committees is low in some cases, and resourcing at county level institutions is insufficient to provide the necessary oversight. Water departments and institutions are unable to provide the necessary oversight and support to communities after infrastructure implementation.

In some cases, a lack of clearly defined roles and responsibilities between county government and community groups led to uncertainty around ownership of the investments. Addressing the identified challenges required collaborative efforts among various stakeholders, including local communities, government institutions, non-governmental organisations and development partners. This was aided by regular community engagement and the building of relationships across the different groups.

The membership in WCCPCs is dynamic and requires regular refresher training due to term limit criterion. Knowledge and skills in technical and management areas need to be increased and build on earlier trainings. Most investments have functional water committees, but few members are trained on operations and maintenance, as well as other project management aspects of the facilities. All WCCPCs had representation from both genders, although there were fewer women at all the sites visited.

In some cases, communities mobilised themselves to create alternative sources of water adjacent to the projects. For example, when the water pan dried up in Kitui, the community mobilized their own resources and dug a well nearby, and when the pump failed to draw water from the Tana River in Garissa, they sought support from the Safaricom Foundation, who dug a borehole and used the existing pipeline network to supply water to the community. The innovation and resilience demonstrated in some of the community-driven projects was found to attract other development partners and corporate social responsibility partners to adopt the model and boost climate resilience efforts.

The findings underscore the need for holistic, community-centric approaches to water resource management. Traditional and Indigenous institutions and experiences are important in enhancing the functionality of resilience investments and in anticipating and withstanding climate variability and extreme weather events to improve effectiveness, value for money and sustainability of the investments. They should be supported by policies, resources, training and engagement at county and national level. Individual technical reports together with briefs for each country have been drawn up that provide evidence and findings specific to the context of each of the study sites, which can be used to substantiate suggested measures and recommendations. The findings should be considered to ensure that scale-out of adaptation measures at the local level, such as those to be implemented by the FLLoCA programme, build on learnings for increased sustainability into the future.

The study has served as a stark reminder of the impact that the functionality and sustainability of water investments have on communities now and into the future. Long walks to fetch water during the day keep children - particularly girls - away from school, and when these walks have to be done in the evening due to crowding at sites, such as in Kitui, they expose women and children to risks including wild animals and sexual assault. Furthermore, these walks are simply not possible for the elderly and PWD. Functioning investments on the other hand have led to improved and diversified livelihoods, as well as better functioning ecosystems. They have also led to improved conditions at schools. When communities are able to have financial, legal and government backing to implement their solutions to water security ownership, the functionality of these investments bring with them numerous benefits.

VI. Recommendations

Based on the findings, a number of recommendations are made. They emphasise the importance of community empowerment, capacity-building, climate-resilient designs and strategic partnerships. By implementing these measures, we can pave the way for more resilient and sustainable investments that not only meet the immediate needs of the communities but also contribute to their long-term well-being in the face of evolving climatic conditions.

Functionality

There is a need to consider, seek and obtain all the information necessary for the planning and design of earth dams to ensure that even during seasons of less rainfall they can still hold adequate water to be used during the dry season. Hydrogeological experts or hydrological survey reports should be consulted to inform site selection and design to correctly identify potential sites. To minimise corrosion in the highly saline boreholes, replacement of galvanised iron (GI) pipes with unplasticised polyvinyl chloride (UPVC) pipes is a primary repair need for the investments. Additionally, cheap and easy-to-get replacements are required because the GI pipes are heavy and costly for the community to maintain.

Sustainability

To improve the sustainability of investments, emphasis should shift towards O&M, rehabilitation of existing water points, improved governance and M&E among other aspects. Appropriate regulatory frameworks are required to facilitate supportive resource allocation, as well as a commitment to allocate consistent budget for the O&M of the water infrastructure.

Governance

Advocating for policies and laws or regulations that support sustainable water management and resource allocation for O&M expenditure is essential, as well as engaging with the local and national policy-makers to prioritise water sustainability. It is also important to strengthen public participation to influence resource allocation for resilience building and for major repairs of the investments. This can lead to the development of supportive regulatory frameworks and resource allocation for not only the investments but also for oversight, maintenance of the water infrastructure, and learning.

Land easement and parcel allotment to transfer land rights are required for the parcels of land where the public investments are sited. The action will solve the issue of land tenure for the investments and prevent conflicts of interest, such as water resources being run like an individual property. The climate governance structures should make use of the current laws in land ownership to help solve land issues.

Climate information

Strengthening the provision of actionable climate information at community level to guide decisions, planning and implementation is essential. This requires attention to be paid to changes in the way climate information is currently provided to communities. Future projects, therefore, should incorporate local climate information at the initial design stage, with close monitoring during implementation to detect and rectify any technical issues and ensure the projects are constructed to standards. Therefore, Climate Information Services (CIS) investments need to be improved, with the help of the Kenya Meteorological Department.

Capacity-strengthening

There is a need for capacity-strengthening of the local community planning committees and site management committees in terms of good governance and certain technical aspects, like water resource management, O&M, financial management and bookkeeping. The capacity of community members also needs to be strengthened for lobbying and advocacy to get more partners and implementers on board for the purposes of adding on to their projects. Awareness raising, community sensitisation and capacity-strengthening need to be continuous activities under CCCF because the dynamics of the stakeholder participation in the local committees and implementation teams vary widely. Due to the changing leadership of the management committees, there is a need for continuous training on O&M for both ward planning committees and the site management committees.

Gender and social inclusion

While it was noted that women are included and participate within the management committees, this is not universal. Counties need to encourage more women to take up roles in the management of the investments, including leadership positions in the committees. Additionally, to ensure social inclusion, representation and participation from all genders, youth and PWD should be encouraged in these committees, as women, youth and PWD were underrepresented in the sites visited.

Photo 9: A focus group discussion at Kwa Ndambuki Sand dam © Adaptation Consortium

Ecosystem-based adaptation

Landscape restoration activities need to be introduced within the water catchments to increase water recharge, reduce the speed of surface water flow and reduce the amount of silt that gets to the water reservoirs. A landscape approach such as a sustainable land management (SLM) or a watershed catchment model is required to address some of the challenges identified, like the frequent siltation that is a major cause of non-functionality. The landscape approach proposed may require transboundary (cross-ward, cross-county or even cross-country) collaboration. This approach has not been taken under the CCCF mechanism but needs to be considered. The focus of the CCCF mechanism has been on the water resource site and not on the issue of catchment conservation. Additionally, future investments should consider including environmental and climate change impact assessments to safeguard against risks associated with some projects. Programmes on catchment protection also need to be strengthened at the community level to ensure that riparian land and the water catchment areas are well under protection. Undertaking landscape restoration actions in the water catchment areas upstream of the water structures will reduce the siltation process.

Traditional institutions and Indigenous knowledge

The recognition of traditional institutions and Indigenous knowledge to legitimise local action is very important in the sustainability of the investments. It enables communities to articulate their knowledge of critical resources and resilient livelihood systems in the face of climate variability and change, in a manner that policy-makers can understand, appreciate and support.

Community-led monitoring, evaluation and tracking

There is a need to strengthen monitoring, evaluation and tracking systems for ease of follow-ups, reporting and holding each other and the government accountable for the sustainability of investments. Regular M&E by site management committees will enable early detection of faults and timely interventions to maintain functionality. Early monitoring will help in identification of issues and resolution of faults.

Photo 10: A farmer in Wajir with his capsicum plants © Adaptation Consortium

Photo 11: A woman carries water on her back at Kwekuyu water kiosk © Adaptation Consortium

Endnotes

1 The Adaptation Consortium (ADA) works to support county governments in Kenya to mainstream climate change into development and planning through the County Climate Change Fund (CCCF) mechanism.

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20 The term 'not changed' means the status has not changed from the status in 2019. 'Improved' means there is an improved status since the 2019 study, and 'dropped' means the status has dropped since the 2019 study.

21 A genset, also known as a generator set, is a portable power supply source that consists of an engine and a generator.

Appendix I

CCCF investments functionality survey tool	
A. General information	**Project ID:**
Name of enumerators/officers:	Date:
County: _____ Sub-county: _____ Ward: _____ Village: _____	
Year CCCF project implemented: _____ GPS Longitude: _____ Latitude: _____	
Respondent/s relationship to the project? (Indicate relationship and gender): 1. Site committee member (indicate how many males and females) _____ 2. User/beneficiary _____ 3. WCCPC member _____ 4. Other, specify _____ Gender? Photos taken at site (tick) ☐ YES ☐ NO	
B. Functionality (looks overall at the investment, key components come later)	
1. Is the water investment currently functional (choose one option and explain why)?	
If the investment is *partially functional* or *non-functional*, answer: 2. Number of years/months/days the investment has been partially functional or non-functional? Years: _____ Months: _____ Days: _____	

	Tick one	Describe the condition	Reason
Functional			
Partially functional			
Non-functional			

3. What efforts are being made to repair it? _____
_____
_____

4. Who does these repairs? _____

If the project is *functional*, answer:

5. Are there any emerging problems that might lead to non-functionality in the future?

☐ YES ☐ NO

If **yes**, describe the problem that might lead to non-functionality in the future. What are you doing to ensure it continues to function? _____
_____
_____

6. Has the project been out of service in the last month? ☐ YES ☐ NO

If **yes**, number of days: _____

Reason: _____

What is being done about it? _____

Repairs

7. How are repairs usually carried out? (tick all that apply)

	Minor	Major	Details
Reliant on county water department			
Reliant on private company			
Reliant on a trained local technician			
Other, specify			
Do not know			

8. How long does it usually take to carry out repairs? _____

Who usually pays for repairs? (Tick all that apply)

	Minor	Major	Details (Indicate actual cost of repair)
User committees from water fees			
County government			
Water users (from contribution)			
Other, specify			
Do not know			

9. What challenges are faced in carrying out repairs? (tick all that apply)

	Minor	Major	Details
Slow response times from county government, private company or technician			
Limited or no funds			
Lack of available spare parts			
Other, specify			
Do not know			

10. How was the decision about siting made? (e.g., who was involved, who initiated the process etc.)

_____

_____

_____

12. In your opinion, was the investment appropriately sited? ☐ YES ☐ NO

Why? Describe the process (e.g., did it take on local knowledge, was it participatory, or where most convenient etc.)? _____

_____

_____

C. Project specific components (to be filled out by engineer/technical team)

1. Was the investment a new project or rehabilitated project? ☐ NEW ☐ REHABILITATED

Components	Project components (tick all that apply)	Components funded by CCCF? (tick all apply)	Quantity OR capacity	What is the component condition*	Describe the condition, technical workmanship	What repairs do you think are needed? At what costing?
Excavation / Drilling						
Desilting (pan)						
Draw off system						
Piping distribution system, specify type						
Distribution/ Collection Chambers						
Concrete wall						
Gutters (rock) / Inlet-outlet (pan)						
Abstraction/SUMP well						
Pump / power house						
Pump, specify type						
Power, specify type						
Fencing, specify type						
Guard/operator house						
Tank 1: type, capacity						
Tank 2: type, capacity						
Water kiosk / tap stand						
Livestock troughs						
Sanitation facility						
Other, specify						

*Condition: 1=good; 2=poor; 3=not in use; 4=other (specify)

2. Do the components deliver what the project intended? ☐ YES ☐ NO

If **no**, explain: _____
_____
_____

3. Do you think the project meets the required standards? ☐ YES ☐ NO

If **no**, explain why: _____
_____
_____

4. Do you have any other technical observations? ☐ YES ☐ NO

If **yes**, explain: _____
_____
_____

D. Investment management (to be filled out with site committee and beneficiaries/users)

1. Describe the process that led to the design/planning and implementation of the investment
2. Was the design and siting of the investment socially inclusive e.g. did it consider PWD in terms of accessibility?
3. Are you satisfied with the process that led to its design? If yes, what was good about it? If not, what did you not agree with?
4. Are you satisfied with the process that led to its planning? If yes, what was good about it? If not, what did you not agree with?
5. Are you satisfied with the process that led to its implementation? If yes, what was good about it? If not, what did you not agree with?
6. Which are and how are the maintenance plans and strategies implemented?
7. Who was involved in those decisions and do you think everyone that needed to be there, was there? (e.g. was there gender representation and social inclusion)
8. Who else should have been there (was the decision-making gender sensitive and socially inclusive)?
9. What year was the committee established?
10. How many members are on the committee?
11. What is the composition of the committee? Men_____ Women_____ Youth_____ PWD_____
12. What is the role of the site management committee?
13. Are they performing their roles as expected? If no, what do you think could be improved?

14. Who did the selection of the site management committee? Describe the process of the selection? What's their office tenure?
15. Is the management entity currently active? If no, why not?
16. Have the committee members received any training? Details (e.g., who trained them, when, where, trained on what?) etc.)
17. Which are the challenges/problems experienced with the investments? (e.g., in terms of management, access, decision-making, use etc.) Please explain/ list.
18. Is there a redress mechanism? Describe the process.
19. In your opinion, what are the suggested solutions to these challenges?
20. What do you think should be done differently to avoid the above challenges/problems in other projects?

E. Investment use (to be filled with site committee/users)

1. What is the water used for? (tick all that apply)

	Tick	Details
Domestic		
Agriculture		
Livestock		
Micro-irrigation - gardening		
Afforestation within the compound		
Other, specify		

2. What are the different uses of water by the different social groups? Who uses water the most? (Rank)

	Uses	Rank
Men		
Women		
Youth		
Elderly		
PWD		
Other, specify		

3. How many households use the water point? Wet season_____ Dry season_____

4. How many households use the water for domestic drinking? Wet season_____ Dry season_____

5. Of these households, who collects the water (%)? Women_____ Men_____ Children_____

6. Of these households, how many of them have to walk (%) Less than 1km to collect water_____
1-2kms to collect water _____ More than 2kms to collect water_____

7. How many heads of animals are served by the water point?

	Wet season	Dry season
Cattle		
Sheep/goat		
Donkey		
Camel		

8. How is the water yield for domestic, livestock or other productive uses, in the wet and dry season? (1 = Adequate, 2 = Inadequate, 3 = Water point not in use, 4 = Do not know)

	Wet season	Dry season
Domestic water		
Livestock water		
Other productive use 1 (specify)		
Other productive use 2 (specify)		

9. Is there a schedule for water access for domestic, livestock or other productive use?

	No	If Yes, please describe
Domestic water		
Livestock water		
Other productive use 1 (specify)		
Other productive use 2 (specify)		

10. Do households pay for water for domestic, livestock or other productive use?

		No	Yes, how much (K.sh)?	Who/ how do they pay?
Domestic water	(per 20 liters)			
Livestock water	Camels			
	Cows			
	Sheep/goats			
	Donkey			
Other productive use 1 (specify)				
Other productive use 2 (specify)				

11. If there is another mode of payment apart from cash, please give details? (payment type, frequency, agreement etc)

12. What is the water quality for domestic or livestock drinking?

	Good	Poor	Give details
Domestic drinking			
Livestock drinking			

13. How is the water tested to determine its safety? Who tests it? How often?

14. If the water is unsafe, what are the specific concerns?

15. Does the design and spacing allow for multiple users? Describe.

16. What other benefit/challenge has the project brought to the environment/community?

Positive benefits	Describe	Unintended (negative) consequences	Describe
Men		Men	
Women		Women	
Youth - female		Youth - female	
Youth - male		Youth - male	
PWD		PWD	
Elderly men		Elderly men	
Elderly women		Elderly women	

17. What do you think can be done to ensure long-term sustainability of the project?

18. If the planning, design and implementation (and monitoring) of this project were to be done again, what would you recommend is done, by whom and how?

19. Any additional comments or concern?

Appendix II

CCCF investments functionality survey

Principal investigator: _____

Site visited: _____

County: _____

Purpose of study

Adaptation Consortium (ADA) works to support county governments in Kenya mainstream climate change into development and planning through the County Climate Change Fund (CCCF) Mechanism. Through the CCCF, over 100 climate change public good investments including water projects were implemented across the five pilot counties and these continue to provide communities with services and climate resilience. The purpose of this study is to investigate the technical and governance benefits and challenges of implementing public good investments that seek to build the resilience of communities in the ASAL counties. The study will unpack the current status, obstacles to technical and governance challenges, focusing on the technical workmanship, standards on design and quality assurance, as well as knowledge skills and practices needed. ADA intends to conduct this study to provide a practical way forward for the current modalities of climate change public good investments at community level linking to the county level to ensure sustainability of investments especially water service provision.

Please tick the appropriate box	Yes	No
The purpose of the study has been fully explained to me or I have read and understood the purpose of the study		
I have been given the opportunity to ask questions about this study		
I agree to participate in the study and understand that taking part in it may include completing a questionnaire, taking part in focus group discussions, being interviewed and being recorded (audio-visual).		
I understand that my participation in the study is voluntary and that I may choose to withdraw from the study at any time without having to give any reasons for my withdrawal and without any implications		
I understand that any information, including my personal details, that I provide during this study will be held in confidence		
I agree to my audio-visuals and/or words being quoted in web pages, reports, publications or any other research outputs		

Name of participant	Signature	Date
_____	_____	_____
Name of Investigator	**Signature**	**Date**
_____	_____	_____

Photo 12: A borehole in a strategic grazing reserve, Isiolo County © Adaptation Consortium

Young men in Wajir walk for long distances in search of pasture and water. © Adaptation Consortium

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