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LOCALLY-LED ADAPTATION: MOVING FROM PRINCIPLES TO PRACTICE IN THE WATER SECTOR

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ABSTRACT

Climate change adaptation is a major global challenge and key to securing livelihoods and economies in the Global South. Locally-led adaptation (LLA) is gaining momentum as an approach to integrate local context, address equity concerns, and enhance the efficiency of adaptation efforts. This study focuses on LLA in the water sector, examining progress and lessons learnt from water adaptation initiatives in East Africa's drylands. The report introduces an assessment framework to evaluate how case studies of water adaptation align with the LLA principles, supplemented with a principle on Nature-based Solution (NbS) in recognition of its potential in locally-led water adaptation. The framework is then applied to six water adaptation case studies in Kenya and Tanzania. It focuses on the governance and finance processes that prioritise the agency of local actors, and explores the adaptation outcomes, emerging social and environmental impacts, benefits, and sustainability of interventions.

ABBREVIATIONS

ASAL	Arid and Semi-Arid Lands
CBA	Community-Based Adaptation
CCCF	County Climate Change Funds
CCCPC	County Climate Change Planning Committee
EbA	Ecosystem-based Adaptation
EDA	Enhanced Direct Access
EDE-CPIRA	Ending Drought Emergencies Climate Proofed Infrastructure programme
FLLoCA	Financing Locally-Led Climate Action
LLA	Locally-Led Adaptation
M&E	Monitoring & Evaluation
MEL	Monitoring, Evaluation & Learning
NAPs	National Adaptation Plans
NbS	Nature-based Solutions
NDCs	Nationally Determined Contributions
O&M	Operation & Maintenance
RUWASA	Rural Water Supply and Sanitation Agency
PBCRG	Performance-Based Climate Resilience Grants
SCMP	Sub-Catchment Management Plan
WCCPC	Ward Climate Change Planning Committee
WRA	Water Resource Authority
WRUA	Water Resource Users Association
WSTF	Water Sector Trust Fund
UNCDF	United Nations Capital Development Fund
UNFCCC	United Nations Framework Convention on Climate Change

EXECUTIVE SUMMARY

Climate change adaptation is a major global challenge that is key to securing livelihoods and economies in the Global South. Locally-led adaptation (LLA) is gaining momentum as an approach that can integrate local context, address equity concerns, and enhance the efficiency of adaptation efforts. LLA aims to empower local actors by giving them decision-making authority over climate funds, resulting in solutions better tailored to local conditions. LLA is guided by the LLA principles, a set of eight principles endorsed by over 120 organisations globally, to ensure that adaptation approaches are effective, equitable and transparent. However, despite its critical importance in adaptation, only limited knowledge exists of experience of LLA implementation on the ground, especially in relation to water.

Water and climate change are closely linked, with water being the primary medium through which people experience climate change impacts. Approximately 60% of all adaptation interventions focus on water-related risks and impacts, which receive a significant share of global adaptation finance. Funding is typically dominated by large or 'grey' infrastructure for water development and management. While improving water access and availability, grey infrastructure comes with challenges such as high construction and maintenance costs, reliance on specialised technical knowledge, limited versatility, and difficulty in adapting to changing environmental conditions. There is growing attention to nature-based solutions (NbS) in water adaptation. NbS provide an alternative to grey infrastructure in the shape of 'green' infrastructure that uses or mimics natural systems to improve water quantity and quality, offering more flexibility, cost-effectiveness, human wellbeing and biodiversity benefits, and contributing to climate mitigation. Despite its potential, NbS tends to be underfunded with limited documentation of outcomes.

OPERATIONALISING THE LLA PRINCIPLES FOR THE WATER SECTOR

This study focuses on LLA in the water sector, examining progress and lessons learnt from water adaptation initiatives in East Africa's drylands. These initiatives are gaining prominence due to the critical role of water security in building climate resilience. The report introduces an assessment framework to evaluate how case studies of water adaptation align with the LLA principles. The framework is made up of nine principles of locally-led water adaptation: the eight principles described above and one further principle on NbS due to its importance in water-related adaptation. Each principle is accompanied by 2–4 indicative criteria that can be

adapted to different contexts, scenarios, and water points, allowing flexibility for different interpretations by diverse actors.

The framework is applied to six water adaptation case studies in Kenya and Tanzania in an attempt to understand how these cases align with the locally-led water adaptation principles. It focuses on the governance and finance processes that prioritise the agency of local actors, and explores the adaptation outcomes, emerging social and environmental impacts, benefits, and sustainability of interventions.

Fieldwork for each case study included site visits and interviews with stakeholders at various levels, ranging from national or subnational government officials to community representatives and implementing partners. The selected case studies show diverse LLA approaches, governance models, and funding mechanisms. They include:

- One water project funded by the Water Sector Trust Fund (WSTF) in Kenya – a national water and sanitation financing institution.
- Two water projects funded by the Local Climate Adaptive Living Facility (LoCAL) in Tanzania – an international, performance-based, grant facility.
- Three water projects funded by the County Climate Change Fund (CCCF) in Kenya – a subnational devolved climate fund.

KEY LEARNING

The case studies provide positive examples of locally-led water adaptation in practice that align well with the assessment framework. There were a number of positive outcomes from the six case studies, indicating that the approach has the potential to deliver on its promises. There were varying degrees of success in adhering to the nine principles, with some, like principle one (devolving decision-making) and principle nine (applying nature-based solutions) performing well. This shows how incorporating NbS into water-related adaptation presents a clear opportunity, particularly within the context of LLA. Overall, the Kenya cases (WSTF and CCCF mechanism), outperformed the Tanzania ones (LoCAL). This difference can be attributed to the longer period for which the Kenya cases had been established, with institutionalised mechanisms for local decision-making, institutional capacity for implementing sustainable adaptation interventions, and developed partnerships. Additionally, the devolved finance and governance context in Kenya is more extensive

than in Tanzania. While LoCAL in Tanzania channels adaptation funding to sub-national governments, it works through national institutional frameworks on climate change. The Kenyan CCCF mechanism, by contrast, is anchored in the autonomy of the county governments, allowing them to independently finance and plan for their climate needs. As a pilot in Tanzania, LoCAL faced initial challenges, was poorly funded, and had to adhere to less flexible government planning cycles. All projects encountered technical challenges and lacked long-term maintenance or funding plans, raising concerns about the sustainability of water interventions beyond the project or programme duration.

HOW DONORS AND GOVERNMENTS CAN SUPPORT LOCALLY-LED WATER ADAPTATION

1. **Support the scaling up of the LLA principles in water adaptation.** Adequate funding is needed to support the momentum and potential of locally-led water adaptation, facilitating expansion, especially in countries with less developed LLA frameworks that require piloting of the approach.

2. **Support mainstreaming of locally-led water adaptation into wider land use and development planning.** Integrate locally-led water adaptation planning into broader spatial scales and relevant sectors, including rural and urban development, livestock and agriculture, land use and ecosystem management, to ensure it is incorporated into wider policy and planning.

3. **Address the predictability of funding.** Secure sustained funding for locally-led water adaptation by developing long-term institutionalised financing strategies, such as increased devolved funding from national budgets, pooling donor funds, and leveraging international climate funds.

4. **Provide flexible budget allocations for adaptation financing.** Support to locally-led water adaptation should encourage adaptive management and ensure quick and cross-sectoral disbursement when needed during emergencies.

5. **Strengthen the institutionalisation of LLA.** Institutionalise locally-led water adaptation within local governance structures for lasting impact that extends beyond project timelines and prioritises the inclusion of marginalised groups.

6. **Build local technical capacities for sustainable water management.** Ensure the long-term success of locally-led water adaptation by planning for sustainability, adopting diverse funding sources, and providing ongoing technical training for local actors.

7. **Facilitate a locally-driven approach to nature-based solutions (NbS).** Promote NbS that are locally-led, inclusive, and consider the water use rights and the priorities of different water users.

8. **Enhance capacity and knowledge co-production in LLA.** Establish mechanisms for collaborative knowledge production through multi-stakeholder processes, including through participatory vulnerability assessments, and monitoring and evaluation focused on local priorities and needs of marginalised groups in water adaptation.

Indigenous irrigation system, Nguruman, Kajiado County, Kenya, 2022. Photo: Mikkel Funder

INTRODUCTION

Aim of the report

Climate change adaptation is a major global challenge and key to securing livelihoods and economies in the Global South. The locally-led adaptation (LLA) principles (Box 1) aim to ensure that adaptation approaches are effective, equitable and transparent. The principles have been endorsed by more than 120 organisations around the world, including government agencies, donors, NGOs, grassroots organisations, international bodies and research organisations. However, knowledge about experiences with LLA on the ground and what it implies in practice is still limited – especially in relation to water management, which is critical for adaptation. This report contributes to the ongoing efforts to implement LLA in practice in two ways:

1) It examines the lessons that can be taken from water-related LLA on the ground in six case studies in Kenya and Tanzania, thereby offering an initial example of field-based studies of water-related LLA in practice.

2) It provides and applies an assessment framework within which stakeholders can assess the extent to which water-related adaptation activities comply with the LLA principles.

Background

Water is essential for all societal and ecosystem needs and at the heart of sustainable development. Water is critical for socio-economic development, energy and food production, healthy ecosystems, and for human survival itself. According to the latest Intergovernmental Panel on Climate Change (IPCC) report AR6, currently four billion people are estimated to experience severe water scarcity for at least some part of the year due to climate and non-climate factors (Caretta et al. 2022). The number of people experiencing heavy precipitation and flood events is also increasing (Caretta et al. 2022). Droughts and floods are a big threat to sustainable development and the achievement of SDG6 to ensure availability and sustainable management of water and sanitation for all by 2030.

Water and climate change are inextricably linked (UN Water 2019). Water is the primary medium through which people experience the impacts of climate change (Rahman et al. 2023a). Anthropogenic climate change is increasing the likelihood and severity of extreme weather events, leading to more frequent droughts and floods (Caretta et al. 2022). The intensity and frequency of these events is projected to rise with each degree of global warming, posing greater risks to vulnerable regions and populations (Caretta et al. 2022). There is a growing body of evidence indicating that the impacts of water-related climate hazards disproportionately affect vulnerable groups, including the poor, women, children, disabled and indigenous peoples, particularly in the Global South (Caretta et al. 2022).

Water as a priority sector for climate adaptation

In global climate change policy fora, there are calls for increased attention to be paid to water's critical role in mediating the climate crisis (Rahman et al. 2023a). Many climate adaptation interventions are shaped in response to water-related hazards and adaptation to water-related risks and impacts makes up 60% of all adaptation interventions (Caretta et al. 2022). Water is a top adaptation priority in 87% of the UNFCCC Parties' nationally determined contributions (NDCs) under the Paris Agreement (UNFCCC 2022). Water adaptation actions prioritised in these NDCs

include initiatives aimed at improving or establishing water infrastructure; developing water resource plans and strategies that encompass integrated water resources management; ecosystem-based adaptation; and transboundary water management (UNFCCC 2022). Water is also a priority sector in countries' National Adaptation Plans (NAPs).

Water adaptation interventions are commonly delivered as infrastructure to improve access to and availability of water. Adaptation options that focus on such physical or 'grey' infrastructure include irrigation systems, dams and reservoirs, boreholes and pipelines. Although improving access to water, they can be associated with problems of high construction and maintenance costs, limited flexibility, and long operational lifetimes that may not be resilient to the increasing variability and uncertainty of climate change (Dodman et al. 2022). Additionally, they may undermine mitigation goals due to their reliance on energy sources that contribute to carbon emissions (ibid). There are also longstanding concerns over the development of infrastructure for the provision of water in Africa's rural areas without the correct maintenance or support systems (Skinner 2009). Water schemes based on delivering technological or infrastructural solutions, without robust governance and management support systems, can lead to functionality issues, water point failure, and worsen water scarcity (Egeru et al. 2023; Bedelian et al. 2022). The development of water infrastructure is also often politically-driven as politicians seek to win votes, which raises questions about who benefits from or gains access to new water points, particularly how this impacts poor and vulnerable groups (Gomes 2006; Bedelian 2019). Srivastava et al. (2022) argue that technological or infrastructural solutions tend to neglect the context-specific social, political and cultural dimensions of water access and use, leading to inequality among users and injustice.

At the same time, there is growing attention to nature-based solutions (NbS) and nature-based solutions for adaptation, also known as ecosystem-based adaptation (EbA), in water-related adaptation. The application of these in the water sector can provide a holistic approach that generates environmental, economic, and social benefits (Acreman et al. 2021; Hagedoorn et al. 2020). NbS rely on natural processes to improve water availability and quality, and mitigate the risks associated with water-related hazards while contributing to biodiversity. They emphasise sustainable management and restoration of ecosystems to aid communities in adapting to the adverse impacts of climate change (Hagedoorn et al. 2020). It is suggested that 'green' infrastructure or NbS, which uses or mimics natural systems to improve water quantity and quality, is more flexible, can provide human wellbeing and

biodiversity benefits, contributes to climate mitigation, and reduces the risks associated with climate change. The combination of grey and green infrastructure is seen as a cost effective, climate-resilient and sustainable approach to water management (WWAP/UN Water 2018).

Water adaptation may lead to maladaptation

At the same time there is a growing concern that water adaptation interventions might result in unintended consequences, where these interventions undermine local livelihoods, hinder future adaptation efforts, or render communities more vulnerable to the impacts of climate change than before (Schipper 2020). According to Caretta et al. (2022), a third of the water adaptation case studies reviewed in IPCC AR6 document instances of maladaptation, i.e. inappropriate adaptation measures that may arise from addressing short-term concerns while inadvertently introducing long-term risks. For example, interventions such as irrigation and water management may redirect traditional livelihoods towards overspecialised options, providing short-term benefits but negatively impacting long-term adaptive capacity and the environment (Juhola et al. 2016). The preference for infrastructural adaptation solutions can lead to lock-in effects due to their long lifespans, creating a false sense of security that encourages people to remain in vulnerable areas or continue activities that will make them more susceptible to climate change when the infrastructure eventually fails (Schipper 2020).

The causes of maladaptation are often rooted in longstanding structural inequalities and existing vulnerabilities (Eriksen et al. 2021), including those related to water (Srivastava et al. 2022). For example, water has significant gender implications as women and girls are responsible for providing water for their households, limiting their time for employment and education, particularly when fetching water over longer distances – a challenge that will worsen with increasing water scarcity (Sultana 2018). Maladaptation also occurs when vulnerabilities are shifted or redistributed, causing non-beneficiaries to become more vulnerable to climate change than before. For example, increased irrigation, drawing more water from a river may mean less water is available for communities downstream (Schipper 2020). Furthermore, certain adaptation interventions, such as the adoption of more labour-intensive cash crops, have intensified the burden on women in cultivation while enhancing men's control over income (Caretta & Börjeson 2015).

Failing to acknowledge these root causes of social and economic vulnerabilities that water adaptation investments can open up may result in adaptation interventions reinforcing or worsening current climate vulnerabilities (Srivastava et al. 2022).

Integrating equity and justice considerations is thus crucial in the context of water adaptation and how interventions are designed (Sultana 2018; Caretta et al. 2022). The IPCC (2022) summary report on impacts, adaptation and vulnerability, recognises that inclusive adaptation – that is informed by cultural values, indigenous and local knowledge, as well as scientific knowledge – can help prevent maladaptation and lead to more effective, relevant, legitimate and sustainable adaptation action. This all supports the integration of locally-led adaptation (LLA) into the design and implementation of water-related technologies as a response to existing climate change vulnerabilities.

Locally-led adaptation (LLA)

Locally-led adaptation (LLA) is gaining momentum as an approach that can integrate local context, address equity and justice concerns, and enhance efficiency. LLA places local actors at the centre of driving adaptation action – in prioritising, designing, implementing and managing initiatives. By integrating the voices of communities into determining their adaptation priorities, LLA recognises the crucial role of inclusive, local-level planning in successful adaptation, and in preventing maladaptation (IPCC 2023).

LLA is an approach aimed at comprehending and incorporating the root causes of vulnerability including climate vulnerabilities. LLA recognises that communities and other local actors, being the most vulnerable to climate change, are often the best equipped to identify solutions. It acknowledges that those most significantly impacted by and disproportionately susceptible to the effects of climate change are frequently excluded from decision-making processes. Given the highly localised nature of climate impacts, local solutions are more cost-effective.

In the typical or 'business-as-usual' adaptation scenario, international and national level decision-makers commonly drive adaptation interventions, and international climate finance fails to reach the local level. Typically, the design of adaptation programmes follows a top-down approach, with decisions made by central governments or funders, limiting opportunities for local organisations and marginalised groups to secure and manage funding. LLA calls for 'business unusual' (Soanes et al. 2021) – a shift in focus from this conventional approach to one where local actors, including community-based organisations, citizen groups, small businesses and local governments, have more influence over adaptation efforts. This ensures that projects are driven by local priorities and that those most affected by climate change have a say in decisions about adaptation finance and programming.

LLA is guided by a set of eight principles (Box 1) developed by the Global Commission on Adaptation and launched at the Climate Adaptation Summit in 2021. The principles emphasise inclusion, participation, justice and equality, and a commitment for finance to local actors to invest in their adaptation priorities. They underscore the importance of local actors playing meaningful roles in designing, planning, implementing, and monitoring adaptation measures so they are context-specific and sustainable over time.

BOX 1. THE LOCALLY-LED ADAPTATION PRINCIPLES

1. Devolving decision-making to the lowest appropriate level: Giving local institutions and communities more direct access to finance and decision-making power over how adaptation actions are defined, prioritised, designed and implemented; how progress is monitored; and how success is evaluated.

2. Addressing structural inequalities faced by women, youth, children, disabled and displaced people, Indigenous Peoples and marginalised ethnic groups: Integrating gender-based, economic and political inequalities that are root causes of vulnerability into the core of adaptation action and encouraging vulnerable and marginalised individuals to meaningfully participate in and lead adaptation decisions.

3. Providing patient and predictable funding that can be accessed more easily: Supporting long-term development of local governance processes, capacity and institutions through simpler access modalities and longer-term and more predictable funding horizons, to ensure that communities can effectively implement adaptation actions.

4. Investing in local capabilities to leave an institutional legacy: Improving the capabilities of local institutions to ensure they can understand climate risks and uncertainties, generate solutions and facilitate and manage adaptation initiatives over the long term without being dependent on project-based donor funding.

5. Building a robust understanding of climate risk and uncertainty: Informing adaptation decisions through a combination of local, Indigenous and scientific knowledge that can enable resilience under a range of future climate scenarios.

6. Flexible programming and learning: Enabling adaptive management to address the inherent uncertainty in adaptation, especially through robust monitoring and learning systems, flexible finance and flexible programming.

7. Ensuring transparency and accountability: Making processes of financing, designing and delivering programmes more transparent and accountable downward to local stakeholders.

8. Collaborative action and investment: Collaboration across sectors, initiatives and levels to ensure that different initiatives and different sources of funding (humanitarian assistance, development, disaster risk reduction, green recovery funds and so on) support one another, and their activities avoid duplication, to enhance efficiencies.

Source: Soanes et al. 2021.

LLA progress and the debate so far

There is still limited application of LLA in practice. Putting the LLA principles into practice will require institutions to incorporate them at every stage of the project cycle, from designing and planning projects to monitoring and evaluating. Despite the potential, there is limited practical application of LLA on the ground, with only a fraction of adaptation projects incorporating its elements. A review of 374 adaptation projects found that only 138 include some elements of LLA, and only 22 featured LLA as a core or central characteristic. Local actors often play passive roles as recipients rather than assuming leadership roles, especially in decisions related to fund allocation and distribution (Tye & Suarez 2021). LLA is yet to become the norm in on-the-ground adaptation action.

Not all community-based adaptation is LLA. Recent analyses of LLA highlight that we must avoid branding all community-based adaptation measures as LLA (Rahman et al. 2023b). This means being clear on what we mean by being 'local' or 'locally-led' (Rahman et al. 2023b). While LLA shares many principles of community-based adaptation (CBA) such as participation, empowerment and accountability, it differs by prioritising local leadership and agency, especially over finance, and by fostering local capacities to strengthen these aspects of leadership, agency and decision-making (Tye & Suarez 2021; Vincent 2023). In practice, a continuum of local contributions to adaptation projects exists wherein agency and ownership increase

along a spectrum, ranging from increased consultation of beneficiaries to genuine leadership, (Rahman et al. 2023b; Tye & Suarez 2021). Additionally, LLA prioritises challenging gender and social inequalities and emphasises inclusion, aspects that are integral to its approach but may not be as pronounced in CBA (Tye & Suarez 2021).

LLA goes beyond the community. The conceptualisation of 'local' in terms of geographical or spatial scale represents another critical issue. Scholars argue that LLA should avoid some of the pitfalls of CBA by expanding the notion of local, going beyond the confines of the community level (Rahman et al. 2023b). The challenge with CBA lies in its normative and rigid view that defines the community as a small, fixed unit based on geography or spatial criteria without considering social dynamics. This potentially hinders effective adaptation practice and can even lead to maladaptation (Vincent 2023; Westoby et al. 2021). Instead of solely focusing on communities, LLA advocates alternative entry points such as 'whole-of-island' or local ecosystem approaches (Westoby et al. 2020; 2021). These approaches emphasise the importance of local and legitimate institutions with flexible community boundaries not strictly defined by geography. Furthermore, LLA recognises that local action may not always be the only solution, and that in certain instances actions at higher levels (e.g. regional or national) will be necessary and have a greater impact (Soanes et al. 2021; Tye & Suarez 2021).

LLA can overlook power and justice issues. Rahman et al. (2023b) caution that despite the potential of LLA as a transformational approach for more inclusive and effective adaptation, LLA measures tend to overlook issues of power and justice, limiting its usefulness to local communities and institutions. The current discourse on LLA often neglects these crucial issues, posing the risk of LLA reproducing many of the injustices prevalent in earlier approaches, such as CBA, due to competing interests and inequalities in actors' power (ibid). To prevent the reinforcement of existing vulnerabilities or the creation of new ones, future LLA initiatives need to centre issues of power and justice more prominently or they risk contributing to maladaptation (ibid).

From principles to practice in the rural water sector: study aim and methods

This study focuses on LLA in the water sector, driven by the pivotal role of water in adaptation efforts. To facilitate this, we develop a framework to operationalise the eight LLA principles, supplemented with one principle related to NbS due to its importance in water-related adaptation (Table 1). For each of these nine principles of locally-led water adaptation, along with dialogue with the study team, drawing on

their expert knowledge, we developed a set of water-relevant criteria and questions through a review of literature on LLA and on water governance and adaptation.

The resulting, locally-led water adaptation assessment framework is then applied to six case studies of water adaptation initiatives, offering insights into the on-the-ground implementation of water-related-adaptation efforts. These case studies specifically target water access and availability challenges in East Africa's dryland regions, where water security is a primary concern. Locally-led water adaptation initiatives are gaining prominence in these dryland areas, with a particular emphasis on improving resilience to climate change (Quevedo et al. 2018; Greene 2019; Crick et al. 2020). The selected water case studies encompass diverse approaches and feature various governance models, institutional structures, and funding mechanisms.

The case studies encompass six water projects located in Kenya and Tanzania:

- One water project funded by the Water Sector Trust Fund (WSTF) in Kenya – a national water and sanitation financing institution.
- Two water projects funded by the Local Climate Adaptive Living Facility (LoCAL) in Tanzania – an international, performance-based, grant facility.
- Three water projects funded by the County Climate Change Fund (CCCF) in Kenya – a subnational devolved climate fund.

The authors conducted brief fieldwork for each case study, involving site visits and interviews with stakeholders at national or subnational government, community, and implementing partner level. Community-level stakeholders included women, the youth, the elderly, water committee members and village leaders to capture diverse perspectives. Participants were selected based on their knowledge and involvement in the water projects, as well as their availability and willingness to participate.

The findings from the fieldwork were used to assess how each water project aligns with the nine, locally-led water adaptation assessment framework principles. Each project received a score against these principles, with a brief explanation justifying the score. The framework is designed to be flexible, offering a set of possible and generalised criteria rather than prescriptive ones, which can be contextualised by various actors who might adopt them. The framework aims to serve as a tool for local actors and implementers to self-monitor and evaluate projects and for donors and researchers to understand how water-related adaptation approaches align with

the LLA and NbS principles. Given the limited scope of the case studies, a primary objective was to test the framework, recognising the complexity of measuring processes and outcomes of LLA (Coger et al. 2021a; 2021b). The findings offer valuable insights for funders, governments, implementers, and researchers on LLA in the water sector.

The report is organised as follows. The following section provides some additional context on water-related climate change adaptation, including trends in water governance, the emphasis on nature-based solutions, and on climate finance for water adaptation. The report then operationalises the LLA and NbS principles within the water context and presents the assessment framework. This framework is then applied to evaluate six case studies of water adaptation interventions. The results of the fieldwork for these cases are presented, scored and justified using the assessment framework. Finally, the report concludes by highlighting key learnings and providing recommendations for actions that governments and donors can undertake.

Kwa Kilui Earth Dam, Makueni County, Kenya, 2023.
Photo: Claire Bedelian

CONTEXT

This section provides an overview for readers who are not familiar with the broader context of water-related climate change adaptation. It describes (i) historical trends in water governance; (ii) the growing emphasis on nature-based solutions and (iii) current climate finance for water adaptation.

TRENDS IN WATER GOVERNANCE

The LLA principles fundamentally deal with how climate change adaptation – and thereby water resources and investments – should be governed. Recent decades have seen changing approaches to how water governance is approached in national water policies and associated interventions. Here we provide a brief overview drawing particularly on Woodhouse and Muller's (2017) historical analysis of water policy debates. Developments in water governance policy rationale include:

A shift in the emphasis of global water agreements and Western policy rationales away from enhancing water supply towards regulating use and reducing demand. Historically, efforts have centred on developing infrastructure in order to harness and extract water resources, i.e. boreholes, irrigation schemes, aligning rivers, and building dams. This has played a key role in the formation of modern society including Asia's 'hydraulic' societies. But increasingly the focus has shifted to polices managing the use of water resources, including those of major donors such as the World Bank (Woodhouse & Muller 2017). This has not always been in line with the ambitions of African governments, who alongside regulation of water use also aim for considerable expansion of water infrastructure to harness existing but unused resources (AU 2023; Van Koppen 2003).

Development of a water scarcity narrative, especially since the early 1990s. This initially focused on demand exceeding natural water supplies but has been boosted by climate change concerns (Leong 2021). The scarcity narrative has been a main driver in the shift from supply to demand-side emphasis, and in key water governance approaches such as IWRM (see below). Corollary to this is that 'water security' has come into focus (Sadoff et al. 2020; Shah 2021). While no one questions that water access is a challenge, there are different perspectives on the causes of scarcity. These include approaching water scarcity as (i) a natural phenomenon; (ii) a distribution issue (there is enough water but it is unequally distributed); (iii) a result of 'economic water scarcity' (there is enough water but poor countries lack finance to extract it); or (iv) a mismanagement issue (there is enough water but it is poorly governed) (Woodhouse & Muller 2017). Critics have argued that mainstream water policies and interventions tend to ignore the distribution issue in particular (Sultana & Loftus 2019).

The advent of 'water governance' as a key theme in water policy. The growing emphasis on regulation has led to a surge in attention to the governance dimensions of water in recent decades (as distinct from the more technical/practical aspects of water resources management) (Jiménez et al. 2020). The foundations of this can be traced back to the 1977 Mar Del Plata UN water conference, which highlighted the need for coordination among a multiplicity of water-related agencies, and for participation of stakeholders in water management. The 1992 Dublin Principles on water further emphasised the need for a participatory approach and the particular role of women in managing and safeguarding water. The participatory aspect has gradually evolved from an instrumental approach (for example, through awareness raising) towards participation in water governance as a right (Akhmouch & Clavreul 2017; Chikozho & Mapedza 2017).

IWRM as a dominant approach to water governance. The 'integrated water resources management' (IWRM) approach was a dominant narrative in water governance in the 1990s–2010s and became a key organising concept and approach for many organisations in the development context, for example, the Global Water Partnership (Yasmin et al. 2022). The fundamental rationale of IWRM is that (i) water should be managed within hydrological units such as river basins and watersheds, (ii) water is scarce and must be managed as an economic good, and (iii) competition over scarce resources requires stakeholder participation and coordination through river basin/watershed committees etc. Water governance in IWRM is thus typically focused on hydrological boundaries, market-based regulation and dedicated governance fora. Today, IWRM remains a key feature of mainstream water policies and investment strategies (AU 2023). However, IWRM has increasingly been challenged from various perspectives. These include a critique that IWRM tends to become operationalised through blueprints based on institutional frameworks which are not harmonised with local settings (Molle 2008). It has further been pointed out that while the hydrological framing of IWRM governance mechanisms makes ecological sense, human society tends to be organised differently and with much variation in practice (Whaley 2022). The emphasis on addressing water as an economic good through market-based approaches such as water pricing has also been criticised for monetising what should be a human right, and for not recognising that water as a flowing resource is difficult to fit within conventional market mechanisms based on private control of resources (Anderson et al. 2019; Woodhouse & Muller 2017). IWRM has also been criticised for being weak in its development ambitions, focusing mainly on managing resources (van Koppen & Schreiner 2014).

Emergence of polycentric and adaptive governance approaches. Following on from the perceived shortcomings of IWRM, approaches have emerged that seek to either innovate IWRM or pursue alternative approaches. These include (i) 'problemsheds' where water management is seen as inherently political and the boundaries of a water governance situation are defined by identifying actors and interests across the multiple spaces and scales and bringing them together (Bell et al. 2022; Daré et al. 2018; Mollinga et al. 2007); (ii) polycentric and nested approaches that recognise governance as a network of multiple types of actors and governance fora at different levels of scale, linked in horizontal networks and/or through nested levels of scale rather than in one central river basin or watershed committee (Bruns 2021; Diver et al. 2022); (iii) adaptive governance approaches, which again draw on polycentricity, as well as on institutional flexibility that allow experimental/iterative approaches to resource management, with strong emphasis on participation and on local solutions and knowledge (Pollard et al. 2023; Yasmin et al. 2022).

Calls for water justice have in recent years become pronounced among civil society organisations, scholars and other critics of mainstream water policy (Hommes et al. 2023; Sultana 2018). This builds on earlier concerns over the distributional aspects of water access and rights, and local resistance to imposed water management schemes and large-scale infrastructural projects such as dams (Boelens et al. 2010). Advocates of water justice highlight the unequal outcomes of global and domestic consumption patterns and climate change impacts. This includes inequalities between poor and better-off citizens for example, and industries and small-scale farmers, urban and rural areas, and South/North relationships (Zwarteveen & Boelens 2014). Advocates call for more attention to how privatisation of the water sector and top-down water governance schemes tend to disenfranchise poor water users (Sultana & Loftus 2019). The emphasis is on securing broad equity in water access by supporting people's own agency and local initiatives; democratising water governance through de facto devolution of spaces for deliberation and decision-making; devising policies and approaches that directly address unequal water distribution and paying particular attention to securing water access and control rights for the poorest and marginalised communities (Sultana 2018).

In principle, the LLA approach provides an opportunity to operationalise these developing trends in the context of water for adaptation. By focusing on the lowest appropriate governance level, it enhances the ability to manage water adaptively and in relation to specific contexts, and by focusing on locally-driven planning and decision-making it potentially enhances inclusion and equity aspects. But as past support to water governance – and wider research on adaptation interventions – have shown, this is not without its challenges. These illustrate the need to learn from cases which seek to implement the LLA principles in practice. They also call for tools that can help local stakeholders and other actors (including donors and researchers) to assess whether progress on support to adaptation-oriented water investments is in line with LLA principles. This report provides a contribution to this task.

NATURE-BASED SOLUTIONS AND WATER-RELATED ADAPTATION

Alongside the general evolution in water governance, recent years have seen growing attention to nature-based solutions (NbS). This approach seeks to harness ecosystem functions in order to reverse biodiversity loss and ecosystem degradation, while also addressing climate change and delivering social and economic benefits.

The 2022 resolution by the UN Environment Assembly defines NbS as 'actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human wellbeing, ecosystem services and resilience and biodiversity benefits.'

Water-related NbS can help address adaptation in a variety of ways (Taylor et al. 2018), including:

- Improving water supply by increasing water infiltration, water storage capacity and water retention in soils, wetlands, reservoirs etc, and reducing siltation.
- Enhancing water quality by filtering and trapping sediments and pollutants, and relieving pressure on 'grey' water treatment infrastructure.
- Mitigating impacts of disasters by, for example, reducing flood intensity through vegetation and soil management, and reducing drought vulnerability by enhancing natural water storage and release.
- Enhancing agricultural and aquatic production by regenerating and improving water availability, biodiversity, and ecosystem quality in pastures, farmlands, forests and coastal and inland fisheries.
- Enhancing job opportunities in small and medium enterprises, and in larger-scale industries that currently rely on unsustainable/volatile water supply (e.g. the flower industry).
- Avoiding further negative impacts on water availability and quality by reducing emissions and biodiversity degradation through locally-led nature conservation and restoration.

A range of specific activities to achieve this exist within so-called 'ecosystem-based adaptation' (Gravesen & Funder 2022). Examples include forest restoration to secure reliable downstream water flows; vegetation management to improve natural water filtration; soil and vegetation management to reverse erosion, enhance water storage and reduce flooding; water harvesting on natural slopes; wetland management to improve biodiversity and opportunities for aquatic incomes; reconnecting floodplains with rivers to enhance ecosystem health and fisheries; and constructed interventions like green roofs and artificial wetlands (Reid et al. 2019; Taylor et al. 2018; Souliotis & Voulvoulis 2022).

Green and grey water infrastructure

NbS presents a potential alternative to traditional engineered, i.e. 'grey', water infrastructure (Souliotis & Voulvoulis 2022). Typically, grey infrastructure is highly specialised and designed to address a single purpose. As such it can be effective in the short term and has proved critical in providing water to millions of livelihoods across Africa. But grey infrastructure is also often relatively costly, relies on specialised technical knowledge, lacks versatility, is dependent on external implementers, and struggles to adapt to changing environmental conditions such as declining groundwater levels or increasing floods (Hartmann et al. 2019).

As a result, grey water infrastructure can lead to a high degree of dependence on external funding and expertise, and a risk of technical blueprint solutions that are not adapted to the local context (Danida 2007; Danida 2021). It can also create logistical problems, e.g. a substantial number of boreholes across Africa are estimated to be defunct due to lacking spare parts (Skinner 2009). In some cases, grey water infrastructure contributes directly or indirectly to ecosystem breakdown, e.g. when dams or inter-catchment pipelines disrupt natural hydrological processes.

NbS can alleviate some of these problems as they are better suited for adaptive management, can more easily incorporate indigenous practices and local knowledge, have less need for external implementers and potentially have fewer recurring costs in the long term (Nelson et al. 2020). Unlike grey water infrastructure, they have multiple functions including actively addressing biodiversity decline and climate change.

However, NbS also has its challenges and drawbacks compared to grey infrastructure (see Box 2). In particular, NbS may require considerably more land than grey infrastructure (for example, a dyke against inundations is typically more land-efficient than a retention area) and may require collaborative management across multiple land uses and stakeholders (Hartmann et al. 2019). Moreover, some ecosystems have already degraded substantially, and it will take time for them to regenerate. It is therefore unlikely that NbS will be able to solve all water adaptation challenges everywhere in the short term (Sonneveld et al. 2018). An integrated approach may therefore be needed in many locations (Souliotis & Voulvoulis 2022). Currently there is little capacity for and attention to this integration issue in practice, with green and grey water activities often being implemented as separate 'project islands'. The LLA principles provide a good opportunity for this, as they provide a means for context-specific planning where green and grey water solutions can be holistically planned.

NbS is therefore no silver bullet in supporting water-related adaptation and requires attention to these issues if it is to progress. In particular, there is a need to ensure that both social and ecological aims are addressed in water-related LLA efforts, in order to avoid prioritising one at the expense of the other. This can create dilemmas because stakeholders may have different priorities in terms of balancing social and ecological objectives. Moreover, while communities often possess extensive indigenous and practice-based knowledge of local ecosystems that can be used in NbS within LLA, they may also seek external technical insights and support, such as hydrological mapping and ecosystem dynamics that can help further adaptation. A collaborative approach is therefore needed.

BOX 2. CHALLENGES OF NATURE-BASED SOLUTIONS (NBS)

Nature-based solutions for water adaptation face certain challenges if they are to work:

Systemic complexity. This includes uncertainties in natural systems behaviour, the involvement of numerous stakeholders and the complexity of cross-scale interactions (e.g. effects of policies in one sector on other sectors and local developments). Arguably, this is true for all natural resource management efforts including conventional water infrastructure solutions, but it does emphasise the importance of holistic approaches and integrated planning (Nelson et al. 2020).

Priority bias. One notable concern is that NbS fails to achieve a balance between social and environmental aims and ends up directly or indirectly prioritising one goal over the other. Some authors see a risk that NbS become means to justify interventionist approaches to water management and environmental conservation, thereby overriding local customary user rights and failing to address the needs of vulnerable community members (Osaka et al. 2021; Randrup et al. 2020). Conversely, others have warned against NbS becoming a 'greenwashing' exercise, or of initiating well-intended activities that may deliver short-term social benefits but are detrimental to ecosystems and biodiversity in the longer run (e.g. planting exotic tree species to retain and filter rainwater) (Seddon et al. 2021).

Insufficient investment. There is a growing interest in NbS in global policy debates, but while investments have grown in recent years it remains underfunded and tends, in the Global South, to be dominated by donor funding with little domestic investment (Magnan & Dale 2020; Swann et al. 2021). According to some sources, fewer than 1% of total investments in water resources management in 2018 were allocated to ecosystem-based solutions (WWAP/UN-Water 2018; Hagedoorn et al. 2020).

Political hesitation. In some countries policymakers prefer the political benefits of large-scale grey water infrastructure investments to NbS activities. In Kenya, for example, such projects are a matter of national pride, and symbols of progress and power, which are not easily challenged. By contrast, investments in natural infrastructure such as catchment protection can seem less politically attractive despite their obvious benefits, as they are less visible and results take time (Oates & Marani 2017).

Limited documentation of costs, benefits and outcomes. There is as yet scarce documentation on the real-world costs and benefits of NbS in general and for water-related adaptation specifically (Hartmann et al. 2019; Gravesen & Funder 2022). The outcomes and effectiveness are also not well documented in scientific terms, particularly in Africa (Acreman et al. 2021). That said, some multiple-case studies are beginning to appear, indicating positive benefits on both social and environmental fronts (Reid et al. 2019; Key et al. 2022; Woroniecki et al. 2022).

CLIMATE FINANCE FOR WATER ADAPTATION

According to the climate policy initiative (CPI) (Buchner et al. 2023), **annual global climate finance for adaptation in 2021/2022**[1] was US$63 billion, while mitigation received the significantly higher amount of US$1,150 billion, meaning a total of US$1.3 trillion went towards global climate finance during that period. As these figures show, mitigation accounts for 91% of the total, while adaptation received only 9%. However, the allocation varies between developing and developed countries,[2] with 38% allocated to adaptation for developing countries and only 6% for developed countries (Buchner et al. 2023). The vast majority of adaptation finance came from the public sector (98%), primarily through national (42%) and multilateral (34%) development finance institutions (Buchner et al. 2023).

Globally, adaptation finance had experienced a 29% increase from US$49 billion in 2019/2020, but the proportion of total climate finance directed to adaptation nearly halved during this period. This allocation remains minor in terms of the scale of adaptation needs, estimated at US$212 billion per year for developing countries up to 2030. Sub-Saharan Africa received the largest share of international adaptation finance, amounting to 31% or US$11 billion in 2021/2022. However, an analysis of African countries' collective NDCs and National Adaptation Plans (NAPs) indicates that the continent requires a minimum of US$52 billion per year to achieve its adaptation goals by 2030 (Buchner et al. 2023). Despite a lack of consistency in how countries report their NDC financing requirements (WRI 2023), this nevertheless highlights **a substantial gap between the current level of adaptation finance and the financial requirements** outlined in the continent's climate-related commitments if these countries are to avoid the severe impacts of climate change that they face.

Adaptation finance for the water sector

Water receives a substantial share of global adaptation finance. According to CPI, the water and wastewater sector received almost half (49%) of tracked global adaptation finance in 2021/2022, amounting to US$31 billion, with US$15 billion allocated to water supply and sanitation, and US$7.5 billion to wastewater treatment (Buchner et al. 2023). This aligns with a consistent trend reported by WaterAid, **estimating that the water sector received 43% of annual total adaptation finance** from 2011 to 2018 (Mason et al. 2020).[3]

WaterAid's analysis of international public, climate-related development finance for the water sector, using data from the OECD Development Assistance Committee (DAC) of 2000–2018, shows that funding is dominated by large infrastructure for water resources development and management, and urban water supply and sanitation systems, receiving 47% and 32% of the total respectively (Mason et al. 2020).[4] In contrast, **rural and community-scale water and sanitation received only 6**%. Additionally, almost two-thirds of the international public climate finance for water during this period was directed to only 20 countries, mostly middle-income countries, with only two of them in sub-Saharan Africa – Kenya and Cameroon.

Furthermore, most of this finance was provided in the form of debt rather than grants. There are few least developed countries (LDCs) among these top-20 recipients of international public climate finance for water. This distribution pattern suggests that **not enough climate finance is reaching vulnerable countries, particularly those prioritising water adaptation in their NDCs**. These countries have received comparatively less adaptation-related finance for water (Mason et al. 2020). This

underscores the need for a mechanism to channel more climate finance, particularly at the local level, to countries in need. Such support is crucial to address their water adaptation needs and the severe impacts of climate change they are facing.

Finance that facilitates LLA

There is widespread acknowledgement that **for adaptation efforts to be locally-led, finance for adaptation must reach local actors**, particularly those facing the greatest risks from climate change impacts (Soanes et al. 2017; 2019; Coger et al. 2021a). These are predominantly those countries and communities that have contributed the least to global greenhouse gas emissions and have historically experienced limited agency due to structural inequalities in resource allocation and decision-making power (Coger et al. 2021a).

Central to concerns of climate justice – that those who have done the most to cause the climate crisis, must be the ones who are responsible for addressing it – is that vulnerable countries and communities must be supported to adapt to climate change through the flow of climate finance (Ciplet et al. 2022).[5] This emphasises **the need to move away from finance that is controlled by international institutions** and instead direct funds into the hands of those most affected by climate change, enabling local-level control (Ciplet et al. 2022; Soanes et al. 2017).

Currently, local actors have limited direct access to funds for climate adaptation. Funders and international organisations have more control of climate funds compared to local actors, governments and organisations. **Previous analyses suggest that only 10% of international climate funds reach the local level** (Soanes et al. 2017). Indeed, ongoing research by DIIS and partners in Kenya and Tanzania suggests that in practice it may be even less (Pauline et al. 2023; Tidemand et al. 2022). However, accurately estimating these figures is challenging due to the complexity of tracking the precise amount of finance that reaches local levels (Coger et al. 2021a).

Moreover, estimates of the quantity of finance to the local level do not provide insights into its quality and its effectiveness at supporting LLA (Coger et al. 2021a). Fundamental to LLA, is to consider the quality as much as the quantity of finance – assessing **not just how much reaches local actors but how well it supports local agency** in adaptation decisions (Coger et al. 2021a; Friis-Hansen et al. 2022). Three of the LLA principles specifically address finance: principle 1: devolve decision-making over finance to the lowest appropriate level; principle 3: Provide patient and predictable finance; principle 6: Enable flexible finance.

These three principles outline key criteria for finance to effectively facilitate LLA, emphasising the need for local actors to have control and decision-making authority over funds. It is also important to consider the barriers that local actors face in accessing finance. Ideally, the finance supporting LLA should be flexible, patient and long-term, as outlined in the principles above.

Multilateral climate funds, such as the Green Climate Fund and Adaptation Fund are set up to facilitate access to climate finance for vulnerable countries, with considerable funding going towards water adaptation projects. These funds offer direct access and enhanced direct access (EDA) modalities, enabling national entities to access funds directly, and in the case of EDA, extending access to the subnational level. However, achieving accreditation for direct access, and especially EDA, involves meeting high standards and can be a time-consuming process. EDA, as a relatively new finance modality, still centralises a significant amount of decision-making at the national level (Steinbach et al. 2022).

Another way to channel finance to the local level is to decentralise funds to the subnational or local level. Decentralising decision-making over adaptation finance provides an opportunity for adaptation actions to be realised at the local level, closer to people's needs and priorities. This approach recognises that **locally-led investments are more effectively implemented by a devolved unit,** and thus finance modality. Devolved finance and governance enable communities' priorities to be included in investment decisions, ensuring that solutions and responses are better tailored to local conditions.

Devolved climate finance mechanisms have been piloted in countries such as Kenya, Mozambique, Tanzania, Mali, Senegal and Zambia, where **climate finance is channelled through local government and enables communities to prioritise spending** on climate-resilient investments (DCF Alliance 2019; Friis-Hansen et al. 2022). In these countries, devolved adaptation finance has supported the implementation of community-prioritised investments to improve access and availability of water, successfully promoting climate resilience and positively impacting community wellbeing and resilience (Quevedo et al. 2018; DCF Alliance 2019; Greene 2019; Crick et al. 2020). For example, investments funded through devolved funds have been found to improve human health and hygiene, resilience to disease, and the capacity to withstand stress, as well as reduce water-fetching time and increase opportunities for livelihood diversification and school attendance (DCF Alliance 2019). However, challenges regarding the functionality and sustainability of the water investments remain (Bedelian et al. 2022).

One advantage of devolved climate funds is their potential to allocate a significant proportion of the funds directly to adaptation investments rather than administrative and planning processes, as commonly observed in centralised approaches. Crucially, devolved finance and governance enables community priorities to influence investment decisions, **leading to solutions better tailored to local conditions**. As these initiatives continue to emerge, understanding the governance processes, institutions, investments, and outcomes is essential for learning about effective adaptation.

Hand pump shallow well and kitchen gardens surrounding the Kwa Kilui Earth Dam, Makueni County, Kenya, 2023. Photo: Claire Bedelian

OPERATIONALISING THE LLA PRINCIPLES TO WATER: THE LOCALLY-LED WATER ADAPTATION ASSESSMENT FRAMEWORK

MOVING FROM PRINCIPLES INTO PRACTICE: CONSIDERATIONS WHEN MEASURING ADAPTATION THAT CAN SUPPORT LOCALLY-LED WATER ADAPTATION

This section highlights key considerations for measuring adaptation that support LLA. Unlike mitigation, there is no single measure or standardised methodology for measuring adaptation effectiveness, since most adaptation projects are implemented at the local level, starting from different baseline conditions and lacking clear endpoints, making a common understanding of effectiveness challenging (Dilling et al. 2019). What counts as effective will depend on context.

Adaptation interventions and their measures of success are inevitably shaped by and embedded in systems of power (Dilling et al. 2019). Adaptation tracking often overlooks the critical question of who has a voice in defining and discussing success. Ensuring equitable monitoring, evaluation and learning (MEL) in adaptation requires incorporating a range of voices and taking factors such as transparency, power, and benefits into consideration (Dilling et al. 2019). Existing approaches tend to prioritise top-down, expert-driven knowledge, and to neglect the significance of local lived experiences and traditional knowledge, which can lead to potential injustice and exclusion (Rahman et al. 2023b).

The push for a specific definition or measure of adaptation success may inadvertently favour certain worldviews, potentially excluding others (Dilling et al. 2019), while the extensive use of indicators often results in reductionism, prioritising easily measurable factors (Rahman et al. 2023b). In response, a shift is recommended away from pursuing universal definitions of adaptation success and towards MEL efforts that focus on supporting and measuring the capabilities of communities, thereby enhancing capacity to adapt to climate change (Dilling et al. 2019). Success measures and MEL frameworks need to align with local priorities (Rahman et al. 2023b; Dilling et al. 2019).

Traditional, project-based, MEL approaches typically centred on outputs, beneficiary numbers, and value for money, may inadvertently overlook unintended consequences, wellbeing implications, and the impact on non-beneficiaries, leaving maladaptation unaddressed (Eriksen et al. 2021). These frameworks also fall short when it comes to reporting negative or unwanted outcomes, focusing more on the effective management of planned activities than on identifying potential adverse effects on sociopolitical relations, and on areas and groups beyond the intervention's immediate scope (Eriksen et al. 2021).

To enhance the effectiveness of MEL efforts, there is a growing need to go beyond ensuring that projects deliver what they intended by examining their broader impacts on vulnerability (Eriksen et al. 2021). LLA emphasises aligning MEL frameworks with local priorities, focusing on learning to enhance adaptation processes at the local level (Rahman et al. 2023b). In practice, efforts to track success would ask questions about what matters for local wellbeing, what community aspirations there are, and what measures can be identified that capture local perspectives and lived experiences. (Rahman et al. 2023b; Dilling et al. 2019).

Reporting on adaptation should not only highlight success but also acknowledge failures and challenges, fostering a more insightful understanding of the adaptation process (Westoby et al. 2020). Since LLA supports local agency and leadership, the learning and monitoring process should be structured accordingly to reinforce agency and leadership (Coger et al. 2021b). Aligning MEL systems with the LLA principles allows the incorporation of practices that reflect local priorities and expertise for more effective and equitable interventions (Coger et al. 2021b).

In recognition of these factors, the assessment framework outlined below is grounded in the established LLA principles, addressing concerns such as power dynamics, transparency and accountability, while prioritising local voices and agency. It focuses on processes and systems operating at the local level, while also considering their interactions with processes at higher levels and within the broader context of water adaptation interventions. Furthermore, the framework provides indicative and generalised criteria rather than being overly prescriptive. It can be adapted to different contexts, scenarios, and water investments, facilitating broad interpretation and contextualization by diverse actors. For instance, local implementers could use it for self-monitoring and evaluation, thereby supporting locally-led MEL.

DEVISING THE FRAMEWORK TO OPERATIONALISE THE LLA PRINCIPLES AND NBS FOR WATER ADAPTATION

The locally-led water adaptation assessment framework presented below provides key considerations for water adaptation, in line with the LLA principles (Table 1). Drawing from a literature review of water adaptation and governance, along with the authors' experience and knowledge, each LLA principle is operationalised within a water-focused context. The framework addresses a range of issues and themes related to governance, fund accessibility, accountability, transparency, climate change knowledge, and inclusivity. Recognising the significance of NbS for locally-led adaptation, especially in water contexts, we added a principle on NbS. For each principle, 2–4 criteria and a set of related questions were developed (a more detailed version is available in the annex). Below, an explanation for each principle (as described in Soanes et al. 2021) is provided in the context of water.

Table 1. Locally-led water adaptation assessment framework

LLA principle	Water-related criteria
1. Devolving decision-making to the lowest appropriate level	Water adaptation interventions are prioritised by the lowest appropriate governance unit. Institutions emerge to fortify decision-making, design and implementation of water adaptation interventions. Initiatives are based on local community water needs and demands and are suited to the local context. Communities lead the design, planning, implementation and management of water adaptation interventions.
2. Addressing structural inequalities faced by women, youth, children, disabled and displaced people, Indigenous Peoples and marginalised ethnic groups	Water adaptation interventions recognise and intentionally include the water needs and adaptation priorities of different social and user groups. Marginalised groups have voice and agency through local governance institutions, capacity-building and training, and they gain leadership roles. Water adaptation interventions target and provide benefits to youth, women, people with disabilities, and the poor. Benefits are visible to these groups in terms of health, production, income and education.
3. Providing patient and predictable funding that can be accessed more easily	Funding for water adaptation interventions remains stable or increases and is kept up over timeframes long enough (7 years+) to build sustainable governance processes, capacity and institutions at the local level. Funding is easily and quickly accessible to local institutions through simplified and direct access modalities. Mechanisms are in place to ensure recurring water costs are financed through local/national governments, water service providers or other means and that participatory modalities are sustained.
4. Investing in local capabilities to leave an institutional legacy	Water adaptation interventions support capacity-building (management, technical and financial) and the development of strong local governance and management institutions to lead interventions. Effective and sustainable maintenance systems and appropriate support systems are in place to maintain water adaptation interventions beyond the project lifetime and donor support.

LLA principle	Water-related criteria
5. Building a robust understanding of climate risk and uncertainty	Multiple evidence approaches are used that incorporate local and indigenous knowledge, practitioner's experience and scientific data, to understand climate risk and integrate it into the design of water adaptation investments. Climate risk & vulnerability assessment tools identify communities' risk profiles, vulnerabilities and ecosystem trends. Water adaptation interventions are designed with a degree of climate resilience.
6. Flexible programming and learning	Financing, planning and implementing water adaptation interventions allows for scheduled and ad hoc stocktaking where priorities can be updated and adjusted. Participatory monitoring & evaluation systems are present that allow for iterative learning, programme adjustment and adaptive management.
7. Ensuring transparency and accountability	It is clear how much adaptation finance is available and how it is being distributed across activities. Systems for prioritisation, implementation, management and governance of water adaptation interventions are transparent. There are measures in place for communities to engage in evaluation and learning, citizen feedback, and social audits, enabling downward accountability.
8. Collaborative action and investment	There is coordination of different actors involved in financing and implementing water adaptation interventions to strengthen the delivery of and avoid duplication of interventions. There is coordination across government sectors (e.g. water, agriculture and rangelands) to provide holistic and comprehensive planning of water adaptation interventions for multiple users and uses.
9. Apply nature-based solutions **(authors' addition)**	Water adaptation interventions promote ecosystem-based solutions, including biodiversity and mitigation benefits. Participatory planning, risk assessments, and monitoring & evaluation include understanding and identification of opportunities and risks related to groundwater resources, wider ecosystems, biodiversity and emissions. There is understanding of how water adaptation interventions affect the water and other resource rights of different users and the mechanisms for avoiding this.

In the current study, the framework serves two main purposes in assessing the effectiveness of water adaptation interventions:

1. It helps determine how the LLA projects studied align with and support locally-led adaptation, emphasising the governance and finance processes that empower local actors.
2. It assists in understanding the adaptation outcomes of the studied LLA projects, assessing emerging social and environmental impacts, benefits, and the sustainability of interventions.

Apart from serving the purposes of this report, the framework can also be used, adopted or provide inspiration for LLA stakeholders to assess and evaluate the extent to which nominally devolved water adaptation projects – proposed or under implementation – actually align with the LLA principles.

THE LLA PRINCIPLES AND NBS CONTEXTUALISED TO WATER

Principle 1. Devolving decision-making to the lowest appropriate level

Ensuring that local actors have the agency and authority over finance to lead decisions on water interventions is crucial for effective adaptation. This aligns with the principle of subsidiarity, emphasising that water-related decisions and adaptation interventions should be prioritised by the lowest appropriate governance unit, ideally at the community level, ensuring that local needs and priorities take precedence. However, recognition is given that some higher levels of governance may be necessary. In decision-making over water resources, this may be most effective at the sub-catchment level as a way to prioritise adaptation measures and mediate conflicts between upstream and downstream users (Shisanya 2022).

Devolving decision-making authority over water requires robust local-level institutions or utilisation of existing decentralised government systems. Locally representative committees or groups play a critical role in voicing community needs and priorities. For example, in Tanzania, adaptation planning committees prioritised domestic water points for women, reducing their time fetching water and enabling investment in other activities (Greene 2019). In Kenya, water resource users associations (WRUAs) serve as effective local-level institutions to identify and prioritise adaptation measures according to sub-catchment management plans (Shisanya 2022). These representative committees, formed from the surrounding communities, establish local institutional structures that facilitate decision-making

regarding water resources, water catchment and management plans, fund allocation for water projects, and their strategic placement, ensuring a comprehensive and community-centred approach.

Top-down water governance schemes can disenfranchise marginalised water users, highlighting the need for broad equity in water access by supporting local agency and initiatives. Establishing devolved water governance spaces for deliberation and decision-making is crucial (Sultana & Loftus 2019). Local decision-making over funds ensures that projects align with community needs, with community involvement spanning the entire project lifecycle. This includes decision-making regarding investment choices, design and planning, implementation, and management. For example, community-led appraisals play a key role in determining the most appropriate water point type and technology, considering factors such as existing technical capacity, cost, availability of spare parts, and community needs. Active community involvement fosters ownership and accountability, resulting in more efficient, context-specific, and sustainable water infrastructure (Bedelian et al. 2022). This approach also enhances the effectiveness of implementation, supervision and monitoring, as communities are actively present and invested in ensuring the quality of work.

Initiatives should be grounded in the specific water needs and demands of the local community. Conducting resilience and vulnerability assessments is important to identify key issues and potential challenges. These assessments help to tailor projects to address specific vulnerabilities and priorities. Without considering the local vulnerability context, interventions may inadvertently reinforce, redistribute or create new sources of vulnerability (Eriksen et al. 2021). Vulnerability assessments should capture context-specific factors along sociopolitical lines, including gender, race, age, disability and class (Eriksen et al. 2021).

Principle 2. Addressing structural inequalities faced by women, youth, children, disabled and displaced people, Indigenous Peoples and marginalised ethnic groups.

Addressing structural inequalities and amplifying the voices of marginalised communities within water interventions requires intentional efforts to confront unequal water distribution. Advocates of water justice emphasise securing water access and control rights for the poorest and marginalised communities (Sultana 2018). An intentional approach involves explicitly targeting traditionally excluded groups and incorporating them into decision-making processes, aiming to overcome barriers to accessing funds or to having their voice heard in local decision-making

where biases may favour local elites. For example, politicians may prioritise water points in their localities to gain votes (Bedelian 2019).

Addressing structural inequalities involves recognising and mitigating disparities that hinder marginalised groups from participating. Women, who are the primary water collectors, may face challenges attending meetings or having their voices heard due to structural inequalities (Greene 2019). Poor households are often disadvantaged in accessing water or voicing grievances in water conflicts vis-à-vis better-off community members (Funder et al. 2012). Socially inclusive water interventions acknowledge and cater to the diverse water needs and adaptation priorities of different user groups such as pastoralists, farmers, and domestic users. This involves representing the strategies and priorities of multiple user groups in decision-making on water interventions and ensuring equitable water distribution prior to implementation.

Promoting gender equity is crucial within water interventions as women typically bear the primary responsibility for collecting and managing domestic water, as well as, often, for watering livestock and crops. Enhancing women's access to and storage of water can lead to better nutrition and health outcomes for children (CHC 2018). Gender and social equity considerations should be integral to the selection criteria of water interventions, ensuring that marginalised groups have agency and meaningful participation in decision-making processes. Empowering these groups requires providing them with a voice through local governance institutions, capacity-building, training, and leadership opportunities. Training programmes, for example, create opportunities for women to assume leadership roles, enhance their bargaining power and increase their authority to mobilise the broader community (Coger et al. 2022). Gender and equity-focused training actively promotes fairness and inclusivity (Coger et al. 2022). Additionally, water interventions should be specifically designed to deliver tangible benefits to marginalised groups, including youths, women, people with disabilities, and the poor. These benefits should be explicitly outlined in project proposals and be materialised in the form of employment opportunities, increased income, improved health, higher production, reduced time and energy spent on water-related tasks, and more opportunities for education.

Principle 3. Providing patient and predictable funding that can be accessed more easily

For water adaptation interventions to be effective and sustainable, they require stable and long-term funding that builds institutions and capacities at the local level. For LLA, funding spanning seven or more years is recommended, providing

communities with time to establish sustainable governance processes and enhance institutional capacities for effective community engagement (Soanes et al. 2021). Integrating LLA into national policies is one way to adopt a long-term perspective, improving the predictability of local actors' access to resources. Short-term, project-based financing can lead to fragile and unsustainable decision-making structures (Coger et al. 2022). Localising funds ensures quick and easy access, avoiding unnecessary complexities that could cause delays in releasing funds.

Establishing mechanisms for long-term financing is crucial to addressing recurring water costs and ensuring the sustainability of water interventions. These costs can be covered through various means, including local or central government budgets, water service providers, user tariffs, or alternative sources. Long-term financing frameworks that support institutional capacity development and sustainable water governance play a vital role in ensuring the effectiveness of water interventions. However, financing rural water supply can be challenging due to small, dispersed and economically disadvantaged populations, limiting economies of scale and cost recovery (REAL-Water 2023). Sustainability remains a major challenge to Africa's rural water supply, especially when funds are not dedicated to cover regular operation and maintenance costs. Allocating funding for post-implementation activities, such as monitoring, operation and maintenance, helps ensure the continued functionality of water interventions and their long-term benefits to the communities they serve (Bedelian 2019).

To cover maintenance and repair costs, a user fee system may be implemented, where users contribute to the cost of accessing water. However, it is unrealistic to assume that user contributions alone can fully fund maintenance and repairs, especially in rural communities with limited resources. Moreover, the act of pricing water as an economic good raises concern about the monetisation of what should be a fundamental human right (Woodhouse & Muller 2017). A blended finance approach may be required, combining funding from multiple sources, including user contributions, the local private sector, donors, investors and government support, to sustain water interventions and provide reliable services to communities (Jiang 2023).

Principle 4. Investing in local capabilities to leave an institutional legacy

To ensure the long-term success of locally-led water interventions, a focus on building the capacity of local actors and institutions is crucial. This involves targeted capacity building in key areas such as management, technical skills, fund management, and an understanding of climate risk and uncertainty. By empowering

community members and local governments through training, peer learning, and mentoring, these actors become equipped to not merely act as delivery partners but also to initiate, design and manage water adaptation effectively. This approach ensures that local leadership persists even after the project's financial support concludes (Soanes et al. 2021).

Simultaneously, the establishment of robust local governance and management institutions is essential for the long-term management of water interventions. These institutions should be capable of overseeing water adaptation interventions with little reliance on external support. To enhance long-term sustainability, legal frameworks can be used to formalise and institutionalise these local entities, ensuring a lasting legacy beyond the completion of project-based adaptation.

In the context of water interventions, strengthening local institutions to support the sustainability of investments requires the establishment of effective maintenance systems and appropriate support structures that extend beyond the project's lifetime. Key challenges to sustainable rural water supply in Africa's drylands include weak technical capacity at the community or local government level and the lack of preventive maintenance systems (Bedelian 2019). Effective maintenance helps secure the benefits and long-term success of projects. While transferring project ownership to communities is important for sustainability, it also requires technical expertise for ongoing maintenance. Mechanisms should be established to leverage government technical staff for support, although their availability and capacity may be limited. Communities may struggle to manage all aspects of water point maintenance on their own and may require support from government or the private sector, such as access to spare parts and mechanics (Bedelian 2019). Insufficient funds for major maintenance can lead to extended downtime, leaving communities vulnerable to climate hazards like drought. Thus, strengthening the operation and maintenance of water systems is essential for building climate resilience (WaterAid 2021).

Principle 5. Building a robust understanding of climate risk and uncertainty

LLA interventions in the water sector should be informed by a comprehensive understanding of climate risk informed by integrating local, traditional and scientific knowledge sources. This involves combining diverse perspectives, including local and indigenous knowledge, practitioner experience, and scientific climate information, to accurately assess climate risk and its uncertainties (Soanes et al. 2021). This detailed understanding guides the selection of appropriate solutions for addressing climate risk and informs the design of adaptation investments. However, a review of LLA delivery mechanisms found that, in many cases, LLA approaches

primarily focus on reducing poverty and vulnerability and protecting ecosystems rather than specifically targeting short or long-term climate risks (Steinbach et al. 2022).

Participatory risk and vulnerability assessments aid in identifying community risk profiles, vulnerabilities, and monitoring ecosystem trends. These assessments build on local knowledge that, combined with scientific climate change information, provide a context-specific foundation for designing water adaptation strategies. Strengthening the capacity of local actors to understand climate risk and climate data allows them to integrate it into adaptation interventions, policies, and plans. This promotes a locally-driven perspective on climate resilience, ensuring that local voices are incorporated into the decision-making process, enhancing the relevance and effectiveness of adaptation measures.

Additionally, water interventions must be designed to be climate resilient, selecting infrastructure and technology capable of withstanding climate shocks like floods and droughts. Consideration for climate resilience should be integrated into the design stage, for example by anticipating extended drought periods through increasing water storage capacity and being able to accommodate an increase in water users during droughts. Similarly, water infrastructure should be equipped to handle flood events, incorporating adequate drainage systems and spillways. These risk-informed and shock-responsive water systems allow services to expand and contract to meet demand, thereby contributing to climate resilience (CHC 2019). Securing adequate financing for climate-proofing infrastructure is essential to ensure the resilience of water infrastructure systems against climate shocks, aligning with long-term climate resilience goals and the sustainability of water resources.

Principle 6. Flexible programming and learning

Adaptive management is important for navigating uncertainties in water resource management under climate change. This strategy emphasises flexibility and responsiveness to changing circumstances, and involves adjusting timelines and budgets as contexts change, providing flexible finance, and allowing budget flexibility to reallocate funds without additional approval (Soanes et al. 2021). Flexible and rapid finance options are crucial to disburse emergency funds, allowing communities to set priorities, adjust projects, and extend timelines. The capacity and flexibility to make timely adjustments in response to changing water needs, hydrological conditions, climate factors, or livelihood strategies are key aspects for effective adaptive water management (MacAlister & Subramanyam 2018).

Participatory monitoring & evaluation (M&E) systems play a vital role in adaptive management by actively engaging communities and stakeholders in assessing project outcomes. These systems facilitate iterative learning, programme adjustments, and adaptive management. Empowering communities through locally-led monitoring allows them to decide what to monitor, how to collect data, and how to analyse results (Coger et al. 2022), ensuring that interventions remain responsive to evolving needs and challenges.

Learning from past successes and failures informs adaptive management, guiding modifications in water resource management. Opportunities for regular reflection and adjustment through programme meetings and regular vulnerability assessments encourage flexibility (Coger et al. 2022). These engagements enable communities and stakeholders to actively contribute to the assessment of project outcomes, fostering a continuous cycle of improvement. Plans and investments should incorporate scheduled and ad hoc stocktaking for flexibility to update and adjust priorities as conditions change. These elements ensure that water adaptation interventions remain responsive, relevant and resilient in the face of evolving challenges and uncertainties.

Principle 7. Ensuring transparency and accountability

Communities require clear information on finance allocations and governance arrangements to understand the availability and distribution of adaptation finance (Soanes et al. 2021). Transparency and accountability are essential throughout the entire process of financing, designing, and delivering water adaptation interventions, particularly in active collaboration with local stakeholders. This involves transparent communication of fund allocation across activities. To ensure understanding for local communities, financial information and governance arrangements should be easily accessible, for example through translation into local languages and presentation in accessible formats (Soanes et al. 2021). Simplified and transparent governance processes support downward accountability, especially for those with limited financial literacy (Coger et al. 2022). However, a review of LLA approaches identified a lack of accessible and transparent data on provided funds and local recipients (Steinbach et al. 2022), making transparency hard to achieve.

Establishing transparent systems for prioritising, implementing, managing and governing water interventions, while allowing local communities to understand and participate in these processes, is essential. Key water governance issues include ensuring that water adaptation committees make readily available and directly accessible to water users all information on membership, decision-making, budgets

and costs, and water management and use. Additionally, measures should encourage communities to actively engage in evaluation and learning, including training communities to monitor and track project and financial progress. These efforts empower communities to hold those involved in water adaptation initiatives accountable and ensure transparency and responsiveness to community needs and concerns.

Principle 8. Collaborative action and investment

Achieving efficient and effective water adaptation requires a well-coordinated and collaborative effort that involves various stakeholders, sectors, programmes and funders. Coordination ensures the efficient delivery of water interventions and mitigates the risk of redundant efforts. In many instances, water governance is highly fragmented, characterised by numerous actors, overlapping institutional mandates, and a lack of coordination (Oates & Marani 2017). This makes integrated and collaborative approaches hard to achieve in practice and can lead to the duplication of water interventions and the creation of redundant and non-functional infrastructure (Bedelian 2019).

In the context of LLA, adopting collaborative whole-of-society approaches allows initiatives to complement one another and for their activities to be layered, enhancing efficiency and allowing sharing of best practices (Soanes et al. 2021). This is especially important for water-related initiatives due to the cross-cutting nature of water across various sectors and functions. Multi-level and cross-sector collaboration in water governance is associated with effective responses to climate change challenges (Pahl-Wostl & Knieper 2014). While LLA interventions are implemented locally, they require support and alignment across multiple levels of planning and policymaking (Coger et al. 2022). This requires strengthening cross-sector collaboration within government to facilitate a well-rounded approach to planning water interventions that addresses the diverse needs of multiple users across various domains, including water, agriculture, and rangelands. By aligning these sectors and actors, water resource planning becomes more comprehensive and responsive to the complex and interconnected demands of a diverse user base.

Furthermore, effective collaboration and partnerships should extend to entities not primarily focused on climate adaptation, such as technology providers, financial service providers, agricultural bodies, and meteorology services (Coger et al. 2022). This collaboration can enhance the expertise and resources available for water adaptation efforts, creating a more robust and effective response to climate change and water resource management challenges.

Principle 9. Applying nature-based solutions

This principle recognises the critical linkages between NbS and LLA in the context of water adaptation. Water interventions that promote ecosystem-based solutions offer benefits for biodiversity and contribute to climate change mitigation. For instance, managing upstream forests and wetlands enhances water retention and filtration, while establishing green infrastructure, such as rainwater harvesting and riverbank stabilisation, leads to improved water quality, reduced contamination, and sustainable use. These actions lead to positive outcomes, including increased tree cover, improved rangeland management, reduced land deterioration, rangeland regeneration, and the growth of palatable grasses. The social and climate-resilient benefits extend to improved livestock and human health, increased income, better decision-making using climate information, and enhanced access to pasture and veterinary services to manage drought. Ultimately, these measures contribute to improved ecosystem resilience, enhance the delivery of ecosystem services, and subsequently strengthen human climate resilience.

In the context of NbS for LLA, participatory planning, risk assessments, and monitoring and evaluation processes play a crucial role in identifying opportunities and risks related to groundwater, broader ecosystems, biodiversity, and emissions. Monitoring ground and surface water is important for understanding water availability and usage patterns, preventing the overexploitation of groundwater resources. Furthermore, applying NbS for LLA requires careful planning and project implementation that goes beyond the immediate water resource boundaries to consider the wider catchment and ecosystem. Adopting an ecosystem-scale approach enhances sustainability by addressing complex interconnections within the natural environment. Additionally, understanding how these water interventions impact the water and resource rights of different users, including domestic, agricultural or livestock users, as well as upstream and downstream users, is essential. Implementing responsible water governance mechanisms is crucial to protect these rights, prevent infringements, and ensure that water adaptation interventions respect and support the needs and rights of diverse stakeholders.

Lesoit Sand Dam wall showing funders and partners, Kajiado County, Kenya, 2023. Photo: Claire Bedelian

APPLYING THE FRAMEWORK: CASE STUDIES OF WATER ADAPTATION INTERVENTIONS

This section presents the six case studies to illustrate how locally-led water adaptation is occurring on the ground, reflecting a range of approaches and governance arrangements. The case studies include:

- One water project funded by the Water Sector Trust Fund (WSTF) in Kenya – a national water and sanitation financing institution.
- Two water projects funded by the Local Climate Adaptive Living Facility (LoCAL) in Tanzania – an international, performance-based, grant facility.
- Three water projects funded by the County Climate Change Fund (CCCF) in Kenya – a subnational devolved climate fund.

The findings from each case study are evaluated using the locally-led water adaptation assessment framework. Each project is individually scored from 0 to 4 for each of the nine principles, accompanied by a brief explanation justifying the assigned score. A score of 0 indicates little to no alignment with a particular principle, while 4 indicates near-full alignment. Each water project is scored separately within the three approaches outlined above, acknowledging their unique community context, technical aspects, sustainability considerations, benefit provision, funding sources, NbS and other factors. This approach provides a comprehensive understanding of the specific context and considerations for each water project.

First, to provide context to the findings within the broader water governance landscapes of Kenya and Tanzania, Boxes 3 and 4 provide a brief overview of the institutional framework for water in both countries covered in the case studies.

BOX 3. INSTITUTIONAL FRAMEWORK FOR WATER IN KENYA

The Kenya Government introduced key reforms in the water sector to decentralise control over water resources through the Kenya Water Act 2002 and the subsequent Kenya Water Act 2016 (see Figure 1), in alignment with constitutional reforms in 2010. These reforms emphasise a participatory approach to the management of water resources, guided by the framework of integrated water resource management (IWRM).

A key reform was the separation of water resources management (a national function) and water services delivery (a devolved function). The water resource authority (WRA) coordinates and oversees water resource management across the country, working through six regional river basin authorities. The WRA establishes water resource users associations (WRUAs) to facilitate community participation in the management of water resources within specific catchment areas. Water service delivery, in contrast, is devolved to county governments, with county water service boards coordinating water services provision and water service providers – either county water companies, community-based water groups or private entities – to implement water services. The national and county governments collaborate to ensure water infrastructure aligns with the National Water Master Plan (2015–2030) and county-level water policies.

BOX 4. INSTITUTIONAL FRAMEWORK FOR WATER IN TANZANIA

In Tanzania, water is governed under the National Water Policy 2002, the Water Resource Management Act 2009, and the Water Supply and Sanitation Act 2019, among others. Since the enactment of the Water Supply and Sanitation Act 2019, various structural reforms have been implemented to improve the effectiveness and sustainability of water supply and sanitation services in rural areas. This includes the establishment of the rural water supply and sanitation agency (RUWASA) responsible for the development and maintenance of water infrastructure and services in rural areas (USAID 2022). Previously, rural water infrastructure and services were the responsibility of local government authorities. However, with the establishment of RUWASA, authority over community-based water supply organisations has been delegated to operate and maintain rural water schemes. Despite being situated at the local level, RUWASA operates as a central government agency under the Ministry of Water. Therefore, water management remains a centralised function rather than being devolved to local government authorities.

WATER SECTOR TRUST FUND (WSTF) IN KENYA: CASE STUDY 1

Project background and modality

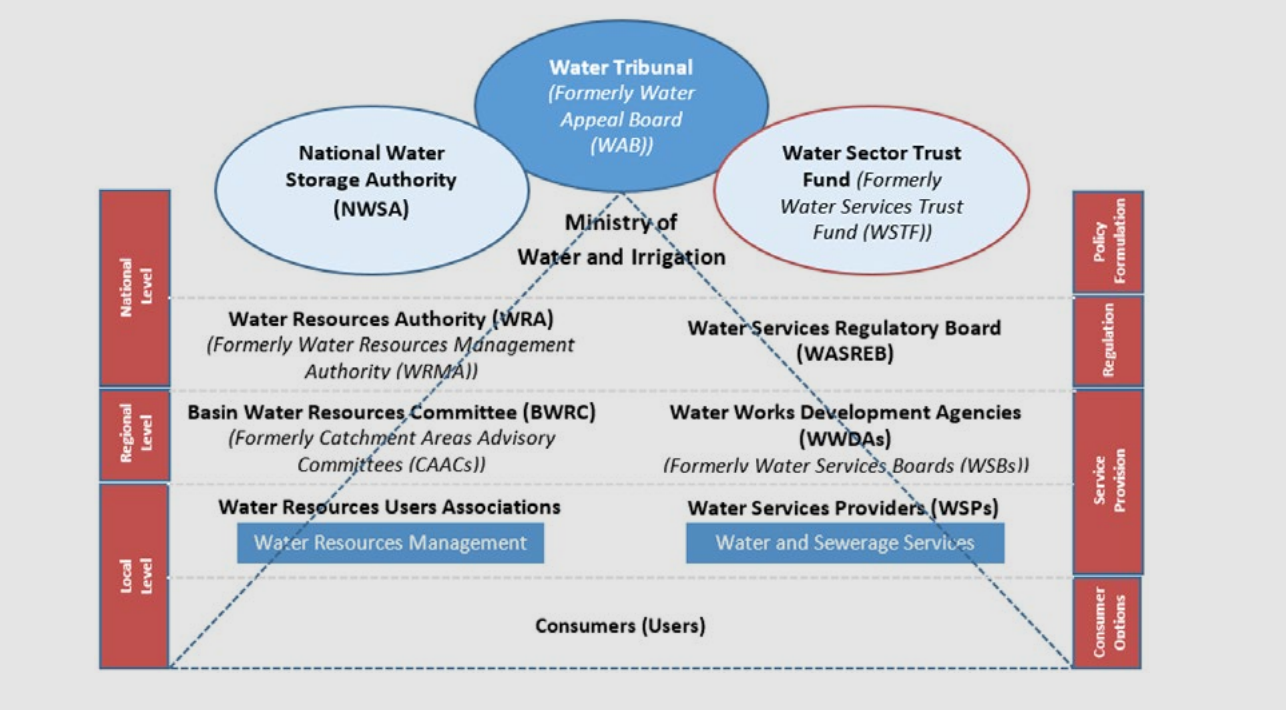
Kenya's Water Sector Trust Fund (WSTF) is a government entity under the Ministry of Water, Sanitation and Irrigation. It provides grants to counties to finance the development and management of water services in marginalised areas. WSTF finances climate-resilient investments, utilising green growth innovations, (such as solar energy and wastewater reuse), nature-based solutions (such as wetlands restoration and soil moisture conservation), and climate-proofing (for example resilient design and materials, and water storage) particularly in Kenya's arid and semi-arid areas (WSTF 2023).

WSTF is implementing the 'ending drought emergencies climate-proofed infrastructure' (EDE-CPIRA) programme to improve water supply and sanitation in eight ASAL counties from 2018–2024, with a total funding of KSh3 billion from the EU, Government of Kenya and the targeted county governments. As part of the programme, water resource users associations (WRUAs) are funded to implement water resource management projects in their respective sub-catchments. WRUAs

are formal and voluntary associations mandated by Kenya's Water Act 2016 to conserve, protect and manage their water resources and resolve water conflicts within their sub-catchments. WRUAs are registered with the Water Resources Authority (WRA), the lead agency in the protection and management of water resources in Kenya.

In Kajiado County, the programme funded the Ilmunkush WRUA to implement the (i) Lesoit sand dam; and (ii) installation of seven 10,000 litre rainwater harvesting tanks at nearby schools from 2021–2022. WSTF funded approximately US$49,000 with US$3,760 provided in self-finance by Ilmunkush WRUA.

Figure 1. Institutional framework for Kenya's water sector under the Water Act 2016



Source: WSTF 2018

Main findings

The text below assesses the extent to which progress in the case study aligns with each of the nine principles of the locally-led water adaptation assessment framework. Figure 2 provides the scoring according to each principle.

Principle 1: Devolving decision-making to the lowest appropriate level

The Ilmunkush WRUA, established in 2016 with over 70 members, has a 13-member elected executive committee that represents the three locations within the sub-catchment. WRUAs operate at the sub-catchment level, facilitating participatory water resource management and governance. This ensures action is taken at the most appropriate governance level, aligning with the principle of subsidiarity. However, although much decision-making is devolved to the local level, eligible funding windows and decisions around which projects can access finance are taken by WSTF and the Water Resource Authority (WRA) at the national level.

WRUA projects funded by WSTF are identified in their three- to five-year sub-catchment management plans (SCMPs). The SCMP development process, facilitated by the WRUA and WRA, is participatory and brings together water users to identify water resource problems, propose solutions and prioritise activities for water resource development, management, conservation and protection. To prioritise water projects, the Ilmunkush WRUA holds community barazas, and identifies and prioritises those areas with the most pressing water needs. The community prioritised the Lesoit sand dam and rainwater harvesting systems to address water shortages in the sub-catchment, exacerbated by local sand harvesting in the Ilmunkush River over several years.

WRUAs write project proposals for WSTF funding and lead the implementation of the funded projects. WSTF and WRA appraise the proposed activities, ensuring alignment with the SCMP, technical feasibility and optimal site selection. The WRA has the overall plan for the basin and a say in what is viable and what is not. The WRUA oversees project implementation, participating in all stages, including technical and financial appraisals, procurement, monitoring, reporting, and contributing labour and materials.

Principle 2: Addressing structural inequalities faced by women, youth, children, disabled and displaced people, indigenous peoples and marginalised ethnic groups

The WRUA committee promotes gender and youth inclusion, although the inclusion of people with disabilities was not as consistent. Positive outcomes were observed,

especially for youths and women. The rainwater harvesting systems installed at the schools benefit around 2,000 students, reducing the time students spent fetching water and enhancing educational opportunities. The sand dam serves around 500 households, providing direct water access for livestock and supporting minor irrigation. Women benefit from cropping and seasonal labour, while the sand dam eases livestock watering responsibilities typically managed by women. However, there is currently no accessible hand pump shallow well for domestic access, leading community members to dig shallow wells in the sand dam during the dry season.

Principle 3: Providing patient and predictable funding that can be accessed more easily

Through WSTF's five-year EDE-CPIRA programme, there have been three rounds of funding in each county. Funding to WRUAs follows a structured and phased approach. WRUAs receive funds according to four predetermined funding category levels (from KSh1.5 to KSh30 million) based on their absorption capacity. After successfully implementing, accounting and auditing one level, WRUAs can move to the next. The Ilmunkush WRUA's funded activities fell under levels 1 and 2.

WSTF funds WRUAs based on SCMP-aligned proposals and the category levels, with Memoranda of Understanding (MoUs) outlining grant management. Funds are released into WRUA bank accounts after appraisals, with each disbursement requiring 70% accountability from the previous one. WSTF also finances WRUAs through various other programmes, with the Kenyan Government covering WSTF's operational costs and donors funding the water investments. WRUAs contribute partial financing and county governments may provide extra funding. WRUAs strive for self-sustainability through member fees, contributions, and water payments, but they are often underfinanced. Each project must have a sustainability plan before WSTF financing. The WRUA collects monthly revenue from households, mobilising additional funds for maintenance and repairs as needed. With additional funding, the WRUA committee would add a shallow well with a hand pump to further improve water accessibility for domestic use.

Principle 4: Investing in local capabilities to leave an institutional legacy

WRUAs provide an institutionalised mechanism for collaborative management, but face issues of weak institutional, governance and technical capacity. The WRA attempts to address this by providing training in watershed management, proposal writing, good governance, budgeting, and conflict resolution, among others. Exchange visits and peer-to-peer learning with other WRUAs contribute to knowledge-sharing.

WSTF also strengthens WRUAs' capacities throughout the funding cycle, offering training in financial and project management, operation and maintenance (O&M), and climate-proofing.

Ilmunkush's WRUA sustainability committee manages the Lesoit sand dam, ensuring its functionality and regular maintenance. Larger maintenance, such as desilting and major repairs, is supported by the county government, and NGOs may also provide support. Limited support is received from the private sector, although this did occur in other counties, especially where there were accompanying income-generating activities, such as beekeeping or ecotourism. The sand dam had not required any repairs or maintenance to date.

Principle 5: Building a robust understanding of climate risk and uncertainty

During the SCMP development, WRUA members identify climate change threats and propose solutions, with training provided on climate risks and adaptation action planning. The participatory development approach ensures that local perspectives are central to identifying and responding to climate risks. In designing the Lesoit sand dam, local knowledge on sand dam management was integrated with technical expertise from WRA and WSTF on site selection, climate-proof design, and rainfall data. Climate resilience is a key component of the EU-funded EDE–CPIRA programme and is incorporated into each proposal call. WSTF and WRA provide technical support during field appraisals to ensure climate-resilient project design. Guidelines on climate proofing include a minimum capacity of 30,000m^3 for water pans and dams to withstand droughts, use of PVC pipes for flood resilience, and roof coverage for water harvesting systems.

Principle 6: Flexible programming and learning

There was some flexibility in terms of budget approval and project scope changes for WSTF-funded projects, although this required formal requests to WSTF for approval. Adaptive management was most evident in the SCMPs which undergo regular updates and revisions to stay aligned to the changing needs identified by WRUAs, including climate change considerations and evolving livelihoods. WSTF actively supports this process, contributing to institutional development and strengthening of WRUAs. Ilmunkush WRUA, for example, reviewed their SCMP, adding sections on livelihood enhancement, climate change mitigation, and flood management. These updates enable them to integrate the latest insights into subsequent proposals to WSTF for a more up-to-date and context-specific outlook in line with current and projected catchment characteristics. Participatory M&E systems were in place, although they followed standardised procedures set by WRA.

WRUAs are trained in M&E by WRA to incorporate monthly reporting on both technical and financial aspects. WSTF will only disburse funds after satisfactory M&E.

Principle 7: Ensuring transparency and accountability

Funding transparency between WSTF and WRUAs is ensured through a clear process. The available funds are specified in the call for proposals and correspond to specific financing levels (level 1 to 4) for WRUAs. With support from WRA, WRUAs develop the bill of quantities and budget, manage procurement, and upon approval, WSTF transfers funds directly to the WRUA's bank account for project implementation.

Ilmunkush WRUA is governed by a constitution and bylaws and maintains downward accountability and transparency through a democratic process, holding elections every three years. WRUAs undergo capacity development on good governance, accountability and transparency facilitated by WRA, often with support from NGOs. For example, the governance and integrity training module strengthens WRUAs by promoting transparency, accountability and participation while clarifying roles and responsibilities (WRA 2017). This initiative has led to increased inclusivity, with greater participation of women and youth, and improved conflict resolution capabilities (WIN 2018a).

Principle 8: Collaborative action and investment

WSTF receives support from a number of donors in financing their programmes such as the EDE-CPIRA. These include the EU, IFAD, Danida and the Governments of Finland and Sweden.

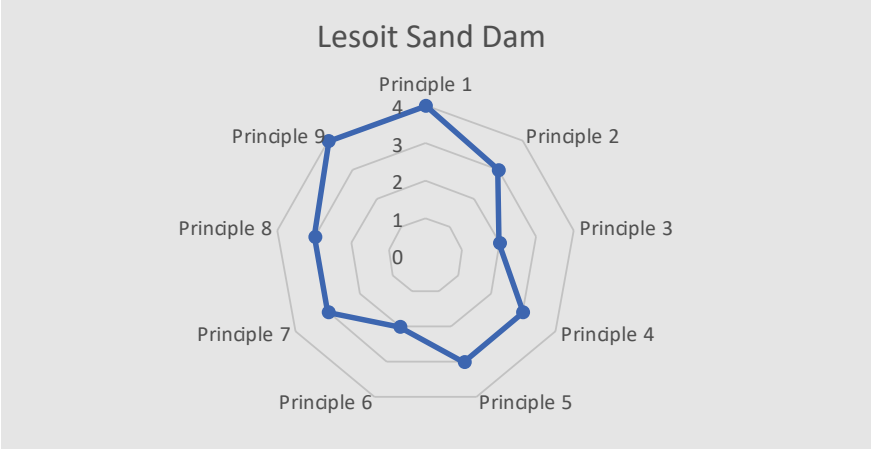
Kenya's Water Act 2016 outlines the roles and coordination of institutions in the water sector. WRUAs, responsible for water resource management, fall under the remit of the national government (WRA and WSTF) and operate based on catchment rather than county or administrative boundaries. While there is limited involvement of the county government in implementation, collaboration does occur in financing SCMPs and ensuring project sustainability. To ensure diverse water needs and interests are included, WRUAs consist of water users representing various sectors including agriculture, livestock, domestic use, industry and the environment. The SCMP development process involves identifying the different stakeholders in the sub-catchment and fostering a multi-stakeholder and cross-sectoral approach for integrated water resource management. Partnerships with NGOs contribute to capacity building, knowledge sharing, and technical support (WIN 2018b). To avoid duplication of projects, WSTF maintains a database of implemented projects and

conducts ground appraisals. WRUAs also outline the nearby water projects and water sources when proposing projects.

Principle 9: Applying nature-based solutions (NbS)

The WSTF incorporates NbS as part of their climate-resilient water management and investment strategies. This involves initiatives to restore wetlands, harvest rainwater, conserve soil moisture, and preserve natural water retention areas. The Ilmunkush WRUA used WSTF funds to prioritise a sand dam, an NbS, addressing water scarcity caused by unregulated local sand harvesting in the Ilmunkush River. The Lesoit sand dam has increased sand retention and water storage capacity, countering the negative effects of sand loss. The WRUA added nature-based measures like tree planting and farmland terracing around the sand dam, promoting water and soil conservation and enhancing soil fertility. These efforts have reduced water conflicts by improving access to water for various users, including for livestock, agricultural and domestic use. WRUA members expressed that sand dams managed under WRUA governance are well-protected, in contrast to other locations experiencing detrimental effects of heavy sand harvesting.

Figure 2. Assessed alignment of the WSTF case study with the locally-led water adaptation principles



THE LOCAL CLIMATE ADAPTIVE LIVING (LoCAL) FACILITY IN TANZANIA: CASE STUDIES 2 AND 3

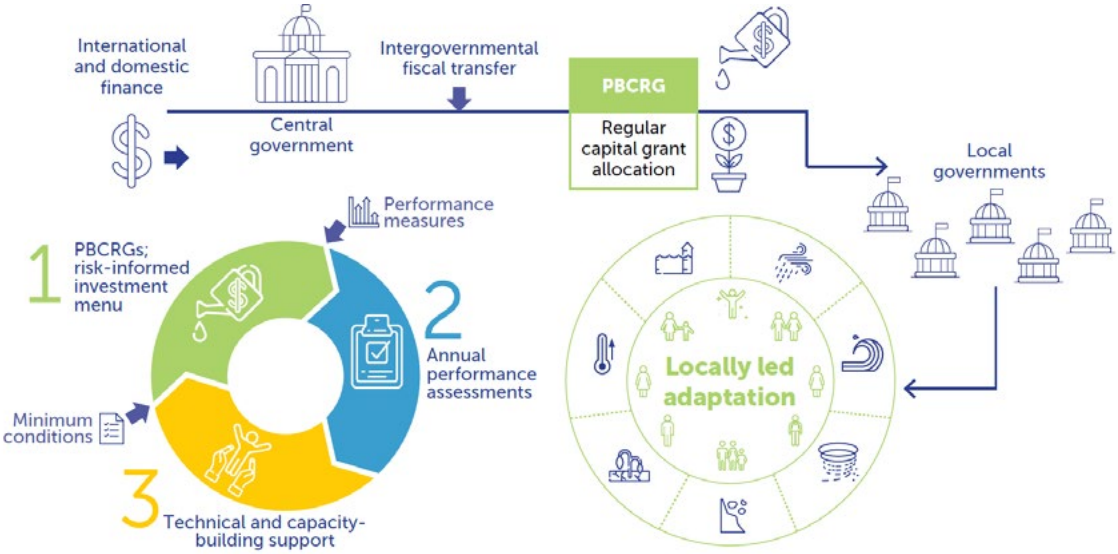
Project background and modality

The Local Climate Adaptive Living (LoCAL) Facility, managed by the United Nations Capital Development Fund (UNCDF), is designed to channel finance to local government authorities in developing countries, particularly the least developed countries (LDCs). LoCAL serves as a flexible mechanism that can be customised to fit each country's specific conditions, aiming to integrate climate adaptation into local government planning and budgeting, and increase financial resources available for climate adaptation investments. LoCAL combines performance-based climate resilience grants (PBCRGs), which ensure programming and verification of climate change expenditures at the local level, with technical and capacity-building support (Figure 3) (UNCDF 2023). LoCAL is being developed or implemented in over 35 countries across the Global South (UNCDF 2023).

LoCAL-Tanzania aims to strengthen the climate resilience of local communities and economies by increasing climate finance transfers to local government bodies and implementing PBCRGs (LoCAL 2023). It has two main objectives: (i) Increase climate finance transfers to local governments by leveraging existing finance within national institutions and systems; and (ii) Establish a standardised national mechanism that supports direct access to international climate finance (LoCAL 2023).

With funding from the EU, LoCAL piloted its approach in three districts of Dodoma Region – Chamwino, Mpwapwa and Kondoa – starting in 2021. Each district received US$50,000 funding as a supplementary grant mechanism alongside local government authority funding. Activities focused on (i) the construction of a borehole at Kisisi village (Mpwapwa District); and (ii) the rehabilitation of Kisese Dissa water catchment in Dissa village (Kondoa District). The objective is to scale up LoCAL to other districts from 2022 (LoCAL 2023).

Figure 3. The LoCAL mechanism



Source: UNCDF (2023)

Main findings

The text below assesses the extent to which progress in the two case studies aligns with each of the nine principles of the locally-led water adaptation assessment framework. Figure 4 provides the scoring according to each principle.

Principle 1: Devolving decision-making to the lowest appropriate level

In both Mpwapwa and Kondoa, the community identified the water projects during a village meeting, a regular government planning meeting open to all. Villagers prioritised climate-related projects in these meetings, which were then forwarded to the ward and later district level for decision-making, following the government planning procedures. The prioritised projects are included in the district development plans, which are then funded by LoCAL. These processes gave communities a degree of devolved decision-making authority to create a list of prioritised projects that respond to their needs. However, in the government planning process, the district development plans must align with the priorities set by the central government. There was little evidence that the district councils had carried out participatory resilience and vulnerability assessments to inform the selection of interventions, despite being part of the LoCAL approach (UNCDF 2023).

Once project aims were confirmed, design and implementation were led by the district councils alongside the Rural Water Supply and Sanitation Agency (RUWASA) in Kondoa and Mpwapwa. In Mpwapwa, the community played an active role, working with experts in project design and decision-making, and they provided labour. In Kondoa, the community was involved in determining the overall nature of the project, but the design was undertaken by RUWASA. This practice resulted in disagreements within the community as some members felt that their design suggestions were overruled. Additionally, the community did not provide labour; instead, the project was contracted out.

Principle 2: Addressing structural inequalities

The LoCAL mechanism uses the existing government structures to achieve its objectives, aligning planning with the government calendar and procedures. However, it was observed that the existing structures, which involve village-level planning meetings, do not inherently promote inclusion of marginalised groups such as women and youth in decision-making. Priorities are usually set by those who can attend the meetings, regardless of their number, gender and age. The projects aim to enhance water supply for 3201 people in Kisisi village (Mpwapwa) and 3732 people in Dissa village (Kondoa) for domestic, livestock and crop use. However, these benefits were not yet visible as the investments were not yet operational during the time of the field visit. In Mpwapwa, women were included as members of the water user committee, responsible for the management of the water project once operational. This committee was yet to be established in Kondoa.

Principle 3: Providing patient and predictable funding that can be accessed more easily

The water investments in Mpwapwa and Kondoa districts were funded by the EU through the LoCAL funding mechanism, providing US$50,000 for each district. Due to the districts' low financial capacity, very limited funds were collected from the district's own sources to support project implementation. The lack of funding for projects in Tanzania has been identified as a major obstacle to project scale-up (LoCAL 2023). The financial allocations to the projects followed the government planning and disbursement procedures. However, there was not enough time to disburse the funds before the end of the government financial year. This led to constraints on local governments implementing the prioritised projects, holding them back until the following year because holding funds for the next year requires justification from the central government, resulting in delays in procurements and payments to contractors.

After the project commissioning, local communities are responsible for operating and maintaining the water projects through the collection of water user fees. The RUWASA sets the water user fee at approximately Tsh40 per 20 litres, according to its guidelines. The collection is intended to be managed through the water user committee's bank accounts. Since the projects have not yet reached this operational stage, it remains to be seen how this will play out.

Principle 4: Investing in local capabilities to leave an institutional legacy

A goal of the LoCAL projects is to build the capacity of district officials, who received a three-day workshop on climate change adaptation and its integration into their daily activities, including proposal development for adaptation projects. However, the funding allocated to capacity-building was insufficient and the three-day workshop was found to be inadequate for building capacity effectively, leading to a request for additional sessions. Due to limited financial resources from the districts, and high staff turnover, capacity-building was delayed until next year's financial round from LoCAL.

At the village level, water user committees are formed or activated to manage projects, and are responsible for establishing bylaws, regulating water charges, and managing associated bank accounts for project sustainability. Once operational, the projects are handed over to the community for management through these water user committees. While these committees were expected to receive training for project management, the current capacity-building efforts were limited to the district level. Moreover, the investments lacked a clear sustainability plan.

Principle 5: Building a robust understanding of climate risk and uncertainty

There was little evidence of local government authorities carrying out climate risk and vulnerability assessments to inform the selection of climate change investments. Prioritisation of activities was generally based more on historical experience related to drought, food insecurity and livelihood improvement than on scientific climate data. Overall, at the district level, there is no climate change action plan in place, and activities are mostly reactive in response to droughts and floods. While the capacity-building workshop for district officials introduced them to climate terminology and uncertainties related to climate change, the subsequent planning and execution of the project did not sufficiently account for climate change risks. In Mpwapwa, no vulnerability assessment was conducted before project implementation and the project overlooked the inclusion of water storage tanks for use during breakdowns or long dry spells. In Kondoa, indigenous knowledge was used to inform the design

and construction of walls around the water source to prevent runoff and to avoid blocking other water sources.

Principle 6: Flexible programming and learning

Financing and programming lacked flexibility to adjust adaptation investments in response to uncertainties and changing circumstances. This is because the financing of the projects follows the government rigid planning cycle, subjecting the release of funds to the central government. This constrains local flexibility and discourages the reallocation of funds. If the local government fails to utilise its allocated funds by the end of the government financial year, the remaining funds revert to the central government. Retrieving these funds requires initiating a request and lengthy procedures.

M&E systems were in place but there was limited evidence on how these were used to inform subsequent planning and documentation of lessons learnt. Progress reports were quite generic and had no clear knowledge management window to capture lessons. M&E systems included input from local government staff and the community.

Principle 7: Ensuring transparency and accountability

The amount of funding for each project was outlined in the proposals, ensuring uniformity and transparency across the pilot districts. At the district level, transparency of project funding was maintained through detailed project proposals prepared by district officials, specifying consumption details for each activity cost. However, it is unclear whether there was awareness of the total funding and cost per activity at the village level. For example, in Kondoa, there was a point where the community mixed up the project costing amount with another unrelated project. The systems for prioritisation, procurement and implementation of projects follow the government planning processes and guidelines. This process was transparent in Mpwapwa, but in Kondoa the community were not aware of design changes in the project.

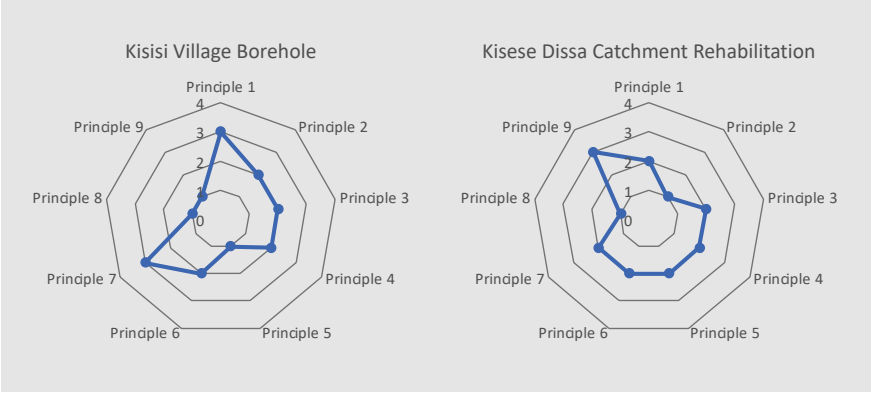
Principle 8: Collaborative action and investment

Limited coordination was observed in financing and implementing the water projects. RUWASA provided technical support, collaborating with the district councils and community in project implementation. Though seeking funding and collaborating with other stakeholders is one of the activities which is supposed to enable RUWASA to carry out its activities, the implementation of these projects was 100% financed by UNCDF. There was no involvement and/or collaboration of NGOs or the private sector to provide additional funding or enhance the sustainability of the projects.

Principle 9: Applying nature-based solutions (NbS)

None of the projects referred specifically to NbS, it being a new concept in this context. In practice, however, the water projects in Kondoa applied NbS, including biodiversity and mitigation benefits. Here, the water project's primary objective was to preserve the water catchment area in the village's forest area. The project also involved the rehabilitation of the water supply network and two water storage tanks. In Mpwapwa there were few observed NbS in place. The main priority of the community in Mpwapwa was to enhance water access. The water user committee mentioned potentially introducing a tree-planting element in the bylaws, although it had not been implemented yet. The pumping of water used electric power and did not include an alternative source.

Figure 4. Assessed alignment of the LoCAL case studies with the locally-led water adaptation principles



Left: Raised water tanks at Kisisi borehole, Mpwapwa, Tanzania, 2023.
Photo: Peter Msumali Rogers

Below: Dry-season watering point, Olkiramatian, Kajiado County, Kenya, 2022.
Photo: Mikkel Funder

Left: Kitchen gardens surrounding the Kwa Kilui Earth Dam, Makueni County, Kenya, 2023.
Photo: Claire Bedelian

Below: Kwa Kilui Earth Dam road sign, Makueni County, Kenya, 2023.
Photo: Claire Bedelian

THE COUNTY CLIMATE CHANGE FUND (CCCF) MECHANISM IN KENYA: CASE STUDIES 4, 5 AND 6

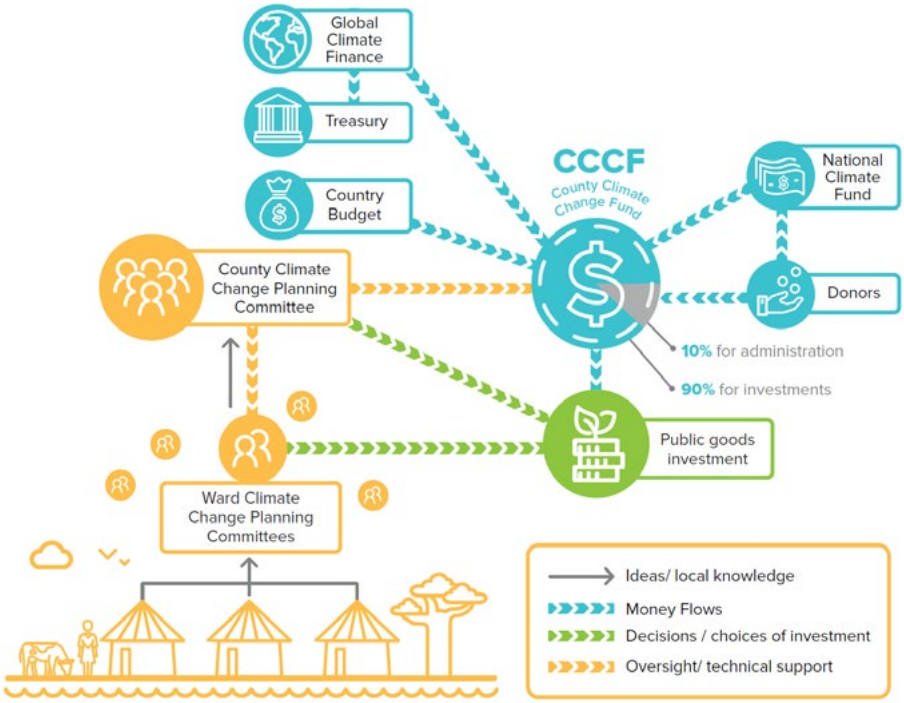
Project background and modality

The County Climate Change Fund (CCCF) mechanism aims to enhance the flow of climate finance to county governments while strengthening public participation in the management and use of those funds. It operates as a devolved mechanism under the authority of each county government that promotes mainstreaming of climate change adaptation into local planning and budget systems. The CCCF aligns with established government planning and budgeting systems, functioning as a key instrument for coordinating climate change action. County governments establish CCCFs to fund public goods investments at the county and ward levels and support operational costs (Figure 5). The mechanism sources funds from various places, including county government budgets, the private sector, donors, and international climate funds. The primary source of finance is a 2% budget allocation from the county government development budget.

The CCCF mechanism establishes local adaptation planning committees – namely county climate change planning committees (CCCPCs) and ward climate change planning committees (WCCPCs) – to conduct climate risk assessments and engage communities in identifying and prioritising resilience-building investments such as water infrastructure. The mechanism integrates climate information services and resilience planning tools into county plans and legislation, along with a monitoring and evaluating (M&E) system.

The CCCF mechanism was initially piloted in five ASAL counties in Kenya by the Ada Consortium from 2011, led by the National Drought Management Authority (NDMA). It is now being scaled up by the Government of Kenya under the ten-year 'financing locally-led climate action' programme (FLLoCA). Several county governments are now establishing CCCFs with allocations of up to 2% of their county development budgets. Makueni County, among the initial pilot counties, has implemented a number of water interventions including i) Ngai Ndethya sand dam, ii) Masue rock catchment and iii) Kwa Kilui earth dam.

Figure 5. Kenya's county climate change fund institutional arrangements



Source: Orindi et al. 2020.

Main findings

The text below assesses the extent to which progress in the three case studies aligns with each of the nine principles of the locally-led water adaptation assessment framework. Figure 6 provides the scoring according to each principle.

Principle 1: Devolving decision-making to the lowest appropriate level

Decision-making in the prioritisation of water adaptation interventions is done at the ward level – a sub-county governing unit consisting of villages – in line with the principle of subsidiarity. The community elects a ward climate change planning committee (WCCPC) consisting of nine members who represent the respective locations in the ward. The WCCPC is responsible for coordinating and mobilising the community in the prioritisation and implementation of water interventions. The WCCPCs, with guidance from the county government, carry out participatory climate risk and vulnerability assessments to prioritise projects and develop proposals addressing specific water needs and climate vulnerabilities. The proposals are vetted by the county climate change planning committees (CCCPCs) who cannot

veto proposals if they meet certain strategic criteria, but they can provide technical support to ensure technical criteria are met. Approved proposals are directed to Makueni's CCCF board for financing.

The majority of the CCCF is allocated to adaptation projects at the ward level (70%), with 20% allocated to the county level and 10% for operational costs. This distribution aims to ensure adaptation projects are tailored to community priorities and are specific to the local context.

In addition to the WCCPCs, community-managed committees are established to oversee the implementation and sustainability of water projects. These committees supervise contractors, manage budgets and finances, and ensure the ongoing operation of water projects. The community provides locally-sourced materials (sand, building stones) and labour to derive community benefits from the project. Overlapping members are included in these committees to ensure institutional memory

Principle 2: Addressing structural inequalities

The CCCF mechanism encourages the inclusion of all social groups in decision-making over funds and in the composition of the community committees. The WCCPC is representative of all social groups including women, youth, elderly, and people with disabilities. Women are elected to executive positions such as treasurer or chairperson. Inclusivity is also maintained in the implementation and sustainability committees, following the public participation policy and one third gender rule, and involving youth, people with disabilities, and other marginalised groups.

The CCCF is allocated to the most vulnerable wards first, before extending to the less vulnerable ones in the county. One of the mechanisms' strategic criteria to prioritise CCCF investments is that they must be public good investments that benefit various groups, including women, youth and other social and livelihood groups. The participatory climate risk and vulnerability assessments aim to address structural inequalities by identifying risks and needs of vulnerable groups like women, children, youth, the elderly, people with disabilities, and others. The assessments consider the main climate risks at ward level and formulate adaptation strategies that consider the needs of the vulnerable communities.

The water investments benefit hundreds of households: Ngai Ndethya sand dam (490hh), Masue rock catchment (150hh) and Kwa Kilui earth dam (300hh). The water serves domestic needs, livestock, kitchen gardens, and other activities like

brick-making. The investments have significantly improved water access, particularly for women and children. Previously, women had to walk five kilometres for water, but now it is much more accessible. At Masue rock catchment, the nearby school changed its name to 'Masue' to reflect the significance of the water benefits. Domestic and livestock uses are separated to maintain water quality. Kwa Kilui earth dam is fenced off to preserve water quality, and a hand-pumped shallow well provides easy domestic water access for women.

Principle 3: Providing patient and predictable funding that can be accessed more easily

CCCF financing comes from various sources, including the county government budget allocation, climate finance from national and international sources, and community contributions. The county government of Makueni allocates 2% of its development budget to the CCCF, providing predictable but limited funding. To supplement this, the county government seeks alternative financing sources. Financing from donors, such as the EU, SIDA, IFAD, supplements the county budget, with all of our three water case studies benefiting from these additional funds. Through the FLLoCA programme, a number of donors have provided additional funds, enabling the county government to extend climate adaptation projects to two more wards in 2023. With additional finance, communities in the case study sites said they would add further water storage and distribution points for broader community access which would also provide water access during the prolonged dry seasons.

The community, through the sustainability committee, is expected to cover operational costs and minor repairs through the sale of water. However, revenue from water sales can be unpredictable, and these committees can lack robust accountability mechanisms. To address these challenges, Makueni County aims to strengthen and guide the operation of water schemes while addressing governance and leadership issues. This includes establishing the Makueni County Rural Water Board (MARUWAB) to oversee tariff implementation and revenue collection from rural water facilities.

Principle 4: Investing in local capabilities to leave an institutional legacy

The institutions and governance structures, notably the ward and county-level climate change planning committees, are key for building local institutional capacity. These committees are formalised and institutionalised through county climate change legislation. By aligning with Kenya's devolved institutional structure, this approach avoids creating parallel structures, ensuring a lasting impact. These

committees enable community-driven planning and leadership, empowering communities to identify, prioritise and plan adaptation investments.

Capacity-building and training are integral components of the CCCF mechanism. After formation, the WCCPC undergoes regular training on various topics, such as group formation, leadership, proposal writing, financial management and climate change. The implementation and sustainability committees also receive training. However, there is a noted weakness in technical capacity for maintaining investments. Many water projects face technical issues and are not adequately maintained. The sustainability committees tend to lack technical capacity to maintain investments. They rely on the ward water officer or other technical officers, or the local private sector for repairs. The county government also faces challenges in technical capacity, with the ward water officer overseeing numerous water points creating delays in responding to requests. For example, in the case of Masue rock catchment, the committee waited three years for a response. Challenges include a shortage of personnel and technical support coverage across the large county. Obtaining spare parts is also problematic. Recognising the need for more technical capacity, including the training of youth for repairs, the Makueni County government recently established the Makueni Rural Water Board (MARUWAB) to provide technical support to community-managed rural water facilities.

Principle 5: Building a robust understanding of climate risk and uncertainty

The participatory climate and vulnerability assessments integrate local perspectives on climate risk, guiding identification and the design of adaptation interventions. Collaborating with various stakeholders in the county, the assessments aim to integrate climate information services into adaptation planning and inform sector-specific climate risks, including those related to water. These should then be accounted for during the proposal stage of projects. For example, the Makueni County government collaborates with donors such as the Africa Sand Dam Foundation in the design of water infrastructure, receiving architectural, scientific, and financial support for sand dam projects. However, in practice, climate information is not always sufficiently available or integrated into the design and implementation of water interventions and there have been challenges to strengthening climate information services at the county level (Crick et al. 2019).

For instance, at Masue rock catchment, climate information was considered during the proposal stage, such as the decision to bury the pipes to respond to flooding risks. However, during the last heavy rains, the security fence preventing contamination collapsed. Additionally, the water storage tank only holds enough

water for two months, highlighting the need for extra storage capacity to last through the dry season. At Kwa Kilui earth dam an environmental impact assessment was conducted, implementing measures such as checks on dams, a spillway to prevent flooding, deep soil compaction, and recommendations for grass and tree planting to prevent soil erosion.

Principle 6: Flexible programming and learning

During the establishment of the CCCF mechanism, flexible funding was provided by SIDA and FCDO, which allowed for an adaptable design process and the opportunity to test, fail, learn and improve programming. Further, the Makueni County government demonstrated flexibility in budget planning by responding to unforeseen circumstances and emergencies, such as the Covid-19 pandemic, by creating a supplementary budget.

Monitoring and evaluation are regular processes throughout the water intervention lifecycle, overseen by the implementation and sustainability committees. While these committees serve as monitoring, evaluation and learning points, there was an observed gap in integrating these learnings into county planning. The county prioritises financing the adaptation investments but lacks systems for feedback on learnings, affecting the implementation of subsequent water infrastructure. For example, the focus on developing water harvesting infrastructure overshadowed critical aspects like water access points, quality and distribution, essential for household water security, prompting a need for adjustments in planning and budget allocation.

Principle 7: Ensuring transparency and accountability

CCCF legislation mandates counties to allocate a minimum percentage of their development budget to support adaptation interventions. In Makueni County, this legislation includes fiduciary mechanisms that align with public finance policy and law. These mechanisms are designed to ensure accountability and transparency and complement the county's existing finance systems.

Transparency and accountability are also maintained through the governance structures and institutions developed at the local level. These institutions actively participate throughout the project cycle, in budgeting, decision-making, prioritisation, and coordination, ensuring transparency and accountability in the water adaptation interventions. However, in some instances, there were reported issues with transparency and accountability in the financial management of the operating water

projects. This was noted when water points were operated like private entities without clear reporting and banking procedures, making them less accountable to the community.

Principle 8: Collaborative action and investment

During the establishment of the CCCF mechanism, there was extensive collaboration involving government institutions, donors, NGOs and the private sector. As the mechanism expands to other wards and counties during scale-up, collaboration continues through the FLLoCA programme, funded by the World Bank and various donors. Collaboration is also evident in the participatory climate risk and vulnerability assessment process, where various stakeholders work together to identify climate vulnerabilities and corresponding adaptation strategies. This collaboration is formalised through Memoranda of Understanding (MoUs) and helps address adaptation gaps, such as those related to technology or financing. For example, the Africa Sand Dam Foundation provides technology, engineering and financing expertise for sand dam development.

To coordinate planning across scales, 20% of the CCCF is allocated to projects developed at the county level. Inter-ward planning also takes place to ensure that water investments are not duplicated where there are shared resources (Crick et al. 2019). However, the planning approach may not fully align with the spatial scale that communities use to manage water resources, as it lacks broader ecosystem-scale planning for water investments, such as at the sub-catchment or catchment level.

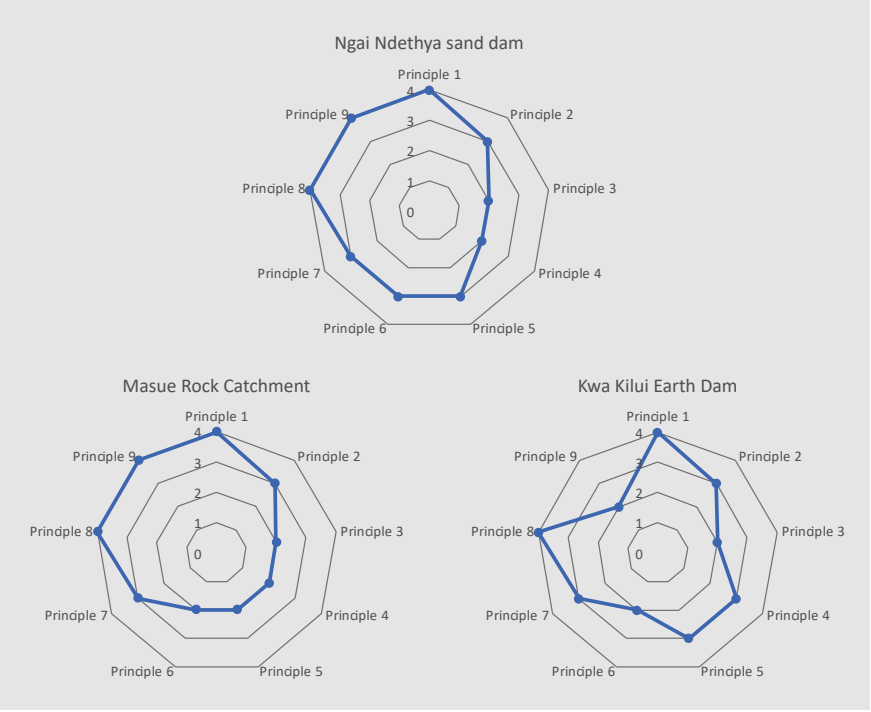
Principle 9: Applying nature-based solutions (NbS)

In implementing all water interventions, the Makueni County government emphasises the integration of NbS. Following guidelines from the Water Resources Authority (WRA), be it held by landowners or by a community, riparian land, defined as the area within 6 to 30 metres of either side of a riverbank, has to be managed under WRA regulations, aimed at conserving the water sources. In the construction of water interventions such as sand dams, communities are encouraged to donate land near riparian areas and convert it into conservation areas. The community also plants Napier grass and trees to prevent soil erosion. The sustainability committees educate the community on conservation, and community policing is adopted to safeguard public water investments, particularly against sand harvesting, which can negatively impact the water table. Sand, considered an economic resource for Makueni, is now recognised as a crucial component of water, leading to its protection for the benefits it brings.

Masue rock catchment uses the natural rock to harvest water, functioning as a nature-based solution. Before the intervention, the surrounding area experienced severe erosion and flooding. The rock catchment has transformed the area by collecting water and minimising erosion, leading to the recovery of deep gullies and growth of vegetation. Crops such as Napier grass are no longer washed away. Furthermore, water harvesting has enabled the expansion of schools and encouraged additional livelihood opportunities such as kitchen gardening, resulting in positive economic and social impacts. The rock catchment requires minimal additional nature-based measures, such as planting trees, to ensure sustainability.

At Kwa Kilui earth dam, Napier grass was planted along the earth dam's banks to prevent soil erosion. The community's strong sense of ownership of the earth dam, coupled with the collective donation of land for mutual benefit, ensures respect and adherence to the established rules without violations.

Figure 6. Assessed alignment of the CCCF case studies with the locally-led water adaptation principles



Water kiosk and tank at Masue rock catchment, Makueni County, Kenya, 2023. Photo: Claire Bedelian

KEY LEARNING

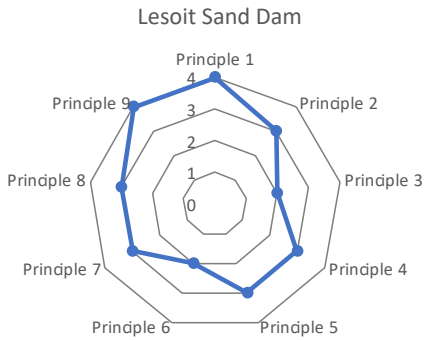
Assessing the scoring across the case studies (Figure 7), the six cases showed positive examples of locally-led water adaptation in practice, aligning well with the framework. There were varying levels of success in adhering to the nine principles, with some, like Principle 1 (devolving decision-making) and Principle 9 (applying nature-based solutions) performing well. This shows how incorporating NbS into water-related adaptation presents a clear opportunity, particularly within the context of LLA. Overall, the Kenyan cases (WSTF and CCCF mechanism) outperformed the Tanzanian cases (LoCAL). This difference is attributable to the longer period for which the Kenyan cases have had established, institutionalised mechanisms for local decision-making in water resources and adaptation planning; built institutional capacity for implementing sustainable adaptation interventions; and developed partnerships. For illustration, the development of the CCCF from the pilot stage to its current scale-up took nearly a decade (Orindi et al. 2020).

Additionally, the degree of climate finance devolution varies in Kenya and Tanzania due to differences in finance models and existing governance structures. While LoCAL channels adaptation funding to sub-national governments, and the district councils ensure participatory adaptation activities are included in district development plans, it works through national institutional frameworks on climate change. The CCCF, in contrast, is anchored in the autonomy of the county governments, allowing them to independently plan for their climate needs by allocating a percentage of their budget to climate change adaptation.

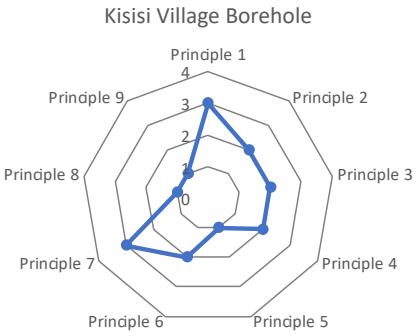
As a pilot in Tanzania, LoCAL faced initial challenges and had to adhere to less flexible government planning cycles. All projects encountered technical challenges and lacked long-term maintenance or funding plans, raising concerns about the sustainability of water interventions beyond the project or programme duration. These issues are discussed further below in a brief summary of key learning per principle.

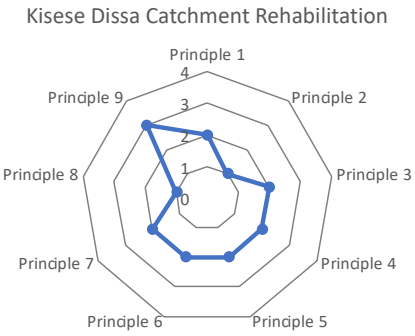
Figure 7. Comparison of all six case study scores from the assessment framework

WSTF case study

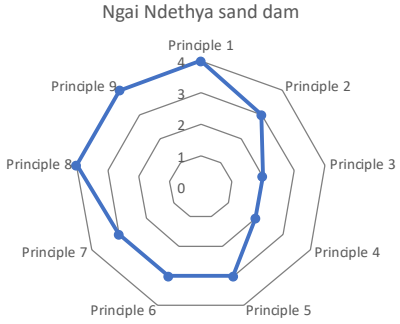


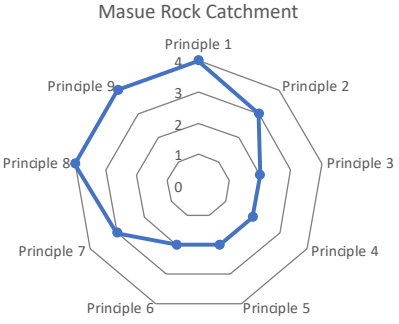
LoCAL case studies

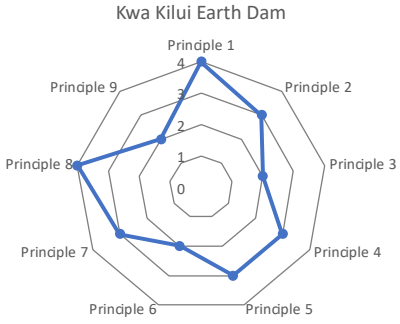




CCCF case studies







Principle 1: Devolving decision-making to the lowest appropriate level

In general, the case studies showed good alignment with this principle. This is positive, as participatory decision-making in devolved and centralised governance systems is often attempted yet often fails. The Kenyan cases appear to perform particularly well in this respect as a result of institutionalised structures for inclusive decision-making in water adaptation governance and an overall devolved governance context that is relatively extensive in Kenya compared to Tanzania.

Both WRUAs and the CCCF mechanism have established institutionalised governance arrangements at the lowest appropriate level. WRUAs manage water resources at the sub-catchment level, and WCCPCs handle ward-level adaptation planning. These are locally-representative institutions that ensure the inclusion of local needs and priorities in the design and implementation of water adaptation interventions. They facilitate participatory resilience and vulnerability assessments meaning that proposed interventions are context-specific and relevant. In Tanzania, district councils serve as the implementing entities, responsible for incorporating local needs and priorities from the village level upwards into water adaptation interventions. Aligning with the existing governance structures, the district serves as the lowest fiduciary institution in Tanzania, in contrast to the ward level in Kenya, illustrating how the extent and limits of channelling finance to the lowest level is in line with the level of decentralisation.

Principle 2: Addressing structural inequalities

Some of the cases showed good progress in terms of institutionalising representation of marginalised and vulnerable groups. The approaches in Kenya explicitly aimed to address structural inequalities by ensuring representation and inclusion of marginalised groups in decision-making bodies, such as the WCCPCs and WRUAs. This inclusivity involved women, youth, people with disabilities, and other marginalised social groups. Women also held leadership roles in these committees. These efforts ensure that water investments consider and benefit these groups. In contrast, LoCAL in Tanzania, did not have representative committees explicitly prioritising investments, and decisions were typically made by those attending meetings without specific inclusion of marginalised groups. However, women were included in subsequent water user committees responsible for managing the water investments.

Participatory climate risk and vulnerability assessments, prevalent in CCCF and to a lesser extent WSTF, played an important role in identifying risks to specific social groups. These assessments recognised existing vulnerabilities and their drivers,

guiding interventions to reduce these risks and vulnerabilities. By identifying the most vulnerable groups, these processes contribute to the development of water projects that address the needs of various social groups. These processes were lacking or less successful in the case of LoCAL. Overall, the water projects demonstrated the intended benefits to various social groups as outlined in the initial proposals.

Principle 3: Providing patient and predictable funding

All the cases struggle to accommodate this principle, leading to uncertainty among stakeholders regarding the long-term predictability of funding. The primary funding sources are external donors with limited time frames, with one exception being the FLLoCA programme, funded by the World Bank, offering a ten-year time frame. However, most funding falls short of the recommended seven-year minimum for LLA. The CCCF, using 2% of the county development budgets, provides a more predictable source of finance, though it still requires supplementing. Funding to WRUAs follows a structured and phased approach, although it relies on resource mobilisation from a number of donors to finance WSTF programs. LoCAL in Tanzania, being a pilot programme, suffered from low funding and relies heavily on external finance. The timing of financing also posed challenges for LoCAL, particularly if funds are released close to the financial year-end, giving local governments insufficient time for planning.

All the approaches faced challenges in financing recurring water costs, primarily relying on water user fees, which can be insufficient or suffer from poor governance. In each case study, the intention was for water user fees to cover operation and maintenance. However, some water investments were not operational or had not experienced breakdowns, so it remained uncertain whether the fees were adequate to sustain and manage the investments. Exploring financing options beyond user fees, such as blended finance or payment for ecosystem services, could be a viable option to sustain water projects. Blended finance involves combining different sources of funding, including public, private, and philanthropic funds. Diversifying funding sources can enhance water point resilience and address maintenance and repair needs.

Principle 4: Investing in local capabilities to leave an institutional legacy

Establishing local governance and management institutions is essential for the sustainable management of water interventions in the long term. This process requires time, and our findings reflect this reality. In Kenya, the CCCF established institutions and the WRUAs have operated long enough to establish sustainable

governance processes at the local level, formalising these processes into county and national legislation, respectively. However, in Tanzania, LoCAL is a pilot programme which has had less time to develop these capabilities to lead and manage interventions.

Strengthening capacity is a key component of effective LLA and is evident in most of the cases studied. For example, in Kenya the decision-making committees like WRUAs and WCCPCs undergo continuous training in areas such as proposal writing, climate risk, good governance, and project management. For LoCAL, there is also a long-term goal of building capacities at the district level to plan and manage projects. However, the process faced challenges due to funding constraints, which limited the number of training days. Capacity building at the community-level was either non-existent or yet to be organised.

Technical capacity was weak in all three approaches. In Kenya, despite regular training, the committees tasked with managing water interventions had limited technical capacity for repairs and maintenance, relying on local government or the local private sector for repairs. These were either inaccessible or faced their own technical capacity gaps. In the case of LoCAL, there was no capacity-building for the community committees managing water projects, who relied on available technical capacity from the RUWASA. In Makueni County, Kenya, the newly formed Rural Water Board established for technical support may offer a promising approach for maintenance and repairs of community-managed rural water points. Moreover, there were no clear sustainability plans for the water investments, leaving them vulnerable to periods of non-functionality. Sustainability of water investments is a critical issue that needs to be considered from the proposal stage.

Principle 5: Building a robust understanding of climate risk

The case studies demonstrated reasonable progress on this principle, particularly through the integration of local perspectives into participatory climate risk and vulnerability assessments. In the CCCF and WSTF approaches, these assessments facilitated discussions on how climate variability affects livelihood systems, and on strategies to enhance adaptive capacity. However, and despite being part of the LoCAL approach (UNCDF 2023), these assessments were not successfully implemented in Tanzania's pilot projects.

To encourage locally-driven strategies for climate-resilience, there were also efforts to train local actors on climate risks and how they can be integrated into adaptation interventions, policies and plans. However, it remained unclear how the insights

from these activities were incorporated into the design of climate-resilient water investments. The predominant focus often centred on delivering water to communities, with less emphasis on integrating information about current or future climate variability. For example, lessons from CCCF piloting found that climate information services were not systematically integrated into investment design and technical specifications (Crick et al. 2019). This underscores the importance of having access to relevant climate data, including future scenarios and downscaled forecasts, and the technical expertise to understand the implications for designing different types of investment.

Principle 6: Flexible programming and learning

The case studies demonstrate the importance of flexible and adaptive management that allows adjustments and updates to plans in response to changing circumstances and priorities. For example, WRUAs update their sub-catchment management plans as contexts change and priorities shift, and Makueni County government conducted a repeat climate vulnerability assessment in 2023 to capture local climate risk and resilience pathways. Flexible budgeting is also crucial, as illustrated by the flexible funding provided during the initial establishment of the CCCF mechanism. However, where there is less flexibility in adjusting budgets, as observed in financing models following central government planning circles, delays in planning and implementing interventions may occur, as seen in the case of LoCAL. This echoes findings from other efforts to devolve adaptation finance, e.g. the climate investment funds, where donor earmarking of funds has unduly restricted local governments' room for manoeuvre in terms of planning adaptation interventions effectively (Friis-Hansen et al. 2022).

Participatory monitoring and evaluation (M&E) occurs but tends to follow standard criteria and specifications set by national and subnational government procedures. Even in cases where these processes are well established, it is unclear how knowledge management and lessons learned influence subsequent planning. As a pilot, LoCAL's systems and procedures are still relatively new, while the CCCF has had time to learn from success and failure, incorporating these lessons into subsequent scale-ups.

Principle 7: Ensuring transparency and accountability

In Kenya, the WRUA and CCCF's local-level institutions have established mechanisms for ensuring transparency and downward accountability. These include clear public vetting processes for electing members, regular elections, well-defined roles and responsibilities, and decision-making processes for adaptation investments.

Additionally, these institutions receive training in transparency and accountability as part of strengthening local governance.

In the Kenyan cases, local-level committees had access to information about the available funding and its distribution across activities, with detailed information outlined in proposals. However, in the case of WSTF, despite local awareness of project budgets, decisions about eligible funding windows and projects that can access finance are made at the national level by WSTF. In the LoCAL pilot projects in Tanzania, district officials were fully aware of the project's budget and activity costs, as clearly stipulated in the project proposals. However, it is unclear whether the local communities, such as in the case of Kondoa, were fully aware of the same. This lack of transparency may in part reflect broader reforms in the water sector, centralising responsibility over water services to RUWASA, which has been argued elsewhere to have led to a situation where upward accountability to the central government is prioritised over downward accountability to the community (Kwezi 2021; Allegretti & Greene 2022).

Principle 8: Collaboration and coordination

Findings from the case studies present a mixed picture, but the positive experiences in Kenya are of note. The cases under the CCCF mechanism exhibited high levels of collaboration in funding and establishing the mechanism over time, extending from the pilot phase to the current rollout through the FLLoCA programme. In the case of WSTF, there is strong collaboration with donors in funding programmes. Furthermore, WRUAs are integrated into the framework for collaborative water governance, fostering collaboration at both ground level and national level, but less so at the county level. Collaborations with NGOs also provide capacity-building and technical support. Limited collaboration especially with non-government actors was observed for LoCAL, perhaps due to it being an initial pilot, heavily reliant on financing from UNCDF.

Effective collaboration and planning across scales and sectors is also crucial for developing water adaptation interventions in the drylands. While WRUAs effectively plan at the sub-catchment level, the CCCF approach may not fully align with the spatial scale that communities use to manage water resources in the rural drylands. In these regions, planning at the ecosystem scale is more appropriate to account for spatial considerations in managing water, pasture and other resources, preventing undue pressure on neighbouring water points. Additionally, WRUAs demonstrate a cross-sectoral approach, fostering multi-stakeholder collaboration in planning and developing water adaptation interventions, considering various sectors and uses of water across the sub-catchment.

Principle 9: Applying nature-based solutions (NbS)

Almost all the case study water interventions included activities classified as NbS, such as sand dams, rock catchments, and water catchment rehabilitation, even when NbS was not an explicit aim of the intervention. Both the CCCF and WSTF approaches emphasise the importance of incorporating NbS. Overall, the findings highlight the potential of LLA in water initiatives to incorporate NbS approaches, even when the overriding objective is providing water to communities. This illustrates the alignment of locally-led water adaptation and NbS as communities prioritise investments that not only provide water access but also deliver environmental and climate change mitigation benefits. NbS also incorporates local knowledge and may have lower maintenance and recurring costs in the long term.

The integration of NbS reflects a potential shift in investment from traditional grey water infrastructure to solutions that include green infrastructure and NbS, while meeting social and economic needs. For the water investments made a few years ago, such as Masue rock catchment, noticeable benefits included reduced soil erosion, restored gullies and reversal of land degradation, improved water quality, and immediate gains in sand conservation and water-holding capacity. Communities experience increased water availability for various uses, including for livestock and cultivation, leading to a reduction in water conflicts. These benefits extend to improved livestock health and production, enhanced crop yields, and opportunities for other livelihoods, such as kitchen gardening. Moreover, the cases demonstrate that empowering communities to make decisions over their water resources benefits the environment and the water resources themselves. For example, communities in Kajiado and Makueni, as a result of the adaptation interventions established through WSTF and CCCF respectively, decided to stop sand harvesting, contributing to environmental conservation. In other parts of these counties, where community-led water resource management is absent, sand harvesting continues.

Water tap at Kisisi borehole, Mpwapwa, Tanzania, 2023. Photo: Peter Msumali Rogers

HOW DONORS AND GOVERNMENTS CAN SUPPORT LOCALLY-LED WATER ADAPTATION

1. Support scaling up of the LLA principles in water adaptation

The study found a number of positive outcomes from the examined LLA projects in the water sector, indicating that the approach has the potential to deliver on its promises, and that the LLA principles are sound. Furthermore, the approaches taken in the projects investigated have the potential for scaling up – indeed, the Kenyan WSTF and CCCFs in particular are already being enacted in multiple locations due to their being embedded in national and subnational government structures. The LoCAL projects in Tanzania have the scope to develop in a similar manner in due course. However, there is a need for supportive funding to sustain the momentum and expand to nationwide coverage. This is also the case in other regions, and in

many countries LLA is less developed, and here there will be a need to support piloting and expansion of the approach.

2. Support mainstreaming of locally-led water adaptation into wider land-use and development planning

The case study water projects were primarily planned as stand-alone projects, without significant integration into broader land use plans at local government level and above. Notably, the CCCF mechanism mainstreams climate change into county development planning and budgeting, ensuring that local priorities related to adaptation are considered in county development plans. However, the absence of planning at broader scales and across sectors poses a challenge, as a project-centred or sector-specific focus may be influenced or overridden by interventions or policies in other sectors. There is the risk that locally-led water projects may be undermined by large-scale infrastructure, agriculture or industrial development projects. An emphasis on mainstreaming locally-led water adaptation into policies and planning processes is therefore needed. This involves embedding locally-led water adaptation in wider policy and planning in related sectors, such as rural and urban development, livestock and agriculture, land use planning, and ecosystem management. At the same time, however, it is important to ensure that this integration does not complicate or impose a top-down bureaucratic process; instead, a bottom-up approach must be followed that emphasises participatory decision-making and planning.

3. Address the predictability of funding

In all the cases studied, stakeholders expressed concern over long-term funding predictability and dependency on international funding with short project time frames. Water investments in the drylands are often planned as one-off interventions but need continuous investment cycles or incremental financing to maintain and upgrade the investments when needed, such as through the addition of extra storage or a distribution system to enhance access. This ensures that they remain functional in the face of regular climate shocks and are sustainable in the long term. Longer time frames, such as the ten-year span of the FLLoCA programme can help address this, but ultimately there is a need to devise long-term institutionalised and innovative financing strategies (e.g. blended finance or payment for ecosystem services) to cover continuous investments and recurring costs. In the CCCF model in Kenya, a percentage of county development budgets (currently 2%) is set aside to secure the predictability of funding. However, this is insufficient to cover needs and is complemented by funds from donors, and global and national climate funds. Further efforts to increase and earmark devolved funding from national budgets (such as in

the case of the CCCF) to support LLA and/or provide mechanisms to pool donor funds to provide long-term international funding commitments (such as in the case of LoCAL) or leverage international climate funds, would help enhance regular and sustained funding. The WSTF is a sector-specific fund that focuses on securing consistent funding for water-related adaptation projects; strengthening such funds ensures targeted support for LLA initiatives within the water sector and should be supported.

4. Provide flexible budgetary allocations for adaptation financing

There is a need to reduce restrictions and detailed earmarking on funding for water-related LLA. It makes good sense to track and mark finance at the overall level (through the Rio markers etc), and a general earmarking of funds for e.g. 'climate change adaptation' at local government level can ensure that funds are not redirected unduly for other purposes. However, overly rigid earmarking of funding reduces effectiveness; by predetermining in detail what can be funded, the potential for adaptive management and innovative solutions is reduced. Detailed earmarking can further constrain local governments' efforts to plan holistically and may lead to project islands. Restrictive funding procedures can be particularly detrimental to the most vulnerable – e.g. community members who need urgent support to restore water systems during drought or flooding. Support to water-related LLA should therefore be careful not to impose overly detailed earmarking; it should allow quick and cross-sectoral disbursement; provide for contingency- and emergency funds, and be based on simple, transparent procedures for bottom-up proposals and approval. The benefits of such an approach in terms of adaptive planning and execution outweigh the risks involved.

5. Strengthen the institutionalisation of LLA

The study found positive developments in participatory decision-making in the cases examined. This was particularly so in the Kenyan cases where inclusive decision-making in LLA processes has been institutionalised (rather than being a one-off project activity) and integrated into local governance institutions for water management, at the sub-catchment and ward levels. This emphasises the importance of supporting institutionalisation of LLA beyond individual project time frames and linking to local governance processes. In settings where local governance mechanisms are very weak or do not exist - e.g. in highly autocratic or volatile/post-conflict settings in other regions – institutionalisation may need to be achieved in other ways through e.g. CBO and NGO mechanisms, or a mix of public and civil society arrangements. There is, furthermore, a need to deepen the inclusion of marginalised groups to avoid that their adaptation strategies are overlooked or

overruled by other local groups. This can be done by drawing on the CCCF mechanism's practices for representation, for example, and ensuring that proposal development, planning and M&E provide a multi-stakeholder perspective rather than assuming that everyone's water needs and adaptation strategies are similar.

6. Building local capacities for sustainable water management

Ensuring the long-term success of locally-led water adaptation interventions beyond the project lifespan, requires several key actions:

1) Develop a comprehensive sustainability plan for the water investments at the proposal stage. This plan should clearly outline roles and responsibilities of institutions for operation and maintenance, establish explicit agreements with the local government for post-project maintenance and repairs, and define the collection of user fees and specific co-funding requirements to ensure continued financial support for ongoing operation of water points.

2) Adopt a blended funding approach that leverages diverse funding sources, including contributions from user fees, government budgets, donor funds and other financial mechanisms. This enhances financial capacity, mitigates risks, encourages innovation, and promotes long-term sustainability.

3) Provide continuous technical training for local actors, including local governments, community water management committees, or a skilled and accessible private sector (e.g. local mechanics or plumbers), to strengthen skills for effective operation and maintenance and repairs. This could be government driven through a national capacity-building institution to ensure that it is standardised and widely rolled out.

4) Tailor the choice of water infrastructure and associated technologies to the user groups and base it on their knowledge, needs, available resources and capacity for maintenance and repairs.

7. Facilitate a locally-driven approach to nature-based solutions

Well-functioning ecosystems are key to the livelihoods of many communities and critical to their adaptation options. Employing nature-based solutions (NbS) to enhance water-related adaptation is therefore an obvious opportunity, particularly in relation to LLA as demonstrated in the study's findings. Donors and governments can facilitate NbS in LLA by considering the following key issues:

1) NbS activities must be locally-driven and integrated within the wider LLA process, i.e. they must be developed by communities and respond to their specific adaptation needs and strategies.

2) NbS activities should not disenfranchise communities in terms of water use rights, nor marginalise poor households through e.g. water user fees that they cannot pay. The global NbS standard provides indicators on inclusion and rights that can help monitor these issues (Funder & Gravesen 2022).

3) NbS activities must provide space for inclusive stakeholder negotiation and conflict resolution within the broader LLA process, recognising that stakeholder perceptions of social and ecological priorities may vary due to the diverse needs of different water users, even within the same community.

8. Enhance capacity and knowledge co-production in LLA

Managing water for adaptation is a knowledge-intensive task. Diverse adaptation strategies, hydrological dynamics and upstream–downstream interactions require knowledge and planning at various scales. Employing NbS furthermore requires understanding of the interactions between green and grey water infrastructure. While communities have strong indigenous and practice-based knowledge about local ecosystems, specialist technical insights such as on hydrological flows and ecosystem dynamics, are also required. To enhance the knowledge based on water-related adaptation, there is need for:

1) Collaborative knowledge production. Establishing of mechanisms for collaborative knowledge production involving communities, local governments and technical specialists. This collaboration should also address NbS activities that require coordinated efforts across catchment and administrative boundaries.

2) Participatory vulnerability assessments to integrate local context, priorities and needs into adaptation investments. These are particularly effective if they focus not only on vulnerabilities, but also consider the capacities, knowledge and adaptation strategies of marginalised groups.

3) Participatory M&E of LLA. Implement participatory M&E processes, including the monitoring of community use rights and benefits. This should be in formats and systems that local actors can understand and use, incorporating co-developed performance indicators. The framework applied in this report could be adapted by local governments and communities to assess whether government and donor-supported activities match the LLA principles.

NOTES

1 Climate finance flows are reported as biennial averages to smooth out annual fluctuations in data (Buchner et al. 2023).

2 The report compares the least developed countries (LDCs), the emerging markets, and developing economies (EMDEs).

3 Climate finance for adaptation in the water sector is far higher than for mitigation. In comparison to adaptation, the water sector received only 0.4% (US$3 billion) of all mitigation finance from 2014–2018 (Mason et al. 2020).

4 The OECD–DAC dataset includes the majority of public, international climate finance flows. However, it was not established to track climate finance, but rather to assess the degree to which climate considerations have been mainstreamed into development finance. To ensure a more realistic representation of climate finance, WaterAid's figures as reflected here, only include flows with a primary climate change adaptation objective (Mason et al. 2020).

5 At COP15 of the UNFCCC in 2009, developed countries committed to providing US$100 billion of climate finance to developing countries each year by 2020. It has been missed every year recorded to date, although preliminary data shows it has been reached in 2023 (OECD 2023).

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ANNEX

DETAILED LOCALLY-LED WATER ADAPTATION ASSESSMENT FRAMEWORK

LLA principle	Criteria	Potential questions on locally-led water adaptation (LLWA)
1. Devolving decision-making to the lowest appropriate level	Water adaptation interventions are prioritised by the lowest appropriate governance unit. Institutions emerge to fortify decision-making, design and implementation of water adaptation interventions. Initiatives are based on local community water needs and demands and are suited to the local context. Communities lead the design, planning, implementation and management of water adaptation interventions.	At what level of governance are decisions made on designing, prioritising, planning and implementing water adaptation projects? i.e. are communities able to identify and design projects or are decisions around which project can access finance taken at a higher level? Does funding flow to local institutions? Does funding flow through national institutions? How is LLWA linked to local and central government decision-making on adaptation planning more broadly? How is LLWA decision-making aligned with existing water governance institutions, state water authorities and private sector actors? To what extent was the initiative started based on local community water needs and demands? What resilience & vulnerability assessments have been carried out that identify community needs and ensure that local context is captured? How was the water point type and associated technology decided upon? What about the siting of the water intervention? How was the community involved in this appraisal?

LLA principle	Criteria	Potential questions on locally-led water adaptation (LLWA)
2. Addressing structural inequalities faced by women, youth, children, disabled and displaced people, Indigenous Peoples and marginalised ethnic groups	Water adaptation interventions recognise and intentionally include the water needs and adaptation priorities of different social and user groups. Marginalised groups have voice and agency through local governance institutions, capacity-building and training, and they gain leadership roles. Water adaptation interventions target and provide benefits to youth, women, people with disabilities, and the poor. Benefits are visible to these groups in terms of health, production, income and education.	How are multiple user groups (e.g. livestock vs. crops vs. domestic), their strategies and priorities recognised and represented in decision-making on water interventions? How are gender and social equity considerations built into selection criteria of water interventions? How are underlying inequalities addressed or recognised? How are entrenched power structures dealt with? What training and capacity efforts explicitly target different marginalised groups? Are these groups included in leadership roles? Is there consistency with human rights-based approaches for water resources? What benefits are included in the project proposals as regards targeting different social and user groups? What are the visible wellbeing benefits or adaptation outcomes specific to these different groups?
3. Providing patient and predictable funding that can be accessed more easily	Funding for water adaptation interventions remains stable or increases and is kept up over timeframes long enough (7 years+) to build sustainable governance processes, capacity and institutions at the local level. Funding is easily and quickly accessible to local institutions through simplified and direct access modalities. Mechanisms are in place to ensure recurring water costs are financed through local/national governments, water service providers or other means and that participatory modalities are sustained.	Does funding allow sufficient time to build the participatory governance processes involved in community prioritisation of adaptation interventions? How long is finance committed for? Are funds ringfenced to ensure predictable access by local institutions? Is funding easily accessible to local institutions and communities? Can funds be accessed and disbursed quickly to implement water interventions? Are application processes and procedures for communities to access finance simplified? Is funding available after the end of project timelines? Does it remain dependent on donor funding? Beyond implementation, are funds allocated to monitoring of water interventions? Or dedicated to O&M?

LLA principle	Criteria	Potential questions on locally-led water adaptation (LLWA)
4. Investing in local capabilities to leave an institutional legacy	Water adaptation interventions support capacity-building (management, technical, financial) and the development of strong local governance and management institutions to lead interventions. Effective and sustainable maintenance systems and appropriate support systems are in place to maintain water adaptation interventions beyond the project lifetime and donor support.	How is local institutional capacity built to understand climate change and design and deliver water interventions? What institutional and capacity-strengthening processes are evident in funding and implementing LLWA projects? Whose capacity is being supported? How is local leadership being strengthened? Do financing arrangements make provisions for long-term capacity development? How are local institutions strengthened to achieve sustainability? Is there training and funding built in for managing interventions after implementation – e.g. for repairs, operation & maintenance – or is this dependent on donor funding? Is there support for communities to manage interventions well into the future? How have local government (or private sector) capacities been strengthened to provide this support? How should work tasks be divided between stakeholders? Should communities be responsible for technical management, servicing spare parts, hydrological studies etc – or is that better left with public & private technical actors?
5. Building a robust understanding of climate risk and uncertainty	Multiple evidence approaches are used that incorporate local and indigenous knowledge, practitioner's experience and scientific data, to understand climate risk and integrate it into the design of water adaptation investments. Climate risk & vulnerability assessment tools identify communities' risk profiles, vulnerabilities and ecosystem trends. Water adaptation interventions are designed with a degree of climate resilience.	How is climate risk integrated into the design of water adaptation interventions? What climate information is used and where does the data come from? What types of knowledge are used? How are traditional sources of knowledge on climate risk integrated in water intervention design? In what ways is the community's understanding of climate risk strengthened? Are climate risk & vulnerability assessments carried out to understand community profiles, needs and risks? How are water adaptation interventions designed to withstand the occurrence of climate shocks such as droughts and floods? Have the interventions and infrastructure withstood these shocks?

LLA principle	Criteria	Potential questions on locally-led water adaptation (LLWA)
6. Flexible programming and learning	Financing, planning and implementing water adaptation interventions allows for scheduled and ad hoc stocktaking where priorities can be updated and adjusted. Participatory monitoring & evaluation systems are present that allow for iterative learning, programme adjustment and adaptive management.	Is there flexibility built into financing and programmes to adjust to changing circumstances and integrate learning? E.g. Is flexibility evident during shocks? Are there opportunities to use flexible finance modalities such as moving between budget lines or ringfencing contingency funds in case of crises? What kind of monitoring and evaluation systems are in place? Who is responsible for these systems? What opportunities are there for reflection, learning and adjustment? To what extent are vulnerability and risk assessments repeated on a regular basis and reflected in updated plans and priorities? Do institutional mechanisms and plans allow for change in hydrological circumstances (e.g. a borehole becomes obsolete as groundwater levels sink), climate factors (e.g. increasing climate shocks/variability shift emphasis), and adaptation strategies (e.g. farmers shift crop emphasis and water needs from year to year depending on rainfall, or pastoralists turn to crop production).
7. Ensuring transparency and accountability	It is clear how much adaptation finance is available and how it is being distributed across activities. Systems for prioritisation, implementation, management and governance of water adaptation interventions are transparent. There are measures in place for communities to engage in evaluation and learning, citizen feedback, and social audits, enabling downward accountability.	Are communities clear on the level of finance or project budget? Do communities know how much finance is available and how it's distributed across activities and budget lines? Are there mechanisms to monitor and track climate finance? Are the governance structures and decision-making processes involved in implementing water interventions transparent to local actors? Is programme information such as financial data and governance arrangements available in local languages and communicated through accessible means (e.g. online, workshops, meetings)? How do local actors participate in monitoring and evaluation? What mechanisms/platforms are in place for communities to engage in citizen feedback and social auditing? Are there measures for communities to assess and express grievances vis-à-vis transparency and accountability? Are there mechanisms to address the misappropriation of funds?

LLA principle	Criteria	Potential questions on locally-led water adaptation (LLWA)
8. Collaborative action and investment	There is coordination of different actors involved in financing and implementing water adaptation interventions to strengthen the delivery of and avoid duplication of interventions. There is coordination across government sectors (e.g. water, agriculture, and rangelands) to provide holistic and comprehensive planning of water adaptation interventions for multiple users and uses.	What efforts have been made to collaborate with all the stakeholders and sectors involved in supporting water adaptation interventions in the area? Does the water intervention build upon existing interventions to avoid duplication? How is water adaptation planning integrated into local government planning (including land use planning), and budgeting processes? How is the water intervention integrated into local and national legal frameworks across sectors and institutions? To what extent are projects coordinated with other national and regional climate action in the water sector, in other sectors, or other large-scale national projects? How should LLWA interventions align with other permanent domestic water financing mechanisms?
9. Applying nature-based solutions (authors' addition)	Water adaptation interventions promote ecosystem-based solutions, including biodiversity and mitigation benefits, e.g. upstream forest/wetland management for water retention and filtering, and green infrastructure for rainwater harvesting, water conservation, and riverbank stabilisation. Participatory planning, risk assessments and monitoring and evaluation include understanding and identification of opportunities and risks related to groundwater resources, wider ecosystems, biodiversity and emissions. There is understanding of how water adaptation interventions affect the water and other resource rights of different users and the mechanisms for avoiding this.	If the intervention focuses on a natural water ecosystem, is it restored or rehabilitated as a key part of the adaptation initiative? If it focuses on a modified or artificial water source, are natural processes enhanced or created? Is the intervention transformative so that e.g. agricultural stakeholders become both custodians and beneficiaries of the water ecosystem? Is natural habitat conservation down-prioritised or neglected in favour of the adaptation solution, e.g. if water supply for farmers increases levels of agrochemical run-off in wetlands or rivers? What is the level of understanding of the groundwater resources and natural water ecosystems as the basis of implementing water interventions? How does the water intervention affect the water–and other resource rights of different users and what are the mechanisms for avoiding this? (e.g. a project to protect upstream water flows through forest conservation and land restoration may impact some users' land rights).

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