

## Groundwater for Deep Resilience in Africa (G4DR in Africa)

### Part I: Project Information

**GEF ID**

10970

**Project Type**

FSP

**Type of Trust Fund**

GET

**CBIT/NGI**

CBIT No

NGI No

**Project Title**

Groundwater for Deep Resilience in Africa (G4DR in Africa)

**Countries**

Regional, Malawi, Mozambique, Uganda

**Agency(ies)**

FAO

**Other Executing Partner(s)**

African Ministers' Council on Water (AMCOW), International Water Management Institute (IWMI), and International Institute for Applied Systems Analysis (IIASA)

**Executing Partner Type**

Others

**GEF Focal Area**

International Waters

**Taxonomy**

Focal Areas, International Waters, Freshwater, Aquifer, River Basin, Pollution, Nutrient pollution from all sectors except wastewater, Nutrient pollution from Wastewater, Learning, Transboundary Diagnostic Analysis and Strategic Action Plan Preparation, Climate Change, Climate Change Adaptation, Ecosystem-based Adaptation, Climate resilience, Least Developed Countries, Community-based adaptation, Influencing models, Demonstrate innovative approach, Strengthen institutional capacity and decision-making, Stakeholders, Civil Society, Academia, Community Based Organization, Non-Governmental Organization, Private Sector, Communications, Awareness Raising, Education, Local Communities, Type of Engagement, Participation, Partnership, Consultation, Information Dissemination, Beneficiaries, Gender Equality, Gender results areas, Capacity Development, Participation and leadership, Gender Mainstreaming, Gender-sensitive indicators, Capacity, Knowledge and Research, Knowledge Generation, Workshop, Seminar, Course, Training, Knowledge Exchange, Field Visit, Conference, South-South, Enabling Activities

**Sector****Rio Markers****Climate Change Mitigation**

Climate Change Mitigation 0

**Climate Change Adaptation**

Climate Change Adaptation 1

**Duration**

48 In Months

**Agency Fee(\$)**

549,677.00

**Submission Date**

4/13/2022

A. Indicative Focal/Non-Focal Area Elements

Programming Directions	Trust Fund	GEF Amount(\$)	Co-Fin Amount(\$)
IW-1-3	GET	5,786,073.00	33,210,000.00
	Total Project Cost (\$)	5,786,073.00	33,210,000.00

## B. Indicative Project description summary

### Project Objective

To bring groundwater and its sustainable development and protection to the forefront of water security and adaptation planning and investment in Africa, enhancing deep resilience for humans and ecosystems.

Project Component	Financing Type	Project Outcomes	Project Outputs	Trust Fund	GEF Amount(\$)	Co-Fin Amount(\$)
Component 1 Supporting the African Ministers' Council on Water (AMCOW), through their Pan-African Groundwater Program (APAGroP), to strengthen planning and investment that incorporates groundwater	Technical Assistance	<p><b>Outcome 1.1: <u>AMCOW sustained and strengthened in its mandate</u></b> to support Regional Economic Communities (RECs), River Basins Organization (RBOs) &amp; Member States (MSs) in achieving GW-based water security and resilience.</p> <p><b>Outcome 1.2: <u>Increased dialogue</u></b> Demand and reporting on tools supporting deep</p>	<p><b>Output 1.1.1: <u>Sustained AMCOW Groundwater Desk</u></b> as an anchor institution for APAGroP and G4DR objectives.</p> <p><b>Output 1.2.1: <u>Lesson-sharing on groundwater</u></b>. Strategic annual knowledge sharing and reporting framework among the Basins &amp; other key stakeholders (e.g., RECs) application of framework to gauge progress toward incorporating groundwater, to be shared with AMCOW and the African Union Commission (AUC) as part of Water and Sanitation Sector Monitoring (WASSMO) process.</p> <p><b>Output 1.3.1: <u>Policy guidelines on</u></b> Groundwater use and</p>	GET	1,510,546.00	8,500,000.00



resilience  
from  
groundwater.

**Outcome**  
**1.3: Environm**  
**ents that**  
**enable &**  
**support**  
management  
of  
groundwater  
opportunity  
and risk.

**Outcome**  
**1.4: Coordinat**  
**ed Multi-Scale**  
**approach to**  
GW Planning  
in Africa.

management co-  
developed with  
multisectoral actors.

**Output 1.4.1: Africa-wide**  
**Groundwater Strategy &**  
**Operational Framework**  
that is driven by data  
and supported through a  
“Hub and Spoke” model  
between AMCOW and  
regional  
centers (Southern  
African Development  
Community (SADC) –  
Groundwater  
Managemnet Institute  
(GMI) - Sahara and Sahel  
Observatory (OSS) –  
Intergovernmental  
Authority on  
Development (IGAD) .

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Component 2 Evidence and Capacity for G4DR in Africa: Identifying areas in Africa that present groundwater-related risks and opportunities for enhancing water security and resilience.	Technical Assistance	<p><b>Outcome 2.1:</b> More informed decision making on groundwater-related risks and opportunities under present and future climate and development scenarios.</p> <p><b>Outcome 2.2:</b> RECs, RBOs, MSs capacitated in groundwater assessment tools and approaches.</p>	<p><b>Output 2.1.1</b> Knowledge Products. Information, knowledge and policy products that map groundwater-related risks and opportunities to water security and resilience.</p> <p><b>Output 2.2.1</b> joint learning and exchange on sustainably assessing quantity and efficiently approaching groundwater quality, and potential risks of GW.</p>	GET	700,000.00	4,500,000.00
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Component 3 Demonstrating benefit: Utilizing evidence-based planning to realize on-the-ground impacts in pilots.	Technical Assistance	<p><b>Outcome 3.1:</b> <u>Value of evidence-based planning</u> that incorporates groundwater is demonstrated.</p> <p><b>Outcome 3.2:</b> Decision-making on prioritization of groundwater investments enhanced.</p> <p><b>Outcome 3.3:</b> Value of evidence-based planning incorporating groundwater demonstrated in additional site(s).</p>	<p><b>Output 3.1.1:</b> Pilots in Uganda and the Shire that include downscaled evidence generation, planning with stakeholders, and on-the-ground implementation of specific activities.</p> <p><b>Output 3.2.1:</b> Criteria for selecting future pilots co-developed and applied in Africa.</p> <p><b>Output 3.3.1:</b> Pilots implemented in additional site(s) that utilize evidence-based groundwater-inclusive planning to realize on-the-ground impact.</p>	GET	2,700,000.00	13,000,000.00
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Component 4 Long-term Vision and Capacity: Facilitating a pan-continental gender-inclusive Youth Forum in Africa around G4DR: engaging youth in G4DR dialogues, mobilizing and building the capacity of youth to develop regionally and locally relevant communication and outreach strategies and interventions, including through digital innovations; supporting pan-continental networks to enable uptake of long-term workable and sustainable strategies and solutions.	Technical Assistance	<p><b>Outcome 4.1: <u>Youth across Arica is capacitated on groundwater</u></b> to enhance consideration of social and cross-sectoral dimensions of groundwater.</p> <p><b>Output 4.1.1: <u>Youth Forum for G4DR – creating opportunities</u></b> for youth of all genders and social differences i) for learning and interaction with professionals and decision makers active in groundwater; and ii) putting forward their voice in decision-making processes.</p> <p><b>Output 4.1.2: <u>Website or social media platform by the Youth Forum,</u></b> attracting youth to the debate and building knowledge sharing around the importance of youth in taking an active role in G4DR in Africa, and continue driving the agenda forward.</p>	GET	300,000.00	2,774,750.00
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Component 5: Knowledge Management and M&E: Supporting capture, exchange and dissemination of key project advancements, as well as evaluation of project progress relative to targets.	Technical Assistance	<p>Outcome 5.1 Knowledge Management &amp; Dissemination to support visibility and adoption.</p> <p>Outcome 5.2 Adaptive results-based management and sharing of information and lessons learned.</p>	<p><b>Output 5.1.1</b> Programme findings and lessons learned identified and contribute to IW:LEARN.</p> <p><b>Output 5.1.2</b> Information sharing mechanism &amp; communication strategy developed enabling broad access to best practices and lessons learned in the countries supporting AMCOW.</p> <p><b>Output 5.2.1</b> Monitoring system operating and providing systematic and regular information updates on progress towards reaching G4DR targets.</p>	GET	300,000.00	2,774,750.00
Sub Total (\$)					5,510,546.00	31,549,500.00
Project Management Cost (PMC)						
GET					275,527.00	1,660,500.00
Sub Total(\$)					275,527.00	1,660,500.00
Total Project Cost(\$)					5,786,073.00	33,210,000.00

Please provide justification

**C. Indicative sources of Co-financing for the Project by name and by type**

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount(\$)
GEF Agency	Food and Agriculture Organization of the United Nations (FAO)	In-kind	Recurrent expenditures	12,000,000.00
Other	African Ministers' Council on Water (AMCOW)	In-kind	Recurrent expenditures	100,000.00
Other	International Institute for Applied Systems Analysis (IIASA)	In-kind	Recurrent expenditures	2,710,000.00
Other	International Water Management Institute (IWMI)	In-kind	Recurrent expenditures	18,400,000.00
			<b>Total Project Cost(\$)</b>	<b>33,210,000.00</b>

**Describe how any "Investment Mobilized" was identified**

Not Applicable

D. Indicative Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount(\$)	Fee(\$)	Total(\$)
FAO	GET	Regional	International Waters	International Waters	5,786,073	549,677	6,335,750.00
Total GEF Resources(\$)					5,786,073.00	549,677.00	6,335,750.00

E. Project Preparation Grant (PPG)  
PPG Required true

PPG Amount (\$)				PPG Agency Fee (\$)			
150,000				14,250			
Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount(\$)	Fee(\$)	Total(\$)
FAO	GET	Regional	International Waters	International Waters	150,000	14,250	164,250.00
Total Project Costs(\$)					150,000.00	14,250.00	164,250.00




Core Indicators


Indicator 7 Number of shared water ecosystems (fresh or marine) under new or improved cooperative management

	Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
Shared water Ecosystem	Global			
Count	1	0	0	0


Indicator 7.1 Level of Transboundary Diagnostic Analysis and Strategic Action Program (TDA/SAP) formulation and implementation (scale of 1 to 4; see Guidance)

Shared Water Ecosystem	Rating (Expected at PIF)	Rating (Expected at CEO Endorsement)	Rating (Achieved at MTR)	Rating (Achieved at TE)
Global	1			


Indicator 7.2 Level of Regional Legal Agreements and Regional management institution(s) (RMI) to support its implementation (scale of 1 to 4; see Guidance)

Shared Water Ecosystem	Rating (Expected at PIF)	Rating (Expected at CEO Endorsement)	Rating (Achieved at MTR)	Rating (Achieved at TE)
Global	1			

Indicator 7.3 Level of National/Local reforms and active participation of Inter-Ministeral Committees (IMC; scale 1 to 4; See Guidance)

Shared Water Ecosystem	Rating (Expected at PIF)	Rating (Expected at CEO Endorsement)	Rating (Achieved at MTR)	Rating (Achieved at TE)	
Global	1				

Indicator 7.4 Level of engagement in IWLEARN through participation and delivery of key products(scale 1 to 4; see Guidance)

Shared Water Ecosystem	Rating (Expected at PIF)	Rating (Expected at CEO Endorsement)	Rating (Achieved at MTR)	Rating (Achieved at TE)	
Global	1				

Indicator 11 Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment

	Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
Female	500			
Male	700			
Total	1200	0	0	0

Provide additional explanation on targets, other methodologies used, and other focal area specifics (i.e., Aichi targets in BD) including justification where core indicator targets are not provided

## Part II. Project Justification

### 1a. Project Description

#### 1) The global environmental and/or adaptation problems, root causes and barriers that need to be addressed (systems description)

**Water challenges & their consequences in Africa.** All regions of Africa face numerous challenges associated with water variability, scarcity and climate change. Droughts are common in most African countries (Gizaw and Gan, 2017; Serdeczny et al., 2017). Irrigation is key to enhancing resilience in the face of rainfall variability and climate change in Africa. However, seasonal variations in surface water availability – coupled with low water storage to provide a buffer (AfDB, 2018) – render water a limiting factor for irrigation intensification (Iglesias et al., 2018; Koech and Langat, 2018). Macro-level impacts of such challenges include slower GDP growth, particularly in the agriculture sector, as well as greater exposure to climate shocks (Sadoff et al., 2015). Micro-level impacts include land degradation, greater community-level malnutrition and poverty. These conditions constitute significant push factors accelerating environmental migration and displacement from acutely affected areas.

**Adaptation challenges amplify water challenges.** Climate change will likely increase the frequency of drought and floods such that by the end of this century, surface water access across 25% of the African continent will likely be affected by climate change (De Wit and Stankiewicz, 2006). Recent projections (Dickerson et al., 2021) indicate that by 2050 more than 400 million additional people in Africa could be exposed to climate change-related water stress. The latest IPCC Report (IPCC, 2021) outlines modalities of such exposure: increases in hot extremes, decreases in mean precipitation, observed increases in heavy precipitation and pluvial flooding, and observed and projected increases in aridity across Africa. Practical manifestations of climate change impacts are real and harmful. Floods cause loss of life and destruction of property. Droughts that undermine food security and exacerbate malnutrition. And long-term changes in mean water availability challenge the viability of people's livelihoods, increasing the risk of land degradation and loss of agricultural productivity.

**Root causes of vulnerability go well beyond a changing climate.** While root causes of Africa's climate change vulnerability stem in part from the harsh climate conditions that the continent faces, equally relevant are: i) the comparative dearth of water infrastructure, and ii) the need to enhance governance planning processes by actively considering all water sources. While regional variation undoubtedly exists across the continent, the aggregate level of infrastructure to abstract and store water is insufficient (Lautze and Giordano, 2007). Likewise, the governance processes that plan and manage water to achieve resilience in the face of climate shocks and expected long-term changes can be strengthened. In Africa's transboundary waters, for example, there are only three groundwater-oriented treaties and one treaty that devotes substantive focus to conjunctive management of ground and surface water (Lautze et al., 2018). In addition to increasing spatial and temporal water variability owing to climate change impacts, future trends/patterns for groundwater will also be considered, including population growth, urbanization and related demands on water resources.

**Groundwater-based climate solutions such as Managed Aquifer Recharge (MAR) are rarely applied.** A growing body of research suggests that a lack of consideration for groundwater in planning and management results in lost opportunity and unharnessed benefits. Solutions such as MAR, which comprises the purposeful recharge of groundwater into the "natural infrastructure" of aquifers to enhance groundwater storage, is expanding globally as a tool to

strengthen water security (Dillion et al., 2019) by mitigating seasonal variations in water availability, controlling floods, protecting ecosystems and reducing land degradation (Dillon, 2005). In Africa, however, only 52 cases of MAR have been identified, concentrated in only eight of the continent's countries (Ebrahim et al., 2020). This comes even though 46% of the continent's area is suitable or highly suitable for MAR application (Ebrahim et al., in submission). In Malawi, for example, deliberate systems for managed aquifer recharge are almost non-existent despite the high reliance on groundwater resources. Nonetheless, there is unfettered wastage of artesian water systems and the project may consider to build capacity to curb this through improved understanding and management of artesian groundwater for livelihood benefits in target areas.

**Benefits of groundwater use are far greater than strengthening resilience.** While groundwater provides immense benefit as a response to climate variability and drought, benefits of groundwater are not limited to severe environments. At a fundamental level, irrespective of severity of climate and water challenges, groundwater provides benefits to key productive sectors such as agriculture, mining and urban uses in Africa. Groundwater is equally key to sustainable water management. It is thus important to acknowledge the role groundwater plays as part of a larger ecosystem, and in provision of ecosystem services. Ultimately, groundwater is a strategic resource, and failing to consider it in planning limits that benefits that can be derived from management. It is thus important to understand past barriers to consideration of groundwater, as well as incentives which can motivate greater consideration to the resource going forward.

**Groundwater plays an important role in supplying drinking water and food security, supporting socio-economic transformations throughout Africa.** Several hundred million people currently living in Africa, especially rural sub-Saharan Africa, depend on groundwater for drinking purposes and this number is considerably expected to increase in the coming decades with growing population and urbanization. Moreover, there is ambition for expanding the irrigated area with groundwater from renewable resources in Africa by about 40-fold (World Bank 2018). Groundwater will also be increasingly important in a changing climate with more extreme events such as droughts (AMCOW 2021). Groundwater, however, is neither a unique solution to water problems nor invulnerable to degradation. Geogenic groundwater contaminants such as arsenic and fluoride are widely present in part of the continent (Amini et al., 2008; Ahoulé et al., 2015; Podgorski & Berg., 2020). Anthropogenic factors and sources not only amplify natural geogenic contamination, but also introduce new contaminants into groundwater such as nitrate, pathogens and pesticides (Lapworth et al., 2020; Ravenscroft and Lytton, 2022). Holistic management of groundwater is required to improve the reliability of water supply while avoiding environmental degradation and widespread depletion and/or pollution.

**Barriers to pursuing groundwater-based management can be addressed.** Key impediments to enhancing infrastructure and improving governance are no doubt multiple. At a high-level, primary barriers for infrastructure are a lack of finance and investment. Improved governance related to planning and implementation, in turn, may benefit from policy and capacity support so that options and solutions are visible and considered. Governments, regional entities, businesses, cities, and rural communities need new solutions and tools backed by new evidence and data to ensure resilience in non-stationary climate conditions. This requires water governance developments that operate at multiple levels, a strong evidence base to support analysis of trade-offs and decision-making, technology and infrastructure adapted to non-stationarity, and integrated solutions across food, land and water system.

**There is a need to enhance groundwater in planning discussions, evidence generation and implementation.** Ultimately, groundwater has clear potential to support the achievement of climate resilience and other development targets. To tap this potential, groundwater should feature prominently in discussions that form part of the Africa-wide agenda for water security as outlined by the African Ministers' Council on Water (AMCOW) Pan –African Groundwater Program (APAGroP) and African Union Agenda 2063. Equally, Regional Economic Communities (RECs) and River Basin Organizations (RBOs) can benefit from more active consideration of groundwater in planning discussions. Consideration of groundwater in planning can, in turn, grow demand for evidence and investment. Together, such efforts should reduce barriers to consideration of groundwater and work to bring the resource to the forefront of water security planning and investment in Africa, enhancing deep resilience for humans and ecosystems. Appropriate groundwater planning should also consider intra and

inter-sectoral trade-offs (including water-energy-food-environment nexus) within the African context, to balance the demands both within the irrigated agricultural sector, and relating to domestic and industrial uses. Finally, groundwater planning should consider risks to groundwater, such as threats to quality. Monitoring of natural and anthropogenic contaminants will be key (Ravenscroft and Lytton, 2022)

## 2) The baseline scenario and any associated baseline projects

**Africa-wide climate initiatives.** In recognition of the increasing and compounded socio-economic and environmental vulnerability across Africa, CCA and disaster risk reduction (DRR) strategies and plans have been developed at pan-African, regional, and national levels (Continental Africa Water Investment Programme (AIP) <https://aipwater.org/>); AU, 2017; UNEP, 2013; AMCOW, 2012a, b). Climate diplomacy, access to and utilization of climate information for preparedness, mitigation and forward-looking policymaking, commitments and actions plans to enhance resilience to climate change and diminishing disaster risks have been spearheaded by the Climate Change and Desertification Unit (CCDU) of the AU, the Committee of African Heads of State and Government on Climate Change (CAHOSCC), the African Ministerial Conference on the Environment (AMCEN) and the ClimDEV Africa initiative (<https://www.afdb.org/en/news-keywords/climate-development-africa-climdev-africa-initiative>).

**Groundwater is often overlooked in initiatives focused on climate and ecosystems.** While groundwater is a resource on which the majority of the African population depends (Upton and Danert, 2019), and while groundwater plays a key role in climate resilience as a drought-tolerant resource in rural poor regions as well as in sustaining ecosystems, resilience and ecosystem-based strategies too often fail to take groundwater explicitly into account. With the strategic role groundwater, can play in the future of climate resilience and ecosystem services in Africa, it is of utmost importance to account for and build into such plans and strategies at all levels the role groundwater plays in water security and resilience and the potential it has in further safeguarding communities against climate change, while supporting the equitable distribution of benefits across society and the sustainability of ecosystem services.

**Opportunity to harness resilience benefits of groundwater through proactive protection and adaptive development and management, groundwater can play a central role in climate resilience.** The African Ministers' Council on Water (AMCOW), the apex body for water management at the African level, has strengthened its capacity to support Member States in addressing groundwater as a viable and critical resource to enhance resilience and a socioeconomic transformation in Africa (AMCOW, 2021), and has through the nascent Pan-African Groundwater Program (AIP; AMCOW, 2012) have laid the foundation for a concerted effort on groundwater for resilience in Africa. There is a key opportunity to utilize the platform to elevate groundwater generally, and support greater inclusion of groundwater in regional, basin and country planning and investment. The key role of international partners in the development of APAGroP – such as BGR, IGRAC, SDC, UNESCO and the World Bank CIWA program – is acknowledged. As outlined in the description and role of stakeholders in section 2, G4DR will explore additional collaboration with such partners in project implementation. Certain key stakeholders are nonetheless worthy of note here.

**AMCOW and African Union (AU).** The African Ministers' Council on Water (AMCOW) and the African Union (AU) have called for Member States to prioritize action on groundwater development and governance for securing resilience and socioeconomic transformation in Africa. As outlined on in the recently-launched AMCOW White Paper, there is a need to:

- A. Recognize the critical role of groundwater in supporting resilience and socioeconomic transformation in pursuit of Agenda 2063.
- B. Take action to increase investments that build capacity and strengthen the enabling environment to realize the full potential of groundwater in line with national development priorities.

- C. Enhance national and regional cooperation around groundwater and transboundary aquifers within a broader goal of international water cooperation and regional integration for peace and political stability.
- D. Engage with APAGroP as a key mechanism for supporting Member States toward equitable and sustainable use of groundwater for achieving multiple development goals, recognizing the need for diverse context-specific pathways.

**The African Network of Basin Organisations (ANBO)** is a voluntary network (association) of transboundary African basin organisations, lakes, and aquifers. It was created in July 2002 to respond to the need to coordinate and strengthen cooperation between African Basin Organisations. Since 2007, ANBO has served as a subcommittee of AMCOW to assist the Council for questions relating to the management of transboundary waters. The overarching ANBO objective for the 2022-2024 period is “Consolidate and broaden Africa's leadership in the field of transboundary water cooperation through strengthened operational alliances between AMCOW, RECs, and with a more vibrant and institutionally sound ANBO”.

**Cooperation in International Waters in Africa (CIWA).** Managed by the World Bank, CIWA makes investments to develop water infrastructure and offers technical support and analyses to create a better understanding of transboundary water issues so that governments, river basin organizations, and other stakeholders can make sound, evidence-based decisions. The CIWA partnership has supported riparian governments in Sub-Saharan Africa to fuel sustainable, inclusive, climate-resilient growth by addressing constraints to cooperative management and development of transboundary waters. CIWA works to strengthen institutions, improve knowledge, develop investment opportunities, and train governments to cooperate across shared waters. CIWA aim at achieving its goals by focusing on: 1) Information: for understanding risks, better decision-making, and monitoring compliance; 2) Institutions: to build trust, coordinate planning, and manage shared resources; and 3) Investment: to manage watersheds, develop groundwater, build storage, among others.

**Building on regional groundwater initiatives.** There is a growing body of regionally-driven initiatives on groundwater in Africa. SADC groundwater work including SADC-Groundwater Management Institute (SADC-GMI) hosts an annual knowledge exchange event and engages with RBOs. Key work has been undertaken between SADC-GMI and IWMI on incorporating groundwater into transboundary basin management. Similarly, OSS is an important center of expertise in West Africa, and IGAD is emerging in its role on groundwater management in the Horn of Africa (with current support (e.g., by CIWA). Furthermore, GEF support to countries and RBOs by BGR, UNESCO and its GRETA program, IGRAC, SDC is also important. Last, there is a relatively recent update of a groundwater map for Africa (WHYMAP) from 2018 and the Africa groundwater atlas.

**Building on projects in particular basins, aquifers and countries implemented by the project consortium.** Recognizing the dispersed but growing number of activities in particular countries or on specific aquifers with adaptation elements, particularly among the consortium of partners involved in implementing the proposed project, it is essential to foster linkage and synergy. As noted below in this PIF, GEF projects with a geographic focus on Africa include the GEF Conjunctive Water Management project for the Nile Basin Initiative ([bit.ly/3okfhy2](https://bit.ly/3okfhy2)) and other transboundary projects with an emphasis on aquifers, e.g. the GEF project under the Nile Basin Initiative focusing on the Kagera aquifer shared by Burundi, Rwanda, Tanzania and Uganda, the Mt. Elgon aquifer shared by Kenya and Uganda, and Gedaref-Adigrat aquifer shared by Ethiopia and Sudan ([bit.ly/3Df3Njv](https://bit.ly/3Df3Njv)). In addition, IWMI has been engaged in multiple transboundary aquifers in Southern Africa, such as the Ramotswa, Shire, and Tuli Karoo (<https://conjunctivecooperation.iwmi.org/>). Finally, IIASA has been active in Uganda by implementing a project to improve water quality.

### 3) The proposed alternative scenario, with a brief description of expected outcomes and components of the project

The Groundwater for Deep Resilience (G4DR) in Africa project aims to bring groundwater and its sustainable development and protection to the forefront of water security and adaptation planning and investment in Africa, enhancing deep resilience for humans and ecosystems. It will do so by:

1. Strategic Planning: Supporting the African Ministers' Council on Water (AMCOW), through their Pan-African Groundwater Program (APAGroP).
2. Evidence and Capacity for G4DR in Africa: Identifying aquifers that present risk and opportunity to enhance resilience, as well as populations/socio-economic contexts in Africa informing investments.
3. Demonstrating benefit: Utilizing evidence-based planning to realize on-the-ground impacts in pilots.
4. Incorporating G4DR into pan-African Youth Forums: enhancing the beyond-project capacity, outreach, networking, and uptake of long-term workable and sustainable strategies and solutions (Component 4).
5. Supporting Knowledge Management and M&E: Supporting capture, exchange and dissemination of key project advancements, as well as evaluation of project progress relative to targets

The **project's expected outcomes will support AMCOW** to realize its mandate to support RECs, RBOs, and Member States to achieve water security and resilience with improved groundwater planning and management. Outcomes will equally support an improved policy context for introducing groundwater solutions in Africa, and foster the cross-scale linkages necessary for optimal realization of groundwater-based solutions. Enhanced knowledge generation and lesson exchange will increase awareness on the opportunities and risks related to groundwater, and capacity strengthening activities will enable stakeholders across scales to process such information so that it can be applied. Further, planning, evidence-generation, and implementation of integrated solutions will be undertaken in local pilots, so that the value of groundwater-based planning and evidence is demonstrated on-the-ground. In addition, greater awareness and attention to groundwater for resilience in Africa will be promoted at an inter-generational level through the Youth Forum on G4DR in Africa. Finally, visibility and performance evaluation will be supported through knowledge management and Monitoring and evaluation activities.

**The project components directly address challenges of improving groundwater governance** identified by the FAO-led Global Groundwater Governance Project and detailed in the Framework for Action; namely, the importance of identifying and empowering a lead agency through adequate finance and strengthening capacity development; ensuring accurate data, information and knowledge; appropriate policy development and political support; participatory planning and stakeholder consultation including river basin organizations (FAO, 2016). Furthermore, the project components and outcomes complement FAO's Four Betters Strategic Framework, through strengthening groundwater and agriculture food systems resilience in Africa to promote better production, enhance nutrition, and improve health and lives. Furthermore, the project directly complements GEF International Waters objective to enhance water security in freshwater ecosystems (GEF 7 Objective 3).

**Component 1 Strategic Planning: Supporting the African Ministers' Council on Water (AMCOW), through their Pan-African Groundwater Program (APAGroP), to strengthen planning and investment that incorporates groundwater.**

Key to strategic planning at a pan-African level is the existence of a central node to enable this. The groundwater desk at AMCOW currently serves at this central node, and so sustaining this platform will be essential. G4DR will therefore provide a direct subgrant to sustain groundwater desk at AMCOW so that it can continue to anchor and spearhead groundwater efforts at a pan-African level. G4DR will also work with the groundwater desk to explore options for financial sustainability after the project. To support planning, it is equally relevant to share lessons on groundwater governance and support harmonization and inter-linkage between planning processes at a pan-African scale and in RECs, RBOs and member states. Building on existing events at regional and continental levels, AMCOW will support a stakeholder engagement to enhance knowledge sharing and apply a framework among basins to support AMCOW and the AUC; RECs will play a key role in this process as facilitators of the RBOs. Through this effort, AMCOW (with the support of ANBO, CIWA, etc.), will fulfill



its coordinating mandate to create a platform of engagement and peer knowledge sharing and reporting with Basin Organizations, which will in turn support the existing Water and Sanitation Monitoring (WASMO) reporting platform. During the project preparation phase, a stock-take of existing knowledge exchange platforms will be undertaken, and a strategy devised to build on rather than duplicate existing efforts..

To foster convergence on inclusion of groundwater into water security and resilience planning, Policy guidelines on groundwater use and management will be co-developed with multisectoral actors. Guidelines will follow from both i) the existing level of planning at various scales, and ii) evidence developed as part of G4DR component 2. The guidelines will build on and strengthen existing AMCOW policy mechanisms, and offer specific guidance on triggers for consideration of groundwater in water security and resilience planning. Finally, the first component of G4DR will develop an Africa-wide Groundwater Strategy and Operational Framework that absorbs evidence from component 2 and provides an operational framework to support cross-scale linkage on groundwater planning and management. The structure will outline a structure within which groundwater planning in RECs, RBOs and member states is nested within an overall vision of AMCOW.

### **Component 2 Evidence and Capacity for G4DR in Africa: Identifying areas in Africa that present groundwater-related risks and opportunities for enhancing water security and resilience**

Evidence and Capacity for G4DR in Africa (lead: IIASA) This component aims to assess groundwater-related risks and opportunities to enhance water security and resilience to shocks (e.g. extreme climate events, pandemics) in Africa under current and future potential climate, socio-economic and demographic conditions building on existing efforts by AMCOW, RBOs/RECs, and African countries to inform policy development (see, component 1) and on-the-ground investment (see component 3). Care will be taken to ensure that key themes in the recent AMCOW White Paper – such as climate change resilience, human health, urbanization, food security and the environment – are measured by the assessment. This assessment is necessary as groundwater scarcity (both in terms of quantity and quality) can limit drinking water supply, constrain agricultural production, and manufacturing and mining activities, increase prices and production costs, disrupt supply chains, reduce demand, leading to conflicts between economic activities and other water users, and harm corporate reputation and marketability. Safeguarding water and ensuring its availability in sufficient quantity and quality is a subject of vital interest in African countries.

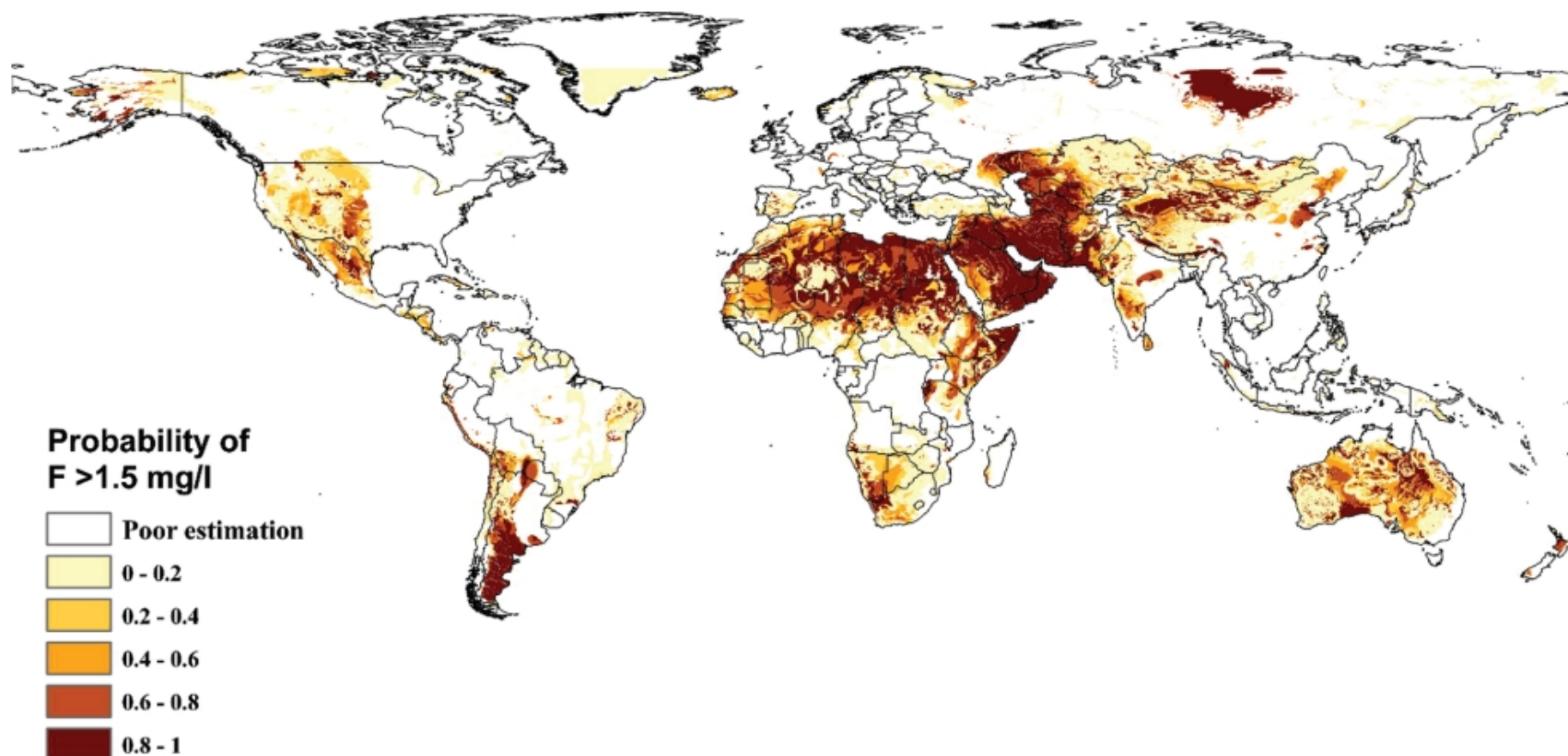


Figure 1. Probability of fluoride concentration in groundwater exceeding the WHO guideline for drinking water of 1.5 mg/L-1 (Amini et al., 2008).

**Determining future groundwater risks and opportunities.** To gain a broader picture of groundwater's potential risks and opportunities in impacting water security, resilience to shocks and the intersectoral trade-offs of water uses at the nexus among water, food, energy and the environment at various scales and in multiple contexts in Africa, G4DR will conduct a pan-African assessment of the current and future socio-economic impacts, and demographic change and climatic shocks on groundwater quantity and quality, and its demand, including assessing the role of groundwater in satisfying water demand of different water users in households, industry (e.g., hydropower, manufacturing), agriculture and the environment. To do so, we will make use of existing knowledge and available data with AMCOW, RBOs/RECs/MSs, IGRAC, FAO, UNESCO, UNEP (e.g., WWQA and GEMS/Water) and BGR/BGS, together with the latest available data products on water availability by the source of water (surface water, groundwater, non-conventional water), water quality (e.g., nitrate, arsenic and fluoride –Figure 1), sectoral water demand (agriculture, domestic, industrial), environmental conditions (environmental flow requirements, aquatic and terrestrial biodiversity, groundwater-dependent ecosystems), socio-economic settings (e.g., population density, urban-rural population shares, income levels, pumping cost), and governance arrangements (e.g., degree of IWRM implementation, groundwater monitoring) (Table 1). This assessment will partly build on the previous GEF-funded ISWEL project (led by IIASA), which investigated how population vulnerability from multi-sector risks (water, energy, land) change under climate change, socio-economic development, and poverty reduction (<https://hotspots-explorer.org/>).

**Table 1:** Selected data sources relevant to the pan-African groundwater assessment.

Category	Illustrative Source(s)
Groundwater Availability and Demand	<ul style="list-style-type: none"> <li>• Water availability and demand estimations at high spatial resolution under current and future conditions from the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP) [<a href="https://www.isimip.org/">https://www.isimip.org/</a>].</li> <li>• Earth observations data such as water storage and groundwater recharge (MacDonald et al., 2021; Scanlon et al., 2022).</li> <li>• Global Groundwater Information System (GGIS) and Africa Groundwater Portal of IGRAC provide access to map layers, documents, and well and monitoring data.</li> </ul>
Groundwater Quality and Risk	<ul style="list-style-type: none"> <li>• Global mapping of arsenic in groundwater* (Podgorski &amp; Berg, 2020)</li> <li>• Review of arsenic occurrence in Africa waters (Ahoulé et al., 2015)</li> <li>• Mapping of fluoride in groundwater (Figure 1)* (Amini et al., 2008; Brunt et al., 2004)</li> <li>• Groundwater vulnerability mapping of nitrate for Africa (Ouedraogo et al., 2016)</li> <li>• Global pattern of nitrate storage in the vadose zone (Ascott et al., 2017)</li> <li>• WHO/UNICEF JMP data on sanitation facilities and services (<a href="https://washdata.org/data">https://washdata.org/data</a>)</li> <li>• A global dataset of surface water and groundwater salinity measurements from 1980–to 2019 (Thorslund &amp; van Vliet, 2020)</li> <li>• A global overview of saline groundwater occurrence and genesis by IGRAC* (Van Weert et al., 2009)</li> <li>• FAO data on fertilizer uses and manure reuse (<a href="https://www.fao.org/faostat/en/#data">https://www.fao.org/faostat/en/#data</a>)</li> <li>• Global Freshwater Quality Database and information system (GEMStat) with water quality data of ground and surface waters reported by countries and organizations (<a href="https://gemstat.org/data/">https://gemstat.org/data/</a>)</li> <li>• Other relevant data and information in IGRAC and GAP database, such as field measurement data, aquifer vulnerability mapping, UNICEF arsenic models.</li> <li>• Additional data and information covered in the latest World Bank report by Ravenscroft and Lytton (2022), including assessment, monitoring, protection, remediation and mitigation measures for groundwater pollution.</li> </ul>

Note: \*these datasets are part of the groundwater assessment platform (GAP, [gapmaps.info](https://gapmaps.info)) hosted by EAWAG. GAP also includes groundwater quality mapping (arsenic, fluoride, salinity) from IGRAC, part of which is cited in the latest World Bank report by Ravenscroft and Lytton (2022).

**Learning and capacitation** to enable knowledge application. It is critical that capacity is strengthened through the activities so that knowledge that is generated is absorbed and incorporated into decisions at the right levels. Equally, it is important that capacities of RECs, RBOs and MSs are sufficiently enhanced so that they do not simply absorb knowledge, but gain the skills to produce it in the future. Accordingly, component 2 will include capacity development activities in groundwater assessment and other priority areas. To support this end, joint learning, training, and exchange on sustainably

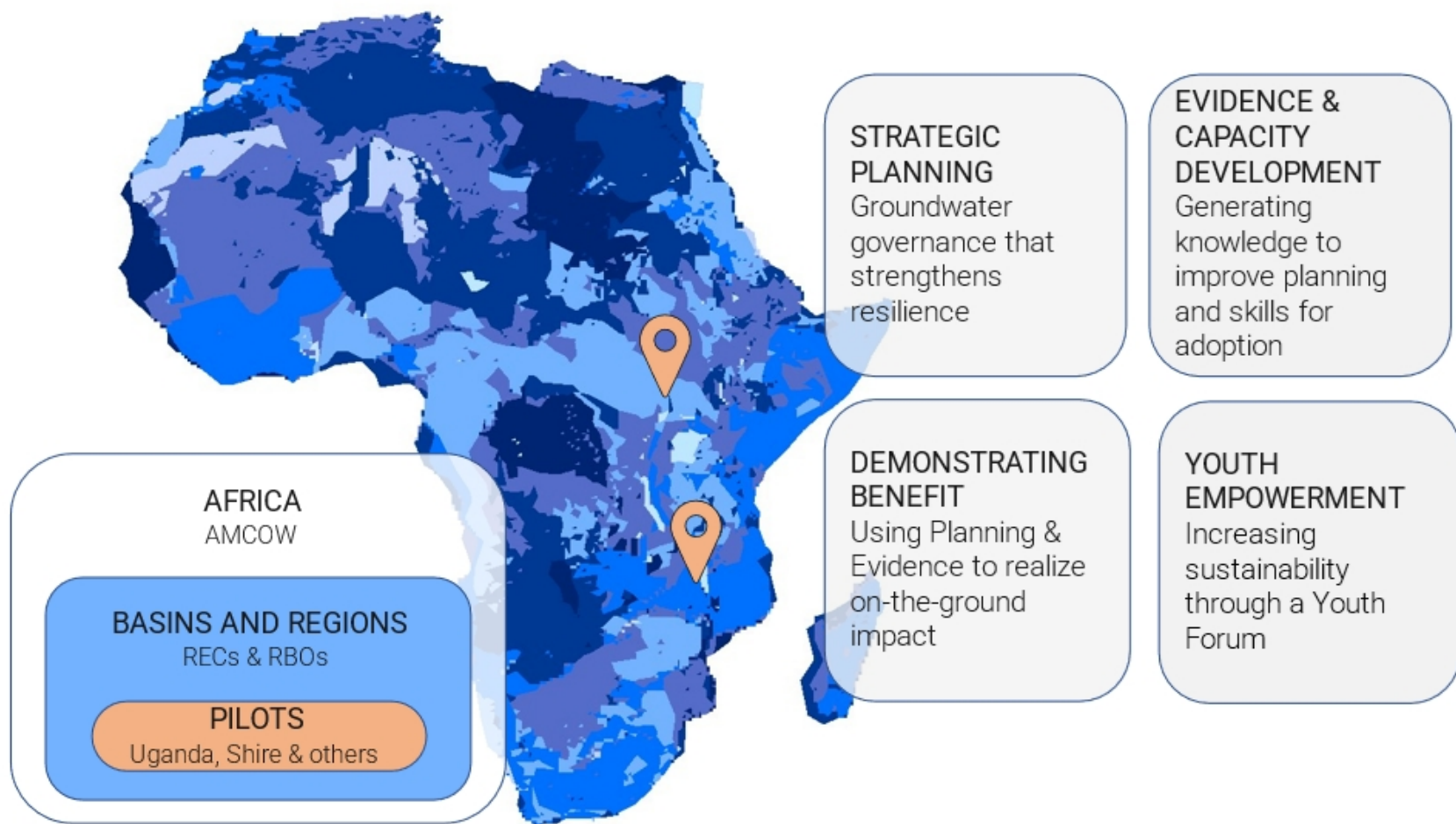
assessing quantity and thoughtfully approaching groundwater quality, and potential risks of groundwater, will be facilitated. All the assessments, tools and framework produced from the activities will be embedded with right stakeholders from AMCOW, RBOs/RECs and African nations to develop the ownership and capacity.

### **Component 3: Demonstrating benefit: Utilizing evidence-based planning to realize on-the-ground impacts in pilots**

Improved groundwater-based planning, coupled with enhanced evidence, will make a substantial contribution to groundwater for deep resilience in Africa. To demonstrate that groundwater-based planning and evidence enhance on-the-ground impacts; however, pilot activities will also be undertaken in a set of countries and aquifers. Pilots will demonstrate specific benefits in the context of the broad response areas outlined in the AMCOW White Paper such as Climate Change Resilience through Adaptive Groundwater Management, Agricultural Transformation Based on Groundwater, Groundwater-sensitive Nature-based Solutions, Transboundary Aquifers for Regional Integration and Stability. Pilots will include targeted evidence generation, co-development of solutions with stakeholders, and on-the-ground implementation of specific activities such as: solar pumping to avoid overuse; water reuse in a smaller urban context; cost-effective and appropriate technology for desalination of groundwater sources; a PPP to involve the private sector in protecting groundwater quality to ensure safe water and sanitation services; regulation and incentive to avoid over-abstraction, empowering women entrepreneurs or farmers for more sustainable groundwater management.

**Two initial Pilots: Uganda and the Shire Pilots will be initially implemented in representative sites:** Uganda (national-level), and the shared Shire Aquifer System (Malawi-Mozambique). These pilot areas have been selected as they comprise: 1) hotspots of increases in groundwater development, potential depletion, and/or severe pollution in the near future due to expected population growth, agricultural expansion, energy production and urbanization, socio-economic developments, large-scale expansion of water-dependent economic and business activities, and intensified climate change and variability, and 2) strong buy-in and commitment from stakeholders, reflected in letters of endorsement. In the Shire, for example, high salinity poses a critical groundwater challenge as the alluvial deposits of the lower Shire valley both as a result of evaporation and dissolution of evaporate minerals. Most boreholes close to the river and with shallow water tables indeed face saline groundwater composition.

**Co-developing selection criteria to prioritize pilots & ensuring vertical integration.** As noted, two initial pilots have been selected and will receive focus based on criteria elaborated above. Implementation of these pilots will provide examples from which AMCOW can lesson-learn, and use to inform key criteria in the selection of future pilots. Criteria for prioritization of future pilot sites will indeed be co-developed, agreed and applied during the project. Criteria that support future selection are expected to incorporate a set of technical parameters (e.g., climate change risk and over abstraction) as well as more operational parameters (e.g., demonstrated buy-in, level of cofinance). Additional pilots will then be selected based on an application of such criteria, and implementation activities pursued thereon. Ultimately, pilots are expected to form part of a nested, mutually-reinforcing loop with the other project components (Figure 2). Guidance from Africa, regional and basin-scale will be applied in pilots, and lessons from pilots will be showcased and channelled upward.



**Figure 2.** Harnessing Groundwater for Deep Resilience in Africa

**Component 4 Long-term Vision and Capacity: Facilitating a pan-continental gender-inclusive Youth Forum in Africa around G4DR: engaging youth in G4DR dialogues, mobilizing and building the capacity of youth to develop regionally and locally relevant communication and outreach strategies and interventions, including through digital innovations; supporting pan-continental networks to enable uptake of long-term workable and sustainable strategies and solutions.**

Groundwater overuse and pollution will have inter-generational impacts, as decisions now can create risks or foreclose opportunities later. Indeed, the impacts of salinization or pollution, or depletion of an aquifer, are often irrevocable and as such can compromise possibilities available to future generations.

Facilitating a pan-continental, gender-balanced Youth Forum in Africa around G4DR, enhancing the beyond-project capacity, outreach, networking, and uptake of long-term workable and sustainable strategies and solutions that support inter-generational equity. The project will facilitate a forum for young African professionals and practitioners in the groundwater and CCA fields, enabling a step-change in focus and engagement in groundwater and climate change

across Africa. It will encourage cross-learning and co-development of knowledge in this cross-field and aim to get groundwater on the action agenda for climate change action, considering its key role in inter-generational resilience, sustainability, health, food security, etc. The forum will encourage participation of young men and women and use innovative social media tools to expand the reach and relevance.

**Importance of Youth in Africa.** Africa is the youngest continent, with 60% of people below 25 years of age. The African Union Commission (2006) defines youth as social groups between 18-35 years old. As young people are gifted with innovation, imagination, energy and optimism, they can play a vital role in ensuring SDGs are achieved. Also, they have the right and responsibility to build synergy for a new system of development founded on knowledge sharing, cooperating and the prioritization of issues such as water security.

**Role of Youth in Water Security:** Young people play a vital role the implementation of the agenda 2030 Sustainable Development Goals (SDGs) including SDG 6 on clean water and sanitation (World Youth Parliament for Water 2022). They can be agents of change in the water sector to building resilience in their communities and bringing diverse perspectives and fresh ideas to water discussions on various levels.

Youth is not homogeneous group, intersectional inequalities by gender, class, geography among other issues – shape their engagement in and ability to engage in the SDGs (Wittman et al., 2021). These issues also shape challenges with land and water access, availability and use and their livelihood opportunities and vulnerabilities, including need for and access to groundwater, their level of participation in water management and governance at scale. In general, youth have largely been excluded from agriculture, irrigation, water management and governance, and their ability to influence decisions remains limited across institutional levels from the community to policy. The limited number of studies on youth and groundwater governance in Africa often point to simplistic narratives about young people in policies.

However, evidence globally from research, reveals that structured and meaningful involvement of youth in the water sector is still limited, due to various reasons that range from the lack of recognition to youth as key actors in decision-making to the absence of platforms and forums that enable equitable, inclusive governance (World Youth Parliament for Water, 2022). Despite increasing emphasis on youth engagement in development interventions, policy actors fail to recognize young people as agents of their rights. Also, they fail to understand diverse aspirations, needs and concerns of the youth of all genders and social differences (Wittman et al., 2022).

**Facilitating a gender-inclusive Youth Forum through collaboration with Youth Parliament of for Water** Meaningful and effective representation of youth of all genders and social differences in decision making processes is key to encourage cross-learning and co-development of inclusive groundwater and climate change interventions across Africa. IWMI will work with World Youth Parliament for Water (WYPW), to achieve the following objectives:

- Create a network of groundwater youth of all genders and social differences ambassadors of change
- Empower youth of all genders and social differences by creating opportunities to sharing their ideas, experiences and good practices and actively participate in decision making processes, so that youth perspective can be incorporated in groundwater related activities and events
- Develop youth of all genders and social differences professionally by creating opportunities for cross-learning, co-development of knowledge, growing professionally, and building valuable professional networks.
- Identify key joint priorities and plans to implement initiatives related to groundwater and youth.

**Component 5: Knowledge Management and M&E: Supporting capture, exchange and dissemination of key project advancements, as well as evaluation of project progress relative to targets**

The final component of the project will focus on Adaptive results-based management and sharing of information and lessons learned. The project will develop an approach to knowledge management and a strategy for communication. This will update and strengthen the ongoing communication efforts of AMCOW, including modernize the existing website into a PAN-African hub for information sharing to support wide dissemination of good practices ,lessons learned and outputs achieved by the G4DR on the management of the continent's groundwater resources and provision of water supply services. Project findings and lessons at Pan-African, subregional and national level as well as to the GEF IW:LEARN initiative. M&E will be one of the key functions provided by the project PMU under the guidance of FAO in its role of GEF Implementing Agency. This effort will aim at the evaluation of the progresses made by the project. In this context, an important task for the PMU will be to work with partners and countries to periodically review the project indicators to ensure they are fully up-to-date and aligned with regional agreements, and to national policies and project targets.

#### 4) Alignment with GEF focal area and/or Impact Program Strategy

The project aligns with IW-3-6: Enhance water security in freshwater ecosystems through enhanced regional and national cooperation on shared freshwater surface and groundwater basins and *CCA-3: Foster enabling conditions for effective and integrated climate change adaptation*.

Within the GEF-7 International Waters Focal Area Strategy, the proposed project aligns with Objective 3, '**Enhance water security in freshwater ecosystems**'. Under this, the project aligns with the following two areas of strategic action:

**Advance information exchange and early warning**, through the following points:

1. GEF support will be designed to enhance the availability of sound data and information for science-based policies and decisions. On a regional level, this will build the science base and dialogue for informed prioritization of investments; on a global level, this effort will enable predicting future 'hotspots' and 'basins at risk' (addressed by Components 1: Strategic Planning; Component 2: Evidence Base and Capacity for G4DR in Africa; and Component 3: Demonstrating benefits).
2. Improved policy formulation processes and conjunctive management of surface and groundwater resources on national and regional levels (Components 1: APAGroP Governance; Component 3: Demonstrating benefit with evidence-based planning and Component 2: Evidence Base and Capacity for G4DR in Africa)

#### 5) Incremental/additional cost reasoning and expected contributions from the baseline, the GEFTF, LDCF, SCCF, and co-financing

**Scenario in which the project is not implemented.** Under business-as-usual conditions, the AMCOW groundwater desk would likely not be sustained. AMCOW would lose a key platform to assert the role of groundwater in water security and resilience across Africa. Equally, the hub-and-spoke framework through which AMCOW links with regional groundwater hubs would remain undeveloped. Evidence on groundwater in Africa would not receive an infusion of resources to support advances that support improved roll-out of solutions. Pilots manifesting practical benefits of groundwater management around the continent would not be widely undertaken. And youth would not receive support to learn about the processes and benefits of groundwater management.

**Scenario in which the project is implemented.** The project provides a novel institutional vehicle for supporting resilience and water security at the pan-African level, with relatively few financial means. Hence, and from this, it is clear that: 1) The project may lay a critical foundation for the proposed institutional support framework of continental collaboration around groundwater, and 2) Further achieving the full benefits of the project's activities and ensuring long-term beneficial development outcomes depend on clear strategies for parallel as well as long-term engagement and investments at multiple levels, and continuous capacity development and priority setting, hopefully building on the clear rationale and momentum built as part of the project. There is increasing focus on

groundwater as a key component of resilience, water security and cooperation strategies and plans for Africa, with donors like the World Bank/CIWA, Govt. of the Netherlands, the US State Dept., and the CGIAR, besides GEF, increasingly coming into this field. Hence, there is both a good chance of boosting the financial resource base in the field, while also coordinating and building synergy. The project purposefully aims to make the necessary linkages, create larger communities of practice, and drive the agenda forward. The following institutions and donors have been addressed and expressed interest in collaboration with the project and potentially providing co-financing for the full project: World Bank/CIWA, Govt. of the Netherlands and US State Dept., and the CGIAR.

**Benefits of pan-African GEF approach** Groundwater solutions can be promoted at national levels across Africa, and provide significant benefit. Nonetheless, the cumulative benefits of pursuing groundwater-based solutions at an African level are presumed to be greater than independent pursuit of similar aims at national levels. The benefits achieved through a pan-African approach, over and above those derived from purely national approaches, are three-fold. First, a continental approach supports cross-region exchange, which can catalyse greater impact. Second, economies of scale can be achieved by focusing on a wider area than just national level; for example, a suitability assessment for Managed Aquifer Recharge (MAR) can be undertaken at a continental level while also support country-level decision-making. Third, the legitimacy and networks of regional institutes can be leveraged to catalyse change across the continent, fostering incremental changes in many countries rather than just one.

#### **6) Global environmental benefits (GEFTF) and/or adaptation benefits (LDCF/SCCF)**

The project proposes to engage and make a difference in the intersection between (ground)water, environment, socio-economics and climate change. Future trends including climate change, population growth, urbanization, income growth and related demands on resources (water, energy and land) are expected to threaten water security needed to sustain healthy and viable ecosystems and human societies, and exacerbating vulnerability to shocks worldwide. By working explicitly at this interface, most efficient and lasting solutions for enhancing water security and resilience may be devised and deployed. As one of the most vulnerable and populous continents, Africa is the hotspot for risks and long-term negative impacts of global changes on water resources and the region that would benefit the most from incremental and efficient water-related investments and coordinated informed approaches across sectors and MSs. Moreover, due to telecoupling through processes such as international trade and migration, other regions of the world would also benefit from a more water secure and resilient Africa.

G4DR focuses on the important role that groundwater could play for enhancing water security and resilience in Africa and primarily aims to strengthen the capacity of AMCOW, being the central node for strategic planning and collaboration at a pan-African level, by providing knowledge products and assessment tools and approaches toward the community of practice for resilient groundwater management. This will serve and advance the AMCOW agenda of accelerating the achievement of water and sanitation goals in Africa. G4DR will also enhance the AMCOW groundwater desk and the administrative capacity of AMCOW to host the PMU by the mid-term of the project. Lastly, G4DR will create opportunities for youth of all genders and social differences for learning and networking with professional and decision makers in the water-related sectors through the Youth Forum to raise awareness and attention to groundwater as part of the solution space for enhancing water security and resilience in Africa.

The activities of the project will primarily deliver environmental benefits for the GEF focal area of International Waters (IW). The project aligns with objective 3 of IW: Enhance water security in freshwater ecosystems. As noted below (section 8), G4DR will also contribute to knowledge sharing through IW: Learn by participating in IW conferences. Equally important to dissemination will be interactions with international and regional institutions such as RBOs, RECs, AfDB, WWE, and IUCN.



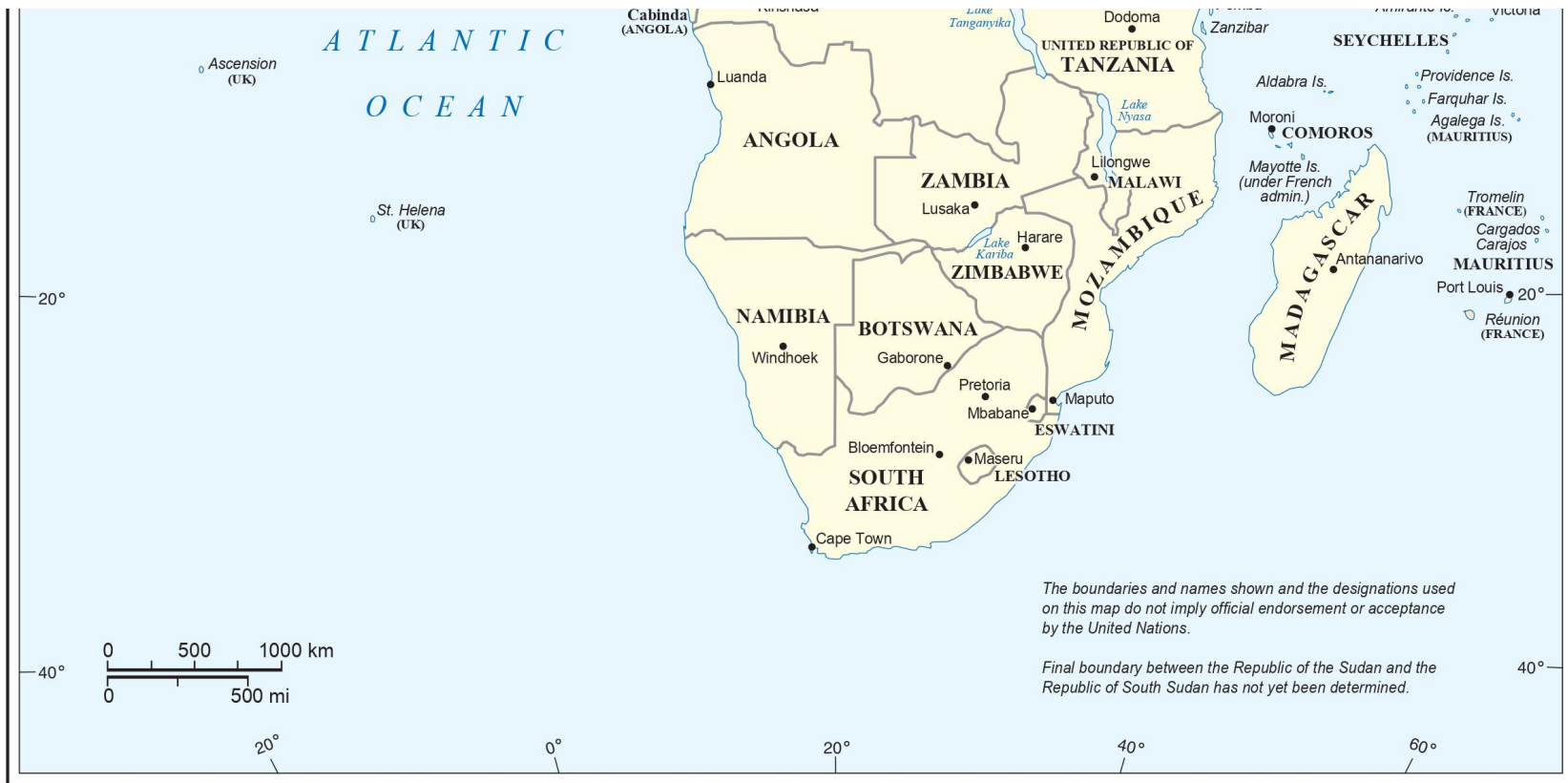
## **7) Innovation, sustainability and potential for scaling up**

G4DR aims to support AMCOW and its groundwater desk, involve stakeholders in pilots, and engage with youth of all genders and social differences (Components 1 and 4). The project's interventions are consistent with AMCOW's objectives to support RECs, RBOs and MSs to achieve water security and enhance resilience and with water sectoral priorities of pilot countries. These aim to guarantee the ownership of the project's achievements and outcomes by the stakeholders, and, together with knowledge sharing and capacity building, enhance the local and regional ability to preserve, to sustain and to replicate the project achievements later on and/or in other areas. Component 2 of the project will provide the evidence base approach to advance the development of cross-sectoral strategies, considering the important role of sustainable groundwater management for achieving water security through securing more reliable water supply to households, agriculture and industries, supporting the health of humans and ecosystems, and increasing resilience to climate change as well as other shocks. The pilot activities in Component 3 will address priority issues of the studied aquifers and will be designed taking into consideration some key criteria, including innovation, replicability and scalability. These actions, which will initially be carried out on a national and transboundary scale, can be replicated and scaled up in a later process. They will also demonstrate stakeholder involvement and community resilience and adaptive capacity building. Best practices and lessons learned from pilots will be codified and disseminated to further promote the potential for replication. Similarly, the achievements and lessons learned from the project implementation may be useful for future interventions in other regions.

## 1b. Project Map and Coordinates

Please provide geo-referenced information and map where the project interventions will take place.





## 2. Stakeholders

Select the stakeholders that have participated in consultations during the project identification phase:

Indigenous Peoples and Local Communities Yes

Civil Society Organizations Yes

Private Sector Entities Yes

If none of the above, please explain why:

In addition, provide indicative information on how stakeholders, including civil society and indigenous peoples, will be engaged in the project preparation, and their respective roles and means of engagement

The project's stakeholders and beneficiaries will support identifying pathways to ensure the focus on vulnerable communities and contexts, and civil society and community-based organizations to engage as part of strategic planning for implementing policies and priority solutions identified during the project. Private sector entities will be approached in the full project preparation phase. Several key partners have been involved in write-up of this proposal. In particular, write-up of this PIF was led by IWMI, IIASA and FAO. AMCOW provided inputs at various points in the process. In addition, the governments of Malawi, Mozambique and Uganda contributed valuable insights. The development of this PIF was ultimately a collaborative effort involving some seven key institutes who will collaborate in project preparation and implementation.

The program's key partner and beneficiary is AMCOW, and by implication the African regional organizations (RECS and RBOs) and the Member States and their constituencies. The program will draft national and international experts and organizations to provide contributions to key parts of the program as relevant. The Groundwater for Deep Resilience (G4DR) in Africa Project builds strongly on IWMI engagement with AMCOW in supporting the definition, institutional setup and implementation of APAGroP in its first phase 2019-2022. The program will allow APAGroP to capitalize on previous engagement and outcomes and help strengthen it beyond the first phase, particularly helping to consolidate and enhance the mandates of AU and AMCOW in groundwater and climate change adaptation.

Institution	Description	Role during the project preparation phase
African Minister's Council on Water (AMCOW)	As the apex body on water, the African Ministers' Council on Water's (AMCOW)'s mission is to promote cooperation, security, social and economic development, and poverty alleviation among the Member States through the effective management of the African continent's water resources and the provision of water supply and sanitation services. AMCOW is mandated to provide political leadership in implementing the African Water Vision 2025 and water components of th	Key partner for the project development. High-level engagement, facilitation, coordination, uptake, dissemination, and strengthening of MSs and regional entities in Africa related to the project objectives.

	<p>e African Union's (AU) agenda 2063. AMCO W is an inter-governmental Pan-African organization and a delivery mechanism on water and sanitation for the Specialized Technical Committee on Agriculture, Rural Development, Blue Economy and Sustainable Environment (ARBE) of the AU.</p>	
<p>African Union Member States (AU MSs) and their line ministries and national sector departments and authorities tasked with environment, water resources, agriculture, water supply and sanitation, health, and climate change adaptation</p>	<p>The 55 African States in Africa, all AU members with varying degrees of capacity and frameworks for groundwater management and climate change adaptation.</p>	<p>Knowledge generators, uptake partners, next users, and disseminators of the policy and practice tools and guidelines co-developed as part of the project.</p>
<p>Regional Economic Communities (RECs) in Africa</p>	<p>Well-established multi-country cooperation mechanisms for securing regional integration and peace and stability across regions of Africa with similarities in cultural/linguistic, environmental, socio-economic, and political background.</p>	<p>Knowledge generators, uptake partners, next users, and disseminators of the policy and practice tools and guidelines co-developed as part of the project – focusing on the transboundary freshwater cooperation challenges and opportunities, impacts of climate change and imperatives for transboundary cooperation on climate change adaptation.</p>
<p>River Basin Organizations (RBOs) in Africa</p>	<p>Formalized regional entities overseeing, supporting and guiding cooperation on freshwater in internationally shared river and lake basins.</p>	<p>Knowledge generators, uptake partners, next users, and disseminators of the policy and practice tools and guidelines co-developed as part of the project – focusing on the transboundary freshwater cooperation challenges and opportunities, impacts of climate change and imperatives for transboundary cooperation on climate change adaptation.</p>

Regional Centers of Excellence (CoEs) on freshwater, transboundary cooperation, groundwater, and climate change, e.g. CoEs under the African Union Development Agency (AUDA-Nepad) such as IGAD, ECOWAS and the Southern African Development Community	<p>These centers have the following core functions:</p> <ol style="list-style-type: none"> <li>1. Establishing a knowledge-driven link to MSs to better understand their national priorities and align these with strategies in Agenda 2063</li> <li>2. Strengthening of effective delivery mechanisms to implement AU continental programmes through projects on the ground</li> <li>3. Creating knowledge nodes and platforms for research</li> <li>4. Harnessing the partnership ecosystem to bring in expertise and best practices for implementation</li> <li>5. Disseminating knowledge such as best practices and proof of concepts</li> </ol>	Central knowledge partners for co-generation, uptake and dissemination of knowledge and policy products generated as part of the project. Also, an entry point for access to candidates for the Youth Forum on G4DR.
Africa Groundwater Network (AGW-Net)	An independent network of groundwater specialists in Africa, focusing on capacity development, information sharing and advocacy, networking and strengthening partnerships around sustainable evidence-based groundwater development and management in Africa.	Seedbed for recruiting members of the Youth Forum on G4DR as well as a dissemination channel for policy and capacity development material derived from the project.
The International Waters Learning Exchange and Resource Network (IW:LEARN) of the Global Environment Facility (GEF)	The IW:LEARN project was established to strengthen transboundary water management around the globe by collecting and sharing best practices, lessons learned, and innovative solutions to common problems across the GEF International Waters portfolio. It promotes learning among project managers, country officials, implementing agencies, and other partners.	Outlet for knowledge, knowledge products and lessons generated as part of the project.
IGRAC, BGR, SDC, UNESCO	These are a mix of technical and funding a	Pending interest from such organiz

O, ANBO and CIWA	gencies that can facilitate strategic input to and collaboration on project implementation.	ations, they will invite to strategic consultations with input and partnership solicited in project roll-out.
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### 3. Gender Equality and Women's Empowerment

**Briefly include below any gender dimensions relevant to the project, and any plans to address gender in project design (e.g. gender analysis).**

**Role of women in water management in Africa:** Marginalized women and youth (female and male) bear disproportionate burdens of inadequate water resources, water quality degradation, inadequate WASH services and water-borne diseases, as they are the primary water collectors (Asaba et al., 2017). Women are also typically responsible for caring for family members who fall sick from waterborne diseases. AMCOW (2018) recognizes that this situation can be reversed by engaging women, girls, youth and other marginalized groups in water resources management and governance. However, in almost all rural communities in Africa, women do play key roles in providing, managing, and safeguarding water resources, and make significant contributions to domestic and productive water use. However, there are few strategic gains for women and their contributions are barely acknowledged - their labor, time investments and participation often under-valued, their voices only occasionally heard in community water governance and management, and their everyday experiences of water insecurity rarely informing water infrastructure design, management, and governance. The reasons for these persisting inequalities are multiple and complex. Women's relative lack of 'access to resources (land, water and finances)' is important, but these material inequalities are shaped by deep-rooted 'social roles, norms, values and cultural identities' (Rao et. al. 2017; 14). While working to reduce these inequalities, the focus in engaging women, increasing their access to and ownership of water, land, economic resources will need to be complemented by addressing structural and systemic biases. Otherwise, engaging women in water resources management can simply add to women work burdens, without any strategic gains for women. These tensions and contradictions are rarely reflected in the informal and formal institutional and governance arrangements for water management (Singh, 2017).

**Gender-transformative groundwater management.** Sustainable and equitable groundwater use can play a critical role in achieving multiple human development objectives including poverty eradication, human dignity and well-being, by providing water for domestic use, enabling food production and sustaining critical ecosystem functions (Moench 2003). In other words, groundwater has the potential to significantly improve the livelihoods of women, youth, and other marginalized social groups (Nigussie et al 2018). However, especially in situations of emerging contestations over water resources in climate challenged contexts, inequality in access to groundwater resources is shaped by entrenched power hierarchies which determine groundwater management policies, strategies, and instruments (Hoogesteger & Wester, 2015). A key outcome for this project can be in unpacking the implications of these challenges for different social groups such as women and youth, and in rethinking environmental stewardship and groundwater governance and management through an informed and transformative engagement of women, youth and marginalized groups (Nigussie et al. 2018).

**Barriers to inclusivity.** Participation of women in groundwater management remains low due to the factors, discussed above. Contextual cultural and social constraints limit the ability of marginalized women to speak in public, impact women's agency; and their low literacy levels are often equated with a lack of knowledge, even though poor and marginalized women reliant on hard to access groundwater resources – might have a lot of experiential knowledge. Women's poor representation and presence in water institutions is one key barrier, even though in relative terms, participation of women in the domestic WASH sector is more prominent, while involvement in irrigation and other productive sector tend to remain male-dominated.

**G4DR's approach to gender inclusion.** Sustainable and equitable groundwater management calls for enabling changes in women's improved access to, and increased ownership of land and water resources; and enhancing their financial, technical capacities and abilities. But these interventions will not sustain if the social norms that reinforce gender and intergenerational inequality persist. Achieving this requires working together with women and men, engaging men



and boys and encouraging positive shifts in gender relations, and change in values, beliefs and practices of local communities and other relevant institutions. Gender and social inclusion is a core goal of this project, and project activities will be guided by IWMI's [gender-and-inclusion-strategy-2020-2023.pdf](#), which emphasizes a gender transformative approach. G4DR will consider the following approaches:

1. Assess how climate change impacts availability and access to groundwater resources to most vulnerable groups such as resource-poor people, women and youth in terms of basic water security and livelihoods, using capabilities and vulnerabilities assessment tools
2. Provide gender-transformative recommendations on key action areas to i) access to and use of groundwater, ii) decision-making and groundwater governance, and iii) pathways to change and influence social norms, cultural values and water roles and responsibilities.

**Gender considerations will cross-cut project components.** We will apply a gender transformative framework to map key systemic and structural barriers to more inclusive interventions. By engaging with AMCOW, RECs, R/LBOs – we plan to also build Gender Equality and Social Inclusion (GESI) capacity of multiple stakeholders. We will adopt a key focus on youth inclusion, by engaging with the Youth Forum to identify and pilot incentives and role models for youth, including females, to become part of networks involved in groundwater for deep resilience in Africa.

**Does the project expect to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment?** Yes

**closing gender gaps in access to and control over natural resources;** Yes

**improving women's participation and decision-making; and/or** Yes

**generating socio-economic benefits or services for women.** Yes

**Will the project's results framework or logical framework include gender-sensitive indicators?**

Yes

#### 4. Private sector engagement

Will there be private sector engagement in the project?

Yes

Please briefly explain the rationale behind your answer.

**Importance of Private Sector.** The private sector is a strategically important, yet diverse set of actors within the water industry who encompass well drillers, pump manufacturers/suppliers, consultants, groundwater-abstracting industries, water sellers and others. These actors are often overlooked in many groundwater initiatives. There are clear risks to businesses from resource depletion, and anthropogenic pollution, which has already been evidenced in some agricultural and urban areas across Africa. The private sector would benefit greatly from sustainable groundwater use, noting that they are ultimately accountable to the consumer base and other interests they represent. Strengthening private sector capacity and fostering good practices can significantly benefit sustainable groundwater use and management.

**Activities.** G4DR will seek to work closely with diverse private sector actors across both pilot areas in supporting efforts to achieve deep resilience. Private sector actors will be identified and mapped and business models that facilitate viable engagement established. After identifying relevant products and services providers along the mapped-out groundwater value chains, benchmark criteria can be developed and applied to rank actors most suitable for cooperation and inform further market analysis across other regions. Context-specific engagement plans will be developed, considering the specifics of different groups of actors. Interviews, focus group discussions, and workshops will be used to interact and engage in understanding their perceptions and needs, and in drawing cross-learning with other stakeholders from the collective knowledge, resources and networks. Exemplary cases of water stewards will be identified and nurtured where applicable. The Ugandan pilot presents an exciting opportunity as most urban water supply systems rely on groundwater with extensive private sector participation. Engagement platforms such as hackathons or a science-driven accelerator program can be launched to develop scaling strategies and best practices to develop commercially sustainable models involving public and private actors. At the national and regional scale, AMCOW will help facilitate engagement with the private sector, building upon their demonstrated capacity in this area, through, for example, the *african dialogues* associated with the WASH sector. AMCOW can also be instrumental in helping to call upon the private sector (and governments) to prioritize investments in groundwater to achieve deep resilience through climate-resilient infrastructure and inclusive water and sanitation services.

*Links will be made with channels like the Youth Forum or Capacity Building to scale this up beyond the pilot areas.*

## 5. Risks to Achieving Project Objectives

Indicate risks, including climate change, potential social and environmental risks that might prevent the Project objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the Project design (table format acceptable)

Risk	Rating	Assessment / Mitigation
1. Social/ Economic/ Environmental risks:		
Assessment activities themselves will carry negligible risks.	Low	Components 2 of this project includes an assessment based on existing dataset, information and methodologies. The assessment activities will carry negligible physical, environmental, economic, or social risks. In case study regions, risks will be assessed and informed through stakeholder dialogues and addressed through the participation of regional and local stakeholders in the design of scenarios and the identification of regionally relevant groundwater challenges and solutions.
Climate variability and change	Low	<p>The project addresses, in some of its activities, climate risk and climate impact on regional development, and relevant climate adaptation measure to increase resilience to climate shocks. It will incorporate the latest climate projections for Africa in risk and vulnerability assessments to understand the impact of climate variability and change on groundwater resources and planning measures to address climate impact as part of the project's adaptation framework.</p> <p>We anticipate the project activities and outcome to have negligible impact on climate change. Regional and national planning will be in line with respective regional and national policy guidelines, which include compliance to social, economic and environmental risk indicators.</p>

		Carbon emissions due to project activities (e.g., travels) are offset at each partner agencies under their institutional carbon offsetting programmes and/or other internal sustainability guidelines.
Risks related to COVID-19:	Low	Potential impacts of COVID-19 will be closely and regularly monitored throughout the project lifetime. COVID-19 mitigation strategies and measures will be in line with policies, procedures and guidelines of the partner agencies, relevant countries and lessons learnt through execution of other projects in Africa since early 2020.
a) Delays due to COVID-19 lead to slow implementation or stalling of the project	Low	<p>a) It is anticipated that, even if face-to-face interactions are reduced, the project will still be able to carry out most activities as planned with proper management and alternative communication channels, which have been widely exercised in 2020-2021. Exceptions are the local activities, such as stakeholder engagement and joint learnings, which is covered in the item b below.</p> <p>The project will implement adaptive management. The work plan and stakeholder engagement plan will be flexibly designed to mitigate the impacts of COVID-19. Remote communication via email, online meetings, and phone may be used increasingly to adjust to the current situation. Consequently, the project will invest in staff safety and remote working capacities (e.g. provide internet access, dongles, etc., to enable out-of-office work).</p> <p>The detailed budget will be flexible and have a contingency budget item to include COVID-19 related prevention measures, especially for activities involving local and int</p>

		ernational travels.
b) Delays due to COVID-19 lead to slow or stalling of the local activities including stakeholder engagement process and capacity development activities that involve local and international mobilities	Medium	<p>b) Based on the latest entry and travel regulations in relevant countries, restrictions to mobility within and between countries have significantly reduced. Although the future development is uncertain, we remain cautiously optimistic that the international and national mobility restrictions due to COVID-19 for the project will be low to medium.</p> <p>The project will, as part of Components 1, 3 and 4, assess and strengthen tools for remotely engaging actors and support remote project co-design tools for national and local stakeholders. Expert consultants experienced in virtual stakeholder engagement can be hired to facilitate the stakeholder engagement process. This will ensure that the project delivers the anticipated co-design process and outcomes, and provide learning experience for local stakeholders. Meanwhile, budget for in-person engagement process can be reallocated to engage a more diverse group of stakeholders, which strengthens local and regional ownership and increase long-term sustainability of project impact.</p>
c) Impacts from COVID-19 affect the availability of technical expertise and capacity.	Low	c) It is not currently anticipated that the COVID-19 restrictions would affect the availability of national expertise. Concerning international experts, it is expected that expertise will be provided remotely in case of COVID-19 restrictions.
d) Increased national debt/fiscal crises due to costs of COVID-19 responses influencing sustainability of project	Low	d) G4DR focuses on governance, evidence-bases, long term strategic planning and investment plans. These aspects rely less on short-term reduction of government spending and therefore the risk is considered low.

results where Government funding is needed.		Component 3 covers enhancing the prioritization and optimization of investment for G4DR. This shall enhance evidence-based planning for on-the-ground investment, which goes beyond government financing and includes the private sectors and public and private partnerships for investment.
e) Future risks of similar crises (including from human-livestock-wildlife interaction)	Low	e) The project will ensure implementation of the One Health approach, contributing to a coordinated approach in promoting public health, animal health, plant health and environmental outcomes, including the human-livestock-wildlife interface.
<b>2. Technical and coordination risks:</b>		
Regions, where case studies are conducted may have information and capacity constraints, such as security risks and political instability. Moreover, the time spent with regional stakeholders may be too limited to fully understand and incorporate political and historical realities.	Medium	Case study regions will be carefully selected to limit these risks in the project's first phase. For instance, regions will be identified with limited accessibility to and availability of essential datasets. Yet, the project will work with development partners already active within the case study regions, which should mitigate some of this risk.
Ownership and interest of countries and/or private sector partners is limited in the development of policy documents (e.g., guidelines, framework and strategy).	Low	The policy guidelines and other policy documents will be co-developed with multisectoral actors. AMCOW as a key project partner will gauge and enhance the interest and ownership at both regional and national level. National focal point at AMCOW and national partners for pilots will be actively consulted throughout the project to ensure that the development of policy guidelines addresses

		<p>s existing policy gaps in line with regional and national policy frameworks. Private sector actors will be identified and mapped with context-specific engagement plans and development of commercially sustainable models, which will incentivize the engagement and takeup of the private sector. Knowledge products and sharing will help to engage the public and the youth in driving policy changes and incentivize private sector engagement.</p>
<p>National and subnational take up for project outcome is limited due to the low capacity environment</p>	<p>Medium</p>	<p>Learning and capacitation are planned as part of Component 2 to enable knowledge application and ownership by the right stakeholders from AMCOW, RBOs/RECs and MSs. This includes building on local knowledge and actively engaging local stakeholders on previous pilots in the region that could be replicated or scaled-up and on experience from the pilots within this project. Component 4 on Youth Forum will enhance the beyond-project capacity for further takeup. Lessons can be learned from regional and national groundwater projects and organizations to work in low capacity environments, such as the GEF project on Sustainable Groundwater Management in SADC Member States, interventions and learnings by SADC-GMI, ANBO, OSS and IGAD</p>
<p><b>3. Institutional risks:</b></p>		
<p>Lack of commitment from stakeholders</p>	<p>High</p>	<p>The project builds on a solid foundation of key stakeholders (MSs, RECs, R/LBOs), established as part of the inception phase of APAGroP, to which this project closely links. Furthermore, AMCOW, as a key partner of the project, has a strong convening power and facilitates regular meetings and targeted participatory processes from which this project will link and benefit from.</p>

APAGrop second phase won't be in place, which potentially limit financing for the groundwater desk.	Medium	G4DR primarily aims to sustain and strengthen groundwater desk at AMCOW as detailed in Component 1 with a significant share of the G4DR resources allocated. Options for financial sustainability of the groundwater desk after the project will also be explored between the project partners and relevant external partners (e.g. development banks).
Low enabling environment and changing government priorities/low availability of co-financing	Medium	The project will support an enabling environment and aim to bring on board governments and stakeholders with low capacity through established and new facilitation pathways. The project will use peer pressure to encourage governments with less capacity to come forward to take part in and benefit from the project. Since the project works pan-Africa, it holds some flexibility in terms of applying adaptive management and directing activities towards governments and stakeholders, demonstrating buy-in, up-take capacity and co-financing opportunities.



## 6. Coordination

**Outline the institutional structure of the project including monitoring and evaluation coordination at the project level. Describe possible coordination with other relevant GEF-financed projects and other initiatives.**

FAO will be the GEF Implementing Agency. FAO plays an oversight role, particularly regarding project monitoring and reporting to GEF. FAO's Land and Water Division (NSL) will mainly assist with aspects of project implementation, acting as the lead technical unit (with the FAO Lead Technical Officer embedded in the project team), to ensure the technical and economic feasibility of the measures introduced by the project, and to facilitate sharing of experiences with other regions.

Consistent with the main focus of the project, AMCOW and national partners will play an essential role in project execution. In practical terms, this will be translated in both transferring a subgrant to AMCOW to support the groundwater desk which encompasses both a senior staff and resources for operational support to coordination activities; and, migrating the PMU to AMCOW (pending readiness), by the end of the project execution. Through AMCOW, the project will support a coherent and coordinated 2nd phase of APAGroP, with inputs and investments from various partners and sources, to maximize the long-term outcomes of APAGroP.

The project will engage and support key national institutions to ensure a smooth execution of the two pilots identified at PIF stage. In the Shire, the project will partner with key organizations in Malawi and Mozambique. In Malawi, key organizations will include the Ministry of Agriculture, Irrigation and Water Development, as well as the borehole drillers association. In Mozambique, key institutes will include Direção Nacional de Gestão de Recursos Hídricos (DNGRH) and Administração Regional de Águas do Zambeze (Ara-Zambeze); this has recently been amalgamated into ARA-Centro. In Uganda, key partners will include the Ministry of Water and the Environment. In Uganda, key partners will include the Ministry of Water and the Environment and the Lake Victoria Basin Commission, in addition to representatives of several international organizations in Uganda such as UNEP and UNHCR.

IWMI, who led together with FAO, IIASA and AMCOW the development of the project, will be responsible for managing the project, including day-to-day operations with national entities subcontracted to run activities at the national and local levels. The PMU will be initially established and hosted by IWMI with a view of transferring this function to AMCOW (pending readiness), by the end of the project. The PMU will be responsible for the global-level project activities (project coordination, day-to-day project management, knowledge management and lessons exchange, and common capacity-building activities). Project monitoring will be led by dedicated M&E staff, leveraging existing M&E mechanisms in the region, including continued alignment with national monitoring frameworks, and use of common monitoring indicators where possible. A project Mid-Term Review will provide an independent assessment on project progress after two years of implementation and an opportunity to adjust/improve project execution if required, supporting adaptive management. At the stage of mid-term review, a plan will be formulated to migrate PMU to the AMCOW.

IWMI will support AMCOW in the execution of components 1, 3 and 4. This will be done by leading these components' activities who focus heavily on engagement with key partners such as RECs, RBOs and pilot countries. IWMI is a non-profit, research-for-development organization that works with governments, civil society and the private sector to solve water problems in developing countries and scale up solutions. Through the partnership, IWMI combines research on the sustainable use of water and land resources, knowledge services and products with capacity strengthening, dialogue and policy analysis to support the implementation of water management solutions for agriculture, ecosystems, climate change and inclusive economic growth. IWMI is headquartered in Colombo, Sri Lanka, and has offices in 13 countries across Asia and Africa. IWMI's vision is a water-secure world and our mission is to provide water solutions for sustainable, climate-resilient development. IWMI has a staff complement of over 300 employees, and IWMI's team of over 100

researchers include environmental scientists, hydrologists and hydrogeologists, remote sensing and spatial analysts, irrigation and agricultural engineers, soil scientists, agronomists, water governance and institutional specialists, ecologists and wetland specialists, economists and social scientists, water quality and health experts. IWMI has a strong presence across Africa, conducting projects from offices focusing on supporting the realization of Africa's enormous untapped potential for improved water management. IWMI also helps attain the objectives of the Comprehensive Africa Agriculture Development Program (CAADP), collaborates with the Secretariat of the African Ministers Council on Water (AMCOW) and supports various regional initiatives. These include the agricultural policy of the Economic Community of West African States (ECOWAS), the Agriculture and Rural Development Strategy and Food Security Action Plan of the East African Community, and the Regional Indicative Strategic Development Plan (RISDP) of the Southern African Development Community (SADC).

IIASA will support AMCOW in the execution of component 2. This will be done by leading the development of analytical tools and supporting AMCOW in stakeholder engagements. IIASA has been at the forefront of methodological advances to tackle environmental issues, including water, food, energy, and biodiversity. The developed tools have been used for policy evaluation and decision-making in many parts of the world. IIASA has previously led the technical part of the GEF-funded Integrated Solutions for Water Energy and Land (ISWEL) project, which developed tools and capacities to support the sustainable management of water, energy and land, through the development of a truly nexus approach. In ISWEL, IIASA developed an integrated modelling assessment framework to explore and answer key questions regarding global nexus challenges and potential solutions to meet the sustainable development goals (SDGs). G4DR will build on those developments and seek to further improve the existing modelling assessment framework. Moreover, IIASA is already a partner in the GRIPP network and works closely with several research institutes and planning and funding agencies through the Water Futures and Solutions (WFaS) initiative. Moreover, IIASA is co-coordinating the development of the SSPs, which are the latest generation of global change scenarios and narratives for long-term climate change impact, adaptation, and mitigation assessments. The SSPs will form the basis for comparative scenario analysis for the IPCC and will likely be used to define the global change narratives used in this project. IIASA is also a leading partner of the Inter-Sectoral Impact Model Inter-comparison Project (ISI-MIP). G4DR will have many synergies with ISI-MIP, bringing together impact models from multiple sectors to examine climate change's biophysical and socio-economic impacts. Outputs from ISI-MIP will be used as inputs to G4DR assessment framework (e.g., climate change impacts on water availability). This project will also contribute to ISI-MIP in that it will focus on groundwater in Africa.

GEF projects related and relevant to the proposed project will be further mapped during the project preparation phase, with a geographic focus on Africa, but also a global focus as relevant to the broader groundwater and resilience portfolio. Some contacts have already been made, in order to identify such linkages, e.g. with the GEF Conjunctive Water Management project for the Nile Basin Initiative ([bit.ly/3okfhy2](http://bit.ly/3okfhy2)) and various other transboundary projects with a focus on aquifers, e.g. the GEF project under the Nile Basin Initiative focusing on the Kagera aquifer shared by Burundi, Rwanda, Tanzania and Uganda, the Mt. Elgon aquifer shared by Kenya and Uganda, and Gedaref-Adigrat aquifer shared by Ethiopia and Sudan ([bit.ly/3Df3Njv](http://bit.ly/3Df3Njv)), WB/CIWA support to groundwater and centers of excellence in SADC, IGAD, and Sahel (CIWA/WB, 2021), AfDB/AWF support to North-Western Sahara Aquifer System, Iullemeden and Taoudéni Aquifer Systems, and Niger River and Aquifer Basin ([bit.ly/3lyKiwi](http://bit.ly/3lyKiwi)), and work on transboundary aquifers in ECOWAS (ECOWAS-SWAC/OECD, 2006).

The project will engage and coordinate with the GEF ID 10797 Sustainable Groundwater Management in SADC Member States Project Phase 2, aiming at developing capacity and knowledge for inclusive groundwater management in the SADC region at the national and transboundary levels.

The project will engage and coordinate with the Climate Change and Desertification Unit (CCDU) of the AU, the Committee of African Heads of State and the Government on Climate Change (CAHOSCC), the African Ministerial Conference on the Environment (AMCEN) and the ClimDEV Africa initiative.

Finally, the project will explore opportunities to engage and coordinate with partners in the field of transboundary waters and climate change, but which seem to have limited groundwater considerations, e.g. the AGWA initiative for a new tool (the Water Tracker) for countries to integrate water resilience into national climate plans ([bit.ly/32JG8v1](https://bit.ly/32JG8v1)), the GWP initiative towards an International High-Level Panel for Climate Resilient Water Investments in Africa, called for at high level at COP26 ([bit.ly/3rxpwks](https://bit.ly/3rxpwks)) and AMCOW-GWP capacity building initiatives around climate resilient decision-making in water investments ([bit.ly/3lj6tR9](https://bit.ly/3lj6tR9)).

## 7. Consistency with National Priorities

**Is the Project consistent with the National Strategies and plans or reports and assessments under relevant conventions?**

Yes

**If yes, which ones and how: NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, INDCs, etc**

### Malawi

**The Waterworks Act:** The MoAIWD also heads the implementation of water supply (Baumann and Danert 2008; Matamula 2008; USAID n.d.). Water services are regulated in Malawi through the Waterworks Act of 1995, providing water services in urban areas. The Waterworks Act is the leading legislation mandating Public Utility Companies or Water Boards, as sole water service providers in designated urban areas and Market Centres, the boundaries of which the minister declares, and can alter, amend, reduce or extend.

**Water Boards:** At Malawi's regional and district tiers, three regional and two district public water utility companies are sole water service providers in designated urban areas under the Waterworks Act. The five utility companies are Northern, Central and Southern Water Boards at the regional levels, and then Lilongwe and Blantyre Water Boards. Most of the water supply facilities in these cities are old. The aging water facilities may cause various problems, such as the risk of accidents and failures with water supply interruption for a long time due to the deterioration of structural components.

**Irrigation:** Among the various other pieces of policies, legislation and institutions that affect water resources management, an important sector is irrigation. The Irrigation Act of 2001, together with the National Irrigation Policy of 2016 provides for the implementation and provision of irrigation-related goods, works and services. The Act provides guiding principles and the establishment of a relevant body for sustainable development and management of irrigation. The National Policy guides the provision of irrigation goods, works, and services regarding three critical issues affecting the irrigation sector: spatial and temporal water shortages; customary land tenure disputes; and, poor operation and maintenance of infrastructure. The policy seeks to contribute to the attainment of food security, nutrition and sustainable economic growth. Specifically regarding water, the intended outcome is water productivity through catchment management and water harvesting.

**Environment Management Act (2017).** There are several other national, sectoral legislations and policies that impact the water sector. The revised Environment Management Act of 2017 is an integrated and comprehensive legal framework for environmental and natural resource conservation, sustainable utilization, protection, and management in Malawi.

### Mozambique

**Fundo de Investimento e Património do Abastecimento de Água (FIPAG):** The 1991 Mozambican Water Act also regulates domestic water supplies. The first National Water Policy of 1995 emphasized the goal of reconstruction and expansion of basic water provision to urban, peri-urban and rural areas. Specific institutional and financial frameworks for implementation have been established, which fall under the National Directorate for Water Supply and Sanitation, in the Ministry of Public Works, Housing and Water Resources. In 1998, the Decree nº 73/98 established the public 'Investment and Patrimonial Water Supply Fund' (Fundo de Investimento e Património do Abastecimento de Água (FIPAG)). Decree nº 74/98 established the Water Supply Regulatory Council (Conselho de Regulação do Abastecimento de Águas (CRA)). In 2004, the Ministerial Order No. 180/2004 was approved to regulate the water quality for human consumption (Manjate 2010).

**Programa Nacional de Abastecimento de Água e Saneamento Rural (PRONASAR):** The FIPAG was for major cities, including the Maputo Region (Águas da Região de Maputo). The framework allowed for private operators to be in charge of the management of five systems, while the assets and the investments were in the hands of FIPAG with its independent supervisor, CRA. In smaller cities and towns, the Management of Water Supply and Sanitation Infrastructure (Administração de Infraestruturas de Abastecimento de Água e Saneamento, AIAS) operated. In rural areas, water supply and sanitation is coordinated through National Rural Water Sanitation Program (Programa Nacional de Abastecimento de Água e Saneamento Rural (PRONASAR) from 2010 onwards. PRONASAR is striving to manage aid to the rural sector more effectively and to implement sector and institutional reforms that facilitate harmonization and alignment. Community participation is promoted, with rural water points (e.g., boreholes with hand pumps) managed by voluntary committees. In 2006, it was estimated that 85% of its funds came from grants and concessional loans.

**Water Boards:** Accordingly, in the Mozambican part of the Shire System, domestic water supplies are implemented by water boards in urban areas. In rural areas, local government collaborates with NGOs such as WaterAid and World Vision. For example, in Mutarara with a population of 208,864 inhabitants, 46.2% of the population has access to an improved water source, corresponding to 155 drill holes and 135 operational wells, 8 sources connected through small water supply systems. However, groundwater is reported to be saline. Morrumbala has 683 operational water sources in the area and the rural water supply rate is about 64.2% (water officials, pers. communication).

**Irrigation and Fisheries.** At national level, the 10-year Strategic Plan for Agricultural Development 2010 – 2019 (PEDSA) aims to develop irrigation schemes and boost agricultural production in order to improve food security and rural income competitively and sustainably. The PEDSA envisages doubling crop yields and increasing by 25% the area cultivated for basic food production by 2019. Investments in irrigation infrastructure, agricultural technologies, market-based approaches, and enabling environments such as physical infrastructure, financing mechanisms, and coordination are envisaged to achieve this goal. The Ministry of Agriculture (Ministério de Agricultura (MINAG)) is responsible for implementation.

**Environment.** The Ministry for the Coordination of Environmental Action (MICOA), is responsible for environmental protection. This mandate is also highly relevant in the Lower Zambezi. The operation of the upstream Cahora Bassa dam has already affected the livelihoods and ecosystems in the delta, which has also been declared as RAMSAR site (De Bruyne et al. 2017). In particular, Environmental Impact Assessment falls under the authority of the Direção Nacional de Auditoria e Impacto Ambiental authority.

## Uganda

The economy of Uganda heavily depends on natural resources, including its groundwater resources. Building climate resilience of the key sectors and reducing disaster risks are key to its economic development. The third National Development Plan 2020/21-2024/25 (NDPIII) of Uganda and Uganda Vision 2040 emphasizes that climate change negatively affects most key economic sectors, particularly the agriculture, forestry and energy sectors. The National Climate Change Policy (NCCP) identifies adaptation, mitigation, monitoring, and research as priority areas towards “a climate-resilient and low-carbon development path for sustainable development in Uganda”. Multiple policies and legislations make reference to groundwater management and utilization, including the Water Statute (1995), National Water Policy (1999), National Environment Statute (1995), Water Abstraction, Water Sources Protection Guidelines (2013), and Wastewater Discharge Regulations (1998). However, a dedicated policy on groundwater is only under consideration and development lately.

**Nile Basin Initiative (NBI) and Lake Victoria Basin Commission (LVBC):** Regionally, Uganda is a Member State of the two intergovernmental organizations for water resources management. The 10-year Strategy (2017-2027) of NBI identifies six strategic objectives covering areas of sustainable use, monitoring and protection of groundwater resources. One of the key strategic directions is enhancing sustainable and conjunctive use of groundwater and surface water. Key

development objective under the LVBC Strategic Plan (2016-2020) was to promote and facilitate the implementation of the integrated water resources management and development in the Lake Victoria Basin, including fostering and facilitating the development and implementation of sustainable surface and groundwater resources development and management strategies.

**Uganda Vision 2040** recognizes that there is still a poor understanding of climate change and variability in Uganda and hence inadequate adaptation and mitigation measures in the country. Over the Vision 2040 period, the Uganda government promises to develop appropriate adaptation and mitigation strategies in all sectors to increase the country's resilience to the impact of climate change, including knowledge and information sharing, policy and organizational structure, and capacity building.

**Water and Environment.** The Ministry of Water and Environment, is the lead institution in implementing the Natural Resources, Environment, Climate Change, Land and Water Management Programme. The interventions of this programme are critical to the reduction of disaster losses, achievement of increased household incomes and improvement of quality of life of the population as envisaged in the overall NDP III goal. The programme is delivered through three sub-programme, namely: 1) water management, 2) environment and natural resources, and 3) land management. The intermediate outcomes of the Water Management sub-programme include improved catchment-based water resources management (indicated by the percentage of planned Catchment Management Plan interventions implemented and the frequency of water quantity updates), improved water quality monitoring and securing Uganda's interest in transboundary water resources.

**Parish Development Model.** Uganda launched the Parish Development Model in 2022, which is a bottom-up approach for national development with planning, budgeting and delivery of public services at the lowest administrative level (i.e. parish). All interventions and projects are expected to follow the model. The proposed pilot case in Uganda helps to address at least three pillars of the Parish Development Model. These include Pillar 5 on parish-based management information system, Pillar 6 on governance and administration, and Pillar 7 on mindset change, community mobilization and cross-cutting issues).

## 8. Knowledge Management

**Outline the knowledge management approach for the Project, including, if any, plans for the Project to learn from other relevant Projects and initiatives, to assess and document in a user-friendly form, and share these experiences and expertise with relevant stakeholders.**

Due to the nature of the project, knowledge management is an integral part of each component. Throughout the project, G4DR will follow and learn from other relevant projects and initiatives identified and beyond, network with key institutions, and document best practices and results from case studies for dissemination to wider stakeholder groups. G4DR will follow a comprehensive knowledge management approach by collating information on relevant stakeholders, existing and new data, tools and methodologies, as well as innovative projects and initiatives on groundwater issues at different scales (continent, basins, countries). This approach will also seek to foster partnerships, networking and collaborations among agencies and organizations working in the field of groundwater resources, environment, natural resources, especially with regards to regional knowledge for pilot case studies. Some key institutions will include international and regional financing institutions such as AMCOW, ANBO, RBOs, RECs, AfDB, WWE, IUCN.

Tangible knowledge outputs of the project are planned to be a Summary for Policymakers describing project insights and outcomes, and scientific publications in high-impact journals and white papers. Furthermore, G4DR will be presented at high-level panels and side events and at scientific and policy conferences and meetings. An open-source and easily accessible toolkit will be made available, providing both transparency and options for further exploitation of project results. One of the key activities regarding knowledge management also involves capacity building, especially in pilot case studies.

G4DR will also contribute to knowledge sharing through IW: Learn by participating at IW conferences, contributing to the project website, and drafting two experience notes. In addition, efforts will be undertaken to make knowledge management activities gender mainstream. This includes gender-sensitive language in publications, photos showing both women and men (if applicable), and avoiding the presentation of stereotypes. G4DR will ensure that women and men have equal access to the knowledge created.

A strong outreach and communication strategy will be developed to raise national, regional and global awareness on the proposed project and its accomplishments. A variety of communication materials will be generated in multiple languages to ensure that all the relevant stakeholders in Africa are informed and engaged in the activities of the project with the final objective of positioning the G4DR as a driver of transformational change within the African continent and beyond. The impacts of the communication strategy and its materials will be closely monitored in order to adapt them regularly and maximize the impact in each country.

Furthermore, the project will prioritize due participation in the actions identified under the [IW:LEARN Supporting Portfolio Coordination](#) Within and Beyond the International Waters Focal Area, such as regional training workshops, twinning activities, and cross sharing of data and good practices. To this end, 1% of the GEF IW grant will be used to support active engagement and participation of the project's stakeholders in learning activities, including global and regional events and the production and dissemination of experience notes. These will be further shared through the IW:LEARN, eventually benefitting an audience that goes beyond the project partners.

## 9. Environmental and Social Safeguard (ESS) Risks

Provide information on the identified environmental and social risks and potential impacts associated with the project/program based on your organization's ESS systems and procedures

Overall Project/Program Risk Classification\*

PIF	CEO Endorsement/Approval	MTR	TE
Low			

### Measures to address identified risks and impacts

Provide preliminary information on the types and levels of risk classifications/ratings of any identified environmental and social risks and potential impacts associated with the project (considering the GEF ESS Minimum Standards) and describe measures to address these risks during the project design.

ES Risk Identification – Screening Checklist was applied to the project by the FAO ESS team. This did not identify any critical environmental and social risks during the development of the PIF, i.e. Regardless, during the PPG phase a complete ESS analysis will be conducted respecting FAO standards (aligned with GEF ESS Minimum Standards). Moreover, the project will implement a gender tailored action plan, ensuring access to productive resources for all. Finally, although this is not a risk identified at PIF stage, the project will tailor several actions supporting youth empowerment and engagement.

### Supporting Documents

Upload available ESS supporting documents.



**Title**

**Submitted**

**FAO ES Risk Identification – Screening Checklist- G4DR**

**FAO Risk Certificate- G4DR**

### Part III: Approval/Endorsement By GEF Operational Focal Point(S) And GEF Agency(ies)

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S): (Please attach the Operational Focal Point endorsement letter with this template).

Name	Position	Ministry	Date
Shamiso Najira	Deputy Director for Environmental Affairs and GEF OFP,	Environmental Affairs Department.	3/10/2022
Patrick Ocailap	Deputy Secretary to the Treasury and GEF OFP.	Ministry of Finance, Planning & Economic Development	3/31/2022
Claudio M.I. Afonso	GEF Operational Focal Point and National Director of Climate Change	Ministry of Land and Environment	4/26/2022

## ANNEX A: Project Map and Geographic Coordinates

Please provide geo-referenced information and map where the project intervention takes place



