GEF-8 REQUEST FOR CEO ENDORSEMENT/APPROVAL

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General Project Information

Project Title Unlocking the groundwater potential of the Kilimanjaro Water Tower	
Region Africa	GEF Project ID 11547
Country(ies) Regional Kenya Tanzania	Type of Project FSP
GEF Agency(ies): FAO	GEF Agency Project ID 750589
Project Executing Entity(s) UNESCO Ministry of Water, Sanitation and Irrigation-Government of Kenya Ministry of Water-Government of Tanzania Jumuiya Water Fund (TNC)	Project Executing Type Others Government Government Private Sector
GEF Focal Area (s) International Waters	Submission Date 12/16/2025
Type of Trust Fund GET	Project Duration (Months) 60
GEF Project Grant: (a) 7,105,936.00	GEF Project Non-Grant: (b) 0.00
Agency Fee(s) Grant: (c) 675,064.00	Agency Fee(s) Non-Grant (d) 0.00
Total GEF Financing: (a+b+c+d) 7,781,000.00	Total Co-financing 56,534,759.00
PPG Amount: (e) 200,000.00	PPG Agency Fee(s): (f) 19,000.00
Total GEF Resources: (a+b+c+d+e+f) 8,000,000.00	
Project Tags CBIT: No NGI: No SGP: No Innovation: No Competitive Window: No	

Project Sector (CCM Only)

Taxonomy

International Waters, Focal Areas, Freshwater, Aquifer, Transboundary Diagnostic Analysis and Strategic Action Plan Preparation

Rio Markers

Climate Change Mitigation	Climate Change Adaptation	Biodiversity	Land Degradation
No Contribution 0	Significant Objective 1	Significant Objective 1	No Contribution 0

Project Summary

Provide a brief summary description of the project, including: (i) what is the problem and issues to be addressed? (ii) what are the project objectives, and if the project is intended to be transformative, how will this be achieved? iii), how will this be achieved (approach to deliver on objectives), and (iv) what are the GEBs and/or adaptation benefits, and other key expected results. The purpose of the summary is to provide a short, coherent summary for readers. (max. 250 words, approximately 1/2 page)

The proposed project, jointly initiated by the Governments of Kenya and Tanzania, aims to enhance water security, climate resilience, and ecosystem sustainability in the Mount Kilimanjaro region by strengthening the management of the Kilimanjaro Transboundary Aquifer System (KTAS). Aligned with national and regional priorities, this initiative addresses the urgent need for strengthening the sustainable and conjunctive management of the KTAS groundwater and surface water resources. It has been developed through an inclusive process involving UNESCO, FAO, and local stakeholders.

Mount Kilimanjaro, Africa's highest mountain, acts as a vital 'water tower,' supporting the Pangani and Athi River Basins, as well as the Amboseli Internal Drainage Basin, while providing essential groundwater reserves. Water recharge occurs primarily in Tanzania's cloud forests, impacting groundwater distribution in Kenya. The interconnected nature of the KTAS supports approximately 2.05 million people, who rely on its freshwater and dependent ecosystems. However, increasing domestic and agricultural demands, reduced surface water availability, and droughts are stressing the shallow and easily accessible unconfined aquifers, which represent the primary groundwater source in the region. Deeper confined aquifers remain largely untapped due to insufficient understanding of their dynamics and connectivity, highlighting the need for comprehensive hydrogeological research and sustainable management strategies.

The project will deliver Global Environmental Benefits through three mutually reinforcing strategies: (i) improved knowledge and monitoring—harmonized datasets, joint assessment and subsurface modelling, and a shared information system to support evidence-based allocation and drought preparedness; (ii) ecosystem-based protection of recharge and groundwater-dependent ecosystems—priority restoration and protection measures in key recharge landscapes, including an estimated 71,000 ha of cloud forest/forest land under improved management and restoration (Core Indicator 3.2), to improve infiltration, reduce degradation pressures, and strengthen landscape resilience; and (iii) improved transboundary governance—agreed protocols for data exchange, joint monitoring and cooperation (Core Indicator 7), and strengthened national and basin institutions to manage risks adaptively. Capacity development and gender-responsive stakeholder engagement will embed inclusive, long-term uptake.

Importantly, KTAS represents the first comprehensive transboundary aquifer case study in Eastern Africa, providing a scientific and governance model for replication and upscaling across other shared aquifer systems in the region. To maximize this value, the initiative will be branded and promoted as a flagship regional reference case, with communications going beyond basic visibility to systematically document, package, and disseminate lessons (e.g., case studies, policy briefs, infographics, videos, and technical notes) in formats that

can be readily taken up by other basins and partners. Targeted engagement with regional and global platforms—including GEF IW: LEARN, UNESCO, FAO, IGAD and AMCOW—will position KTAS as an entry point for future investments, partnerships and policy actions to harness groundwater for climate-resilient development and regional water security.

Project Description Overview

Project Objective

The overall objective of this project is to enhance water security, climate resilience, and ecosystem health in the Mt Kilimanjaro region shared by Kenya and Tanzania through comprehensive groundwater assessment, transboundary cooperation, and sustainable management of the Kilimanjaro Transboundary Aquifer System (KTAS).

Project Components

1. Groundwater assessment: making the invisible visible

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing ($)	Co-financing ($)
1,421,187.00	11,072,250.00

Outcome:

1.1 Countries improve their common understanding of the hydrological characteristics and socio-economic impacts related to the potential and current state of the shared groundwater resources of the Kilimanjaro region.

Output:

1.1.1 The Conceptual three-dimensional hydrogeological model of the KTAS developed and validated

1.1.2 Stable isotope survey of major springs (e.g., Mzima), production wells, and lakes (Chala, Jipe) conducted and analyzed to characterize their relationships with the Kilimanjaro and adjoining Chyulu Hills aquifers

1.1.3 Transboundary Diagnostic Analysis (TDA) developed, validated, and endorsed by both countries, integrating hydrogeological assessments (1.1.1 and 1.1.2), governance, socio-economic, legal, gender

2. Expanding groundwater resources, and enhancing underground storage capacity

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing ($)	Co-financing ($)
2,230,267.00	15,817,500.00

Outcome:

2.1 Increased access to, quantity and sustainability of groundwater reserves.

Output:

2.1.1 Exploratory deep wells drilled and tested in priority areas (informed by Component 1 findings) to identify and characterize new confined aquifers at economically viable depths

2.1.2 Sites for Managed Aquifer Recharge identified and regional underground water storage and flood management plans developed

2.1.3 Pilot demonstrations of (i) managed underground water storage/retrieval systems and (ii) flood water management solutions (including nature-based and technical approaches) implemented and documented

2.1.4 Recharge-area protection and restoration measures implemented in priority zones (including Kilimanjaro cloud forests), with inclusive community participation

2.1.5 Water demand and supply analysis completed for major sectors, including WASH, agriculture and urban centers

3. Establishing essential groundwater management tools

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing ($)	Co-financing ($)
1,153,512.00	11,495,000.00

Outcome:

3.1 Countries practicing sustainable conjunctive management of the surface and groundwater resources of the Kilimanjaro region

3.2 Increased capacity of national water managers and local communities including women to conjunctively manage surface and groundwater.

Output:

3.1.1 Design of multi-purpose monitoring networks of groundwater quality and quantity based on equipment, methodologies, indicators and protocols agreed upon by the two countries.

3.1.2 Pilot monitoring demonstrations: ad hoc wells drilled in irrigation and local communities' contexts and instrumented with modern equipment for real time data transmission.

3.1.3 Groundwater Information Management System, harmonized in the two countries, to enable storage, retrieval, processing, visualizing groundwater data and information.

3.1.4 Hydro-environmental Observatory of the Kilimanjaro Water Tower established and operational as a reference information center.

3.1.5 Gender-responsive training programmes on groundwater management and surface–groundwater interactions developed and delivered to national agency staff and local communities.

4. Strengthening transboundary cooperation and groundwater management capacity

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing ($)	Co-financing ($)
1,015,134.00	7,908,750.00

Outcome:

4.1 Countries commence efforts to cooperate in the management of the KTAS and strengthen their commitment to undertake agreed priority reforms and investments.

Output:

4.1.1 Terms of reference for the creation and functioning of a permanent transboundary consultation and information exchange body on the Kilimanjaro transboundary aquifer system, prepared and submitted for governments approval.

4.1.2 The Kilimanjaro Aquifer System Strategic Action Program (SAP) for the long-term environmentally sustainable management of the groundwater resources in the project region, prepared and submitted for government approval at ministerial level.

4.1.3 A partnership conference aimed at consolidating international support for the SAP implementation convened with broad participation of the donor community.

4.1.4 A comprehensive review of existing groundwater policies and regulations in both Kenya and Tanzania, identifying gaps and inconsistencies and opportunities for improvement

5. Coordination, knowledge management, stakeholder’s engagement and dissemination

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing ($)	Co-financing ($)
734,280.00	4,745,250.00

Outcome:

5.1 Structured and effective gender-responsive engagement of relevant stakeholders in project activities, inclusive integration of local communities' perspectives, enhanced public awareness and information accessibility, and active involvement of the productive sector contribute to the realization of the project's outcomes and the broader commitment to the implementation of SAP reforms and investments.

Output:

5.1.1 Stakeholder consultation mechanisms established and operational, including engagement with private sector, women, youth, and local communities

5.1.2 Knowledge-exchange and coordination mechanisms with relevant projects and initiatives established and operational.

5.1.3 National and regional outreach events conducted to disseminate project progress and results

5.1.4 Project knowledge management system established and operational, including active engagement with IW: LEARN, a functional project website, and dissemination of key project outputs.

M&E

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing ($)	Co-financing ($)
213,178.00	2,145,548.00

Outcome:

6.1 Operational project M&E systems successfully implemented and informing adaptive management.

Output:

6.1.1 A gender-responsive project M&E system designed and operational

6.1.2 Independent Mid-term Review and Terminal Evaluation undertaken with results fed back to project management including substantive reporting of gender-specific results

Component Balances

Project Components	GEF Project Financing ($)	Co-financing ($)
1. Groundwater assessment: making the invisible visible	1,421,187.00	11,072,250.00
2. Expanding groundwater resources, and enhancing underground storage capacity	2,230,267.00	15,817,500.00
3. Establishing essential groundwater management tools	1,153,512.00	11,495,000.00
4. Strengthening transboundary cooperation and groundwater management capacity	1,015,134.00	7,908,750.00
5. Coordination, knowledge management, stakeholder's engagement and dissemination	734,280.00	4,745,250.00
M&E	213,178.00	2,145,548.00
Subtotal	**6,767,558.00**	**53,184,298.00**

Project Management Cost	338,378.00	3,350,461.00
Total Project Cost ($)	**7,105,936.00**	**56,534,759.00**

Please provide Justification

PROJECT OUTLINE

A. PROJECT RATIONALE

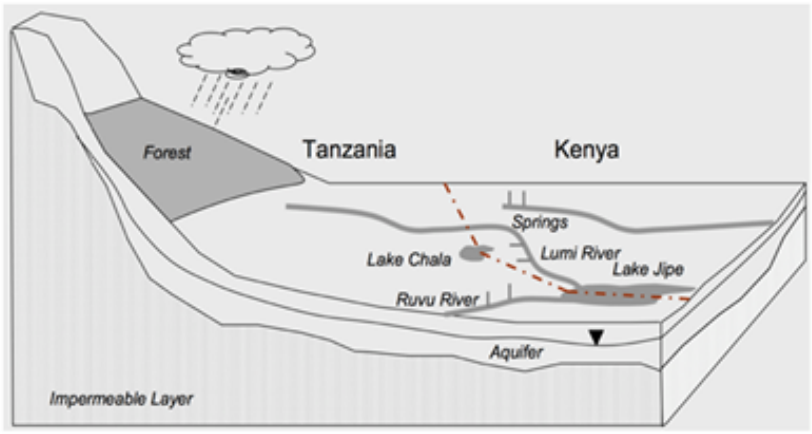
Describe the current situation: the global environmental problems and/or climate vulnerabilities that the project will address, the key elements of the system, and underlying drivers of environmental change in the project context, such as population growth, economic development, climate change, sociocultural and political factors, including conflicts, or technological changes. Describe the objective of the project, and the justification for it. (Approximately 3-5 pages) see guidance here

1. Mount Kilimanjaro—Africa's highest mountain and a major volcanic edifice—functions as a critical "water tower" for a densely populated transboundary region. It feeds the Pangani and Athi river basins and the Amboseli internal drainage, and it underpins a vast and complex groundwater system: the Kilimanjaro Transboundary Aquifer System (KTAS) shared by Kenya and Tanzania. KTAS provides water for domestic supply, irrigated agriculture, livestock, industry and tourism, and sustains groundwater-dependent ecosystems across the wider landscape.

2. Recharge to this volcanic aquifer system occurs predominantly on the Tanzanian side, especially between ~1,500–3,000 m a.s.l., where high rainfall and cloud-forest moisture promote infiltration; the contribution from snowmelt is considered negligible. Infiltration occurs through multi-layered volcanic deposits and fracture/fault systems typical of central volcanoes, creating interconnected shallow and deeper aquifers along the mountain flanks, some of which extend into the surrounding plains in both countries. KTAS is hydraulically linked to cross-border rivers and springs, and interacts with wetlands and freshwater ecosystems—including transboundary lakes such as Chala and Jipe (and potentially Amboseli lake systems, to be assessed). This creates a clear upstream–downstream dynamic whereby recharge conditions in Tanzania influence groundwater availability and ecosystem services in Kenya.

Tentative map of the Kilimanjaro Aquifer (TWAP 2015, GEF/UNEP/UNESCO)

Fig 1: The Kilimanjaro Aquifer System

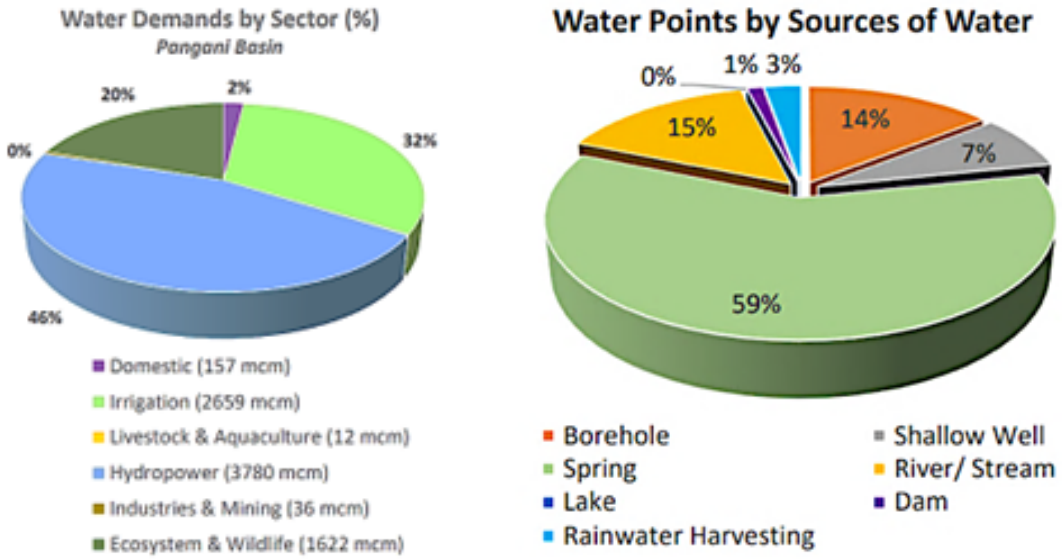


(from Grossman, 2005)

Fig 2: Recharge and Discharge Areas

3. Pressures are intensifying across the Kilimanjaro–Amboseli–Tsavo landscape (including Kajiado and Taita Taveta in Kenya and Kilimanjaro/Manyara in Tanzania). Population growth, urban expansion, agricultural intensification and tourism are increasing water demand and accelerating abstraction from shallow unconfined aquifers in the plains—many of which are already under stress—while the potential of deeper confined groundwater remains under-assessed and therefore not reliably integrated into water-supply planning. At the same time, land-use change, deforestation and degradation of recharge areas reduce infiltration and alter groundwater–surface water interactions, undermining dry-season baseflows and ecosystem stability.

4. These pressures are further compounded by significant gaps in water demand and supply data across the Pangani River Basin, which remain poorly documented and often underestimated, constraining effective resource planning and allocation. For example, data from the Mombasa Water Fund indicates a substantial supply–demand gap, with current water availability at approximately 46,500 m^3/day against a demand of 155,840 m^3/day in 2022, although planned investments are expected to reduce this deficit. At the same time, the basin is characterized by strong surface water–groundwater interactions, with key systems such as Lakes Chala and Jipe largely sustained by groundwater, particularly during dry periods when surface water availability declines sharply. This seasonal variability intensifies competition among users, especially in upstream areas where large-scale irrigation for crops such as sugarcane and flowers consumes significant volumes of water, further exacerbating scarcity for other users. The impacts are most pronounced in transboundary and pastoralist communities that depend on groundwater for livestock, increasing the risk of resource-use conflicts. These dynamics underscore the urgent need for improved data, integrated surface water–groundwater management, and strengthened transboundary cooperation to balance competing demands and enhance water security across the basin.



WATER DEMAND BY SECTOR IN THE PANGANI BASIN (TANZANIA) BASED ON THE PANGANI BASIN FACTS AND FIGURES

ESTIMATED WATER USES IN TAITA TAVETA COUNTY - KENYA

Water Use	Sub-category	Estimated Daily Use (cubic meters)	Primary Sources
Domestic	Household (rural)	10,000	Tsavo, Lumi, Voi rivers, Mzima Springs, Njukini, Njoro Kubwa, Kitobo, Sanite, Maji Wadeni, Humas Springs, Lemonya Springs
	Municipal (urban)	20000	Mzima Springs (major supplier to Voi town and Mombasa City)
Industrial	Industrial	5000	Tsavo and Lumi rivers
Agricultural	Irrigation	50000	Tsavo, Lumi, Voi rivers, various small springs and streams
	Livestock	15000	
Environmental /ecosystem	Environmental water requirements	N/A	information not available

Source: County Development Plan.

Approach for water use:

5. Water use is currently represented inconsistently between Kenya and Tanzania, with differing classification systems and data collection methods that hinder comparability and a clear understanding of sectoral demand across the transboundary system. To address this, the project will adopt a harmonized FAO approach, classifying water use into four main sectors—agriculture (including irrigation and livestock), domestic, industrial, and environmental—using standardized indicators and data disaggregation by source. This will enable consistent assessment, reduce double counting, and support coherent, evidence-based planning and management across both countries.

This project will aim to:

- Conduct, as part of the TDA, a comprehensive water demand and supply analysis for major sectors, including agriculture and urban centres, taking into account the latest data from the Jumuiya Water Fund and other relevant sources in both Kenya and Tanzania

- Once the KTAS assessment will be completed, develop water allocation scenarios that balance economic development needs with environmental sustainability, considering the projected increase in water supply and demand
- Engage with national and local governments to promote water-efficient technologies and practices in agriculture and urban water supply, aiming to reduce the gap between supply and demand

6. Climate variability and change compound these pressures through warming, shifting rainfall seasons and increasing extremes, increasing evapotranspiration losses, drought risk and uncertainty over long-term recharge. Recent drought impacts in the region have underscored the socio-economic and humanitarian consequences of water scarcity and reinforced the role of groundwater as a critical climate buffer—provided it is understood, monitored and managed sustainably.

7. Despite its importance, the Kilimanjaro Transboundary Aquifer System (KTAS) remains poorly characterized and weakly governed as a shared resource, with fragmented and non-harmonized hydrogeological data, limited monitoring systems, and no operational framework for joint data exchange or cooperative management between Kenya and Tanzania. These gaps drive reactive and uncoordinated decision-making, increasing risks to water security, livelihoods, groundwater-dependent ecosystems, and potential resource-use conflicts. In response, the project will establish a shared scientific and governance foundation to enable preventive, adaptive, and cooperative management of KTAS, while promoting inclusive and equitable access to groundwater resources. It will strengthen transboundary cooperation, enhance groundwater assessment and management, and support participatory approaches that integrate the needs of diverse stakeholders, including pastoralists, women, and local communities, through existing governance structures such as Water Users Associations. By combining improved knowledge, strengthened institutions, and inclusive engagement mechanisms—including a functional Grievance Redress Mechanism—the project will reduce conflict risks, enhance climate resilience, and deliver sustainable socio-economic and environmental benefits in line with GEF-8 International Waters priorities.

Barriers

8. The threats to livelihoods, biodiversity, and ecosystems in the Kilimanjaro region arise from a combination of factors, including population growth, increased water demand, and climatic variability. Addressing these challenges requires overcoming several barriers that hinder effective mitigation efforts. The main barriers include:

i. Rapidly expanding and under-documented water demands. Water demand—especially in the Pangani basin—is growing faster than available supply information and planning tools, limiting effective allocation, investment prioritization and long-term water security.

ii. Limited understanding of KTAS aquifer characteristics and use dynamics. The aquifer system (including deeper confined units) has not been comprehensively assessed, and critical gaps remain on aquifer geometry, recharge/discharge, connectivity, abstraction levels and groundwater–surface water interactions. Water and gender analyses are also needed to reflect different uses, needs and knowledge of women and men, and to ensure equitable participation in assessment and decision-making.

iii. Insufficient protection and enhancement of recharge. Kilimanjaro's cloud forests and adjacent recharge landscapes are under pressure, reducing infiltration and affecting downstream discharge areas in Kenya. Land-use change, soil compaction/crusting and degraded vegetation increase runoff and reduce effective recharge; recharge protection measures need to be strengthened and designed with meaningful participation of women and local resource users.

iv. Weak and non-harmonized monitoring systems. Monitoring networks and protocols remain limited and fragmented in both countries, with gaps in coverage, technology, standardization and institutional capacity to generate comparable, reliable groundwater data at transboundary scale.

v. Inadequate transboundary coordination and information exchange. While cooperation exists in connected sub-basins (e.g., the Lake Chala–Lake Jipe–Umba context), there is no operational, system-wide mechanism for joint data sharing, monitoring and cooperative management of the shared aquifer.
vi. Gaps in groundwater governance frameworks and tools. Policies, institutions and practical tools for managing groundwater proactively are not yet sufficiently aligned or implemented across the two countries, including participation, accountability and inclusion measures.
vii. Low public awareness and persistent gender inequalities. Limited awareness of groundwater potential and vulnerability—combined with entrenched gender disparities in access, voice and decision-making—constrains behavior change, stewardship and equitable benefit-sharing.

Threats to the Chala and Jipe Lakes

9. The sustainability of Chala and Jipe lakes in Kenya and Tanzania faces several threats, including pollution from agricultural runoff, deforestation leading to soil erosion, overfishing, invasive species introduction disrupting the ecosystem balance, and water extraction for irrigation and human consumption impacting water levels and quality in the lakes. These threats collectively pose significant challenges to the ecological health and long-term viability of the Chala and Jipe lakes. Specific agricultural practices that contribute to pollution in Chala and Jipe lakes include the heavy use of chemical fertilizers and pesticides, improper disposal of agricultural waste, runoff from livestock farming activities carrying pollutants into the water bodies, and deforestation leading to increased sedimentation and nutrient runoff into the lakes. These agricultural practices have significant ecological consequences on the biodiversity of Chala and Jipe lakes. The use of chemical fertilizers and pesticides can lead to water contamination, harming aquatic organisms and affecting the overall water quality. Runoff from livestock farming introduces excess nutrients into the lakes, causing algal blooms that deplete oxygen levels and harm fish and other aquatic life. Deforestation results in soil erosion and sedimentation in the lakes, impacting habitats and reducing biodiversity. Overall, these agricultural practices contribute to habitat degradation, loss of species diversity, and disruption of the delicate ecological balance in Chala and Jipe lakes.

10. The proposed project aims to overcome existing barriers and establish conditions conducive to enhancing water security and ensuring the long-term sustainability of the groundwater resources originating in the Kilimanjaro central volcanic edifice. A specific integration of gender equality considerations and the specific roles and knowledge that women as water users have in the project areas will also help to overcome barriers and ensure a socially inclusive approach for the project.

11. Partnerships with water funds and the private sector are pivotal for achieving and sustaining the outcomes of the project. By collaborating with established water funds, such as the Jumuiya water Fund, the project can leverage their expertise in managing and financing water resource initiatives, leading to the implementation of effective nature-based solutions for aquifer recharge and flood management. The MOWSI will coordinate through its Agency Water Resources Authority. The Kenya Water (Resources) Regulations 2025 provides a 10% conservation levy that is paid by the water users to Water Resources Authority. The levy is allocated to finance soils and water conservation plans for county entities and WRUAs. This is used within sub catchments facilitated by WRA, counties and WRUAs as communities. These partnerships will enhance access to innovative approaches, financial resources, and technical support that are crucial for the successful execution of the project, the long-term sustainability of its achievements. In parallel, engagement with private-sector actors—including laboratories, hydrological service providers, and agro-industrial enterprises—will facilitate technology transfer, data generation, and innovative water-use efficiency measures.

12. Additionally, these partnerships will mobilize private investments and co-financing to implement nature-based solutions, rehabilitate degraded recharge areas, and promote efficient water use practices in production landscapes, ensuring sustainable water management practices, ensuring that commercial interests align with environmental stewardship. By creating a shared value between public entities, water funds, and businesses, the project can bolster community support and participation, driving long-term commitment and

resource mobilization that will ultimately ensure the resilience and sustainability of water resources in the region. This synergistic approach not only enhances the immediate impact of project interventions but also builds a robust framework for collective management and governance of water resources in the long run.

13. The incremental nature of the costs covered by the Global Environment Facility (GEF) grant, is justified by several critical factors, namely:

1. This project involves implementing innovative technologies and practices that exceed standard approaches, necessitating additional financial investment.
2. The complexities associated with transboundary water management—where two countries collaborate—require tailored solutions and stakeholder engagement, further driving up costs.
3. The GEF projects aim to foster long-term environmental sustainability, which entails not only immediate expenditures but also ongoing monitoring and capacity-building efforts to ensure effective resource management.

B. PROJECT DESCRIPTION

This section asks for a theory of change as part of a joined-up description of the project as a whole. The project description is expected to cover the key elements of good project design in an integrated way. It is also expected to meet the GEF's policy requirements on gender, stakeholders, private sector, and knowledge management and learning (see section D). This section should be a narrative that reads like a joined-up story and not independent elements that answer the guiding questions contained in the guidance document. (Approximately 3-5 pages) see guidance here

- 14. The project team considered several alternative approaches during project design. One option was to focus primarily on optimizing existing shallow aquifers and natural springs through improved efficiency and localized management. However, this approach was deemed insufficient to meet projected water demand, particularly under increasing climate variability and recurrent droughts, and posed risks of further depletion of already stressed shallow systems. A second option emphasized large-scale surface water interventions and conservation measures, including rainwater harvesting and enhanced catchment management. While these approaches provide important complementary benefits, they were considered inadequate as standalone solutions due to the highly variable nature of surface water resources and their limited capacity to ensure reliable supply during prolonged dry periods. A third option focused on technical groundwater assessments without strong integration of governance and transboundary cooperation mechanisms. This approach was not retained, as it would not address the fragmented management of the shared aquifer system, nor ensure coordinated and sustainable use of resources across Kenya and Tanzania. The selected approach combines advanced hydrogeological assessment, sustainable development of deeper confined aquifers, ecosystem-based recharge protection, and strengthened transboundary governance mechanisms. This integrated strategy was preferred as it directly addresses the root causes of groundwater insecurity—limited knowledge, underutilized deeper resources, ecosystem degradation, and weak coordination—while delivering long-term water security, climate resilience, and Global Environmental Benefits.

  15. The approach taken to address the challenges surrounding the Kilimanjaro Aquifer System was chosen as the most effective for several compelling reasons. First and foremost, the unique geological characteristics of the aquifer, being of volcanic origin, influence the hydrological dynamics and availability of water resources in the region. The aquifer's composition, consisting primarily of volcanic rocks with fracture permeability in lava sequences and primary porosity in surrounding volcanic debris and pyroclastic materials, necessitates a tailored strategy that leverages these specific geological attributes. This project focuses on enhancing access to deeper, previously untapped confined groundwater sources, which is critical given that the current reliance on natural springs and shallow,

unconfined aquifers is insufficient to meet the growing water demands of the local population. By tapping into these deeper sources, the project aims to secure a more reliable and sustainable water supply, thereby directly addressing the pressing water scarcity challenges faced by communities in the Kenya-Tanzania border region.

16. Furthermore, the project's emphasis on improving transboundary cooperation is essential for establishing a conducive environment for effective groundwater governance. The Kilimanjaro Aquifer System is a shared resource, and its sustainable management requires collaboration between the two countries involved. Building partnerships and fostering dialogue between stakeholders will facilitate coordinated efforts in managing the aquifer, ensuring that water resources are utilized equitably and sustainably.

17. In addition, the project aims to enhance the resilience of local populations amidst climatic extremes, which are increasingly influencing water availability and ecosystem health. By implementing such comprehensive measures, the project not only aims to address immediate water scarcity issues but also to promote sustainable water management practices that will safeguard freshwater ecosystems and maintain biodiversity in the region.
Overall, this multifaceted approach has been chosen for its potential to create long-term, sustainable solutions that improve access to water resources, strengthen governance frameworks, and support the health and resilience of both human and ecological communities dependent on the Kilimanjaro Aquifer System. By recognizing the interplay between geological characteristics, transboundary considerations, and the need for sustainable practices, the proposed project represents a holistic response aimed at addressing the region’s challenges effectively.

PDO level indicators:

18. Currently, the utilization of KTAS groundwater is restricted to natural springs and shallow, unconfined aquifers present in the subsurface of the plains surrounding the Mt Kilimanjaro volcanic edifice. Through the project, access to deeper, unconfined groundwater resources will increase, easing existing water scarcity pressures, and the enabling conditions for the aquifer sustainable management will be established: definition of, and agreement on the Kilimanjaro Transboundary Aquifer System conceptual model; establishment of harmonized monitoring networks and protocols.

19. To achieve its objectives and remove the barriers that so far have hindered progress towards environmental sustainability, the project will adopt two blended and mutually reinforcing methodological approaches:
(i) The “TDA – SAP” methodology developed by the GEF International Waters Focal Area. This methodology has been successfully applied in numerous 'foundational' projects with the aim of establishing the necessary conditions for coordinated action in transboundary contexts. The approach involves building trust among countries that share the waterbody, facilitating consensus on cooperation frameworks, and identifying the highest priority actions essential for moving towards long-term sustainability.
(ii) The hydrogeological assessment of the aquifer system. When addressing the challenges associated with an imperceptible resource like groundwater, the initial imperative is to render it perceptible and, consequently, manageable. This involves the creation of a comprehensive three-dimensional reconstruction, often referred to as the 'conceptual model,' elucidating the aquifer system's hydrogeological attributes, water extraction potential, recharge and discharge zones, dependent ecosystems and interactions with surface water, vulnerabilities, and prevailing processes impacting both groundwater quality and quantity. Fluoride is a major drinking water problem in Arusha including the Pangani Basin. The stakeholders acknowledge both the surface water and groundwater in the region contain significant levels of fluoride that exceed the WHO guideline value of 1.5 mg/L. Specifically,

the quality of groundwater in the Pangani basin is very poor due to high fluoride content as a result of natural contamination from surrounding geological environment, leading to dental and skeletal fluorosis among the local population. High values of F- (up to 41.2 mg/l) have been recorded with concentrations ranging from 3.87 to 41.2 mg/l with an average value of 15.7 mg/l. To address the concern about high fluoride levels in groundwater, the project will implement a comprehensive approach to mitigate the health risks associated with high fluoride levels in groundwater and improve overall water quality in the Kilimanjaro Transboundary Aquifer region. This includes:

- Conducting a thorough assessment of fluoride levels throughout the aquifer system to identify areas of concern
- Developing and implementing a community awareness program to educate local populations about fluoride-related health risks and available water treatment options
- Incorporating fluoride removal technologies into pilot interventions for water supply systems, ensuring safer drinking water for affected communities. The project can leverage on ongoing initiatives such as the "A Fluoride Treatment Technology Project" being implemented within Arusha (part of Pangani Basin").

20. The Nano Filer Technology project is one of the initiatives being undertaken to address the fluoride challenges in Arusha city as a pilot project to be upscaled in other areas, including the Pangani Basin. This project is developed in the framework of the Government of Korea funded UNESCO Project titled "Sustainable Water Security for Human Settlements in Developing Countries under Climate Change". It is the USD 3 million project implemented in 20 developing countries 10 in Asia and 10 Africa for the period of 10 years from 2020 by selecting 2 implementing countries annually. The project is scheduled for 12 months from September 2024 to September 2025 with the cost of $150,000. The project aims to support Member States' water security in the changing climate. The project includes piloting model studies and strengthening human resources capacity on the methodology used to continue the process even after UNESCO's support is completed.

21. Upon securing a robust understanding of the aquifer's functionality and potentialities, the project will aim to enhance overall water security in the Kilimanjaro region. This involves the mechanical exploration of hitherto untapped deeper confined and fractured aquifers that will likely be revealed by the comprehensive assessment, and mitigation of key factors jeopardizing the long-term sustainability of this invaluable resource, such as the degradation of the Kilimanjaro cloud forests, where the aquifer main recharge occurs. The project design recognizes the intricate interconnections between local livelihoods, established land and water use practices, evolving patterns, and the susceptibilities of groundwater resources to contamination and overexploitation. Additionally, it takes into account the vital ecosystem services provided by groundwater-dependent ecosystems. All of these challenges unfold within a context characterized by transboundary implications and the unpredictable impacts of climate change.

22. This comprehensive strategy, proven successful in various International Waters projects dealing with aquifers, stands in contrast to fragmented interventions that target specific concerns or entail uncontrolled aquifer exploitation without an overarching assessment of functionality and abstraction potential. The anticipations are that, by fostering trust, expanding knowledge, and involving stakeholders in the decision-making process, the project outcomes will lay a sturdy foundation for sustained transboundary action. This approach aligns with the principles of building consensus and ensuring the longevity of project impacts.

THE THEORY OF CHANGE

23. The Theory of Change (ToC) for the Kilimanjaro Transboundary Aquifer System (KTAS) Project reflects a causal pathway that links scientific understanding, cooperative governance, and

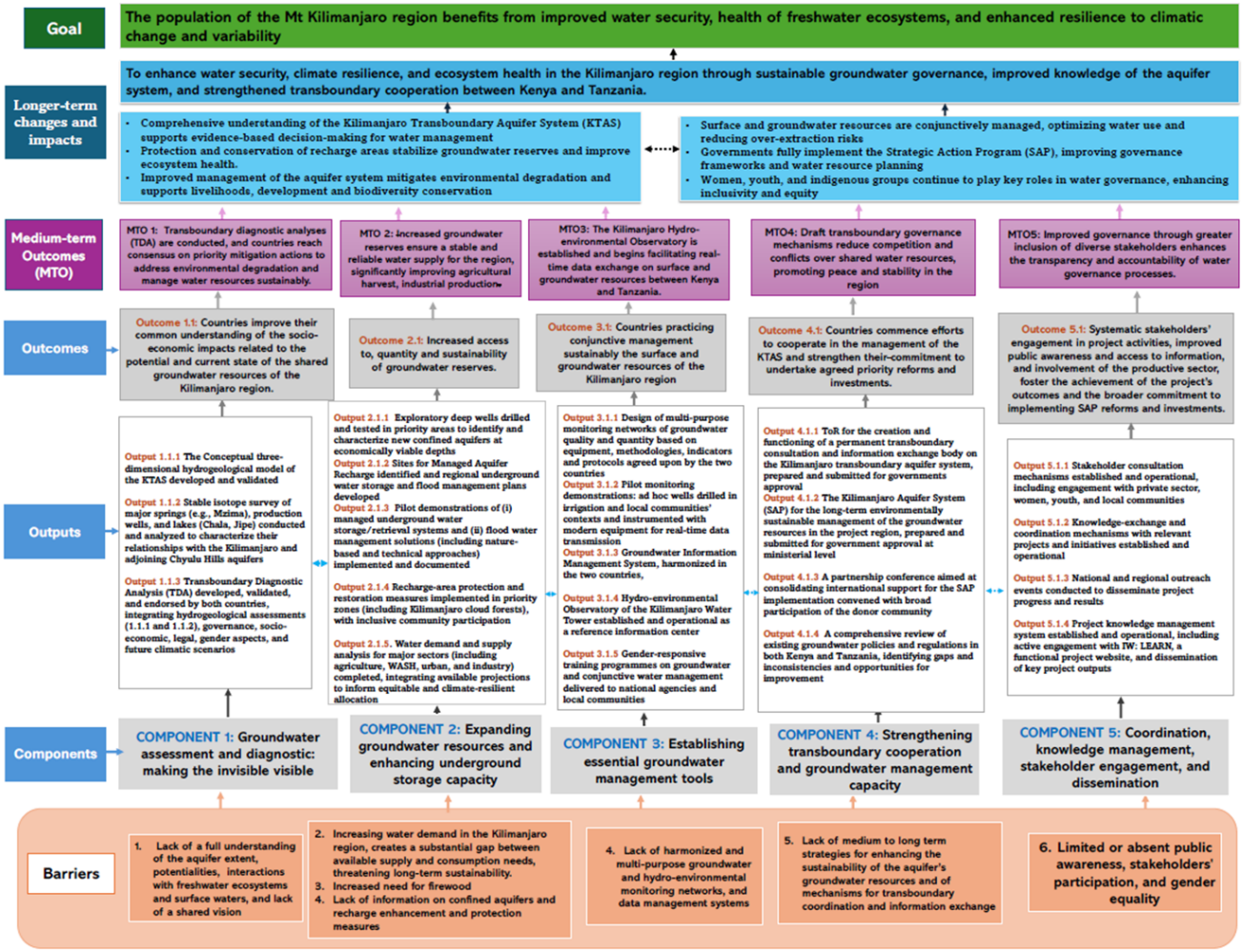
community engagement to long-term water security and climate resilience across Kenya and Tanzania. It is based on the assumption that sound technical knowledge, inclusive stakeholder participation, and coordinated policy reform are foundational to reversing degradation trends and achieving equitable and sustainable use of the shared aquifer.

24. The ToC begins with scientific and technical interventions such as the development of a shared conceptual model of the aquifer, pilot managed aquifer recharge (MAR) sites, and exploratory drilling. These are designed to address current data and knowledge gaps while identifying priority areas for protection and intervention. In parallel, stakeholder engagement, institutional capacity-building, and governance reforms—including the establishment of a permanent transboundary consultation body and validation of a Strategic Action Programme (SAP)—are pursued to foster joint decision-making and harmonized legal frameworks. The Hydro-Environmental Observatory and national monitoring systems serve as platforms for integrated water resource management, informed by real-time data and shared assessments.

25. The project assumes that with continued political will, technical collaboration, and community ownership, these outputs will lead to medium-term outcomes including reduced stress on groundwater resources, enhanced ecosystem protection (e.g., cloud forests), and institutionalized transboundary cooperation. Over time, this will result in improved water availability, increased resilience to climate variability, and strengthened socio-ecological systems in the Kilimanjaro region. Importantly, social inclusion and equal participation of different social groups will ensure a well rooted transboundary cooperation process in the project areas.

26. The Theory of Change that underlies the project design is built on the premise that if:
(i) Countries agree on the conceptual model of the aquifer and recognize the threats to its sustainability;
(ii) Previously unexplored groundwater resources are unveiled through the conceptual model and verified by the drilling campaign.
(iii) Countries are provided with the monitoring tools and the capacity to manage sustainably and conjunctively the surface and groundwater resources of the Kilimanjaro region.
(iv) Transboundary cooperation mechanisms are strengthened;
(v) Countries reach an agreement and commit to implementing priority reforms and investments necessary to reverse degradation trends of their water resources and improve resilience to climate change and water security in the project region;
(vi) The international development assistance community continues to provide support to the countries during the SAP implementation phase.

27. Then, the population of the Kilimanjaro transboundary region will experience benefits such as improved water security, enhanced health of freshwater ecosystems, and increased resilience to climate change and variability.


Goal
The population of the Mt Kilimanjaro region benefits from improved water security, health of freshwater ecosystems, and enhanced resilience to climatic change and variability
Longer-term changes and impacts
To enhance water security, climate resilience, and ecosystem health in the Kilimanjaro region through sustainable groundwater governance, improved knowledge of the aquifer system, and strengthened transboundary cooperation between Kenya and Tanzania.
• Comprehensive understanding of the Kilimanjaro Transboundary Aquifer System (KTAS) supports evidence-based decision-making for water management
• Protection and conservation of recharge areas stabilize groundwater reserves and improve ecosystem health.
• Improved management of the aquifer system mitigates environmental degradation and supports livelihoods, development and biodiversity conservation
• Surface and groundwater resources are conjunctively managed, optimizing water use and reducing over-extraction risks
• Governments fully implement the Strategic Action Program (SAP), improving governance frameworks and water resource planning
• Women, youth, and indigenous groups continue to play key roles in water governance, enhancing inclusivity and equity
Medium-term Outcomes (MTO)
MTO 1: Transboundary diagnostic analyses (TDA) are conducted, and countries reach consensus on priority mitigation actions to address environmental degradation and manage water resources sustainably.
MTO 2: Increased groundwater reserves ensure a stable and reliable water supply for the region, significantly improving agricultural harvest, industrial production
MTO3: The Kilimanjaro Hydro-environmental Observatory is established and begins facilitating real-time data exchange on surface and groundwater resources between Kenya and Tanzania.
MTO4: Draft transboundary governance mechanisms reduce competition and conflicts over shared water resources, promoting peace and stability in the region
MTO5: Improved governance through greater inclusion of diverse stakeholders enhances the transparency and accountability of water governance processes.
Outcomes
Outcome 1.1: Countries improve their common understanding of the socio-economic impacts related to the potential and current state of the shared groundwater resources of the Kilimanjaro region.
Outcome 2.1: Increased access to, quantity and sustainability of groundwater reserves.
Outcome 3.1: Countries practicing conjunctive management sustainably the surface and groundwater resources of the Kilimanjaro region
Outcome 4.1: Countries commence efforts to cooperate in the management of the KTAS and strengthen their-commitment to undertake agreed priority reforms and investments.
Outcome 5.1: Systematic stakeholders' engagement in project activities, improved public awareness and access to information, and involvement of the productive sector, foster the achievement of the project's outcomes and the broader commitment to implementing SAP reforms and investments.
Outputs
Output 1.1.1 The Conceptual three-dimensional hydrogeological model of the KTAS developed and validated
Output 1.1.2 Stable isotope survey of major springs (e.g., Mzima), production wells, and lakes (Chala, Jipe) conducted and analyzed to characterize their relationships with the Kilimanjaro and adjoining Chyulu Hills aquifers
Output 1.1.3 Transboundary Diagnostic Analysis (TDA) developed, validated, and endorsed by both countries, integrating hydrogeological assessments (1.1.1 and 1.1.2), governance, socio-economic, legal, gender aspects, and future climatic scenarios
Output 2.1.1 Exploratory deep wells drilled and tested in priority areas to identify and characterize new confined aquifers at economically viable depths
Output 2.1.2 Sites for Managed Aquifer Recharge identified and regional underground water storage and flood management plans developed
Output 2.1.3 Pilot demonstrations of (i) managed underground water storage/retrieval systems and (ii) flood water management solutions (including nature-based and technical approaches) implemented and documented
Output 2.1.4 Recharge-area protection and restoration measures implemented in priority zones (including Kilimanjaro cloud forests), with inclusive community participation
Output 2.1.5. Water demand and supply analysis for major sectors (including agriculture, WASH, urban, and industry) completed, integrating available projections to inform equitable and climate-resilient allocation
Output 3.1.1 Design of multi-purpose monitoring networks of groundwater quality and quantity based on equipment, methodologies, indicators and protocols agreed upon by the two countries
Output 3.1.2 Pilot monitoring demonstrations: ad hoc wells drilled in irrigation and local communities' contexts and instrumented with modern equipment for real-time data transmission
Output 3.1.3 Groundwater Information Management System, harmonized in the two countries,
Output 3.1.4 Hydro-environmental Observatory of the Kilimanjaro Water Tower established and operational as a reference information center
Output 3.1.5 Gender-responsive training programmes on groundwater and conjunctive water management delivered to national agencies and local communities
Output 4.1.1 ToR for the creation and functioning of a permanent transboundary consultation and information exchange body on the Kilimanjaro transboundary aquifer system, prepared and submitted for governments approval
Output 4.1.2 The Kilimanjaro Aquifer System (SAP) for the long-term environmentally sustainable management of the groundwater resources in the project region, prepared and submitted for government approval at ministerial level
Output 4.1.3 A partnership conference aimed at consolidating international support for the SAP implementation convened with broad participation of the donor community
Output 4.1.4 A comprehensive review of existing groundwater policies and regulations in both Kenya and Tanzania, identifying gaps and inconsistencies and opportunities for improvement
Output 5.1.1 Stakeholder consultation mechanisms established and operational, including engagement with private sector, women, youth, and local communities
Output 5.1.2 Knowledge-exchange and coordination mechanisms with relevant projects and initiatives established and operational
Output 5.1.3 National and regional outreach events conducted to disseminate project progress and results
Output 5.1.4 Project knowledge management system established and operational, including active engagement with IW: LEARN, a functional project website, and dissemination of key project outputs
Components
COMPONENT 1: Groundwater assessment and diagnostic: making the invisible visible
COMPONENT 2: Expanding groundwater resources and enhancing underground storage capacity
COMPONENT 3: Establishing essential groundwater management tools
COMPONENT 4: Strengthening transboundary cooperation and groundwater management capacity
COMPONENT 5: Coordination, knowledge management, stakeholder engagement, and dissemination
Barriers
1. Lack of a full understanding of the aquifer extent, potentialities, interactions with freshwater ecosystems and surface waters, and lack of a shared vision
2. Increasing water demand in the Kilimanjaro region, creates a substantial gap between available supply and consumption needs, threatening long-term sustainability.
3. Increased need for firewood
4. Lack of information on confined aquifers and recharge enhancement and protection measures
4. Lack of harmonized and multi-purpose groundwater and hydro-environmental monitoring networks, and data management systems
5. Lack of medium to long term strategies for enhancing the sustainability of the aquifer's groundwater resources and of mechanisms for transboundary coordination and information exchange
6. Limited or absent public awareness, stakeholders' participation, and gender equality

Assumptions and drivers

Assumptions

A1. The governments of Kenya and Tanzania remain committed to transboundary cooperation and the implementation of shared water governance frameworks
A2. Local communities, private sector, and civil society actively participate in project activities and support sustainable water management practices
A3. Adequate funding and resources are available throughout the project's lifecycle from both international donors and national governments and entities (public or private)
A4. Climate conditions remain within predictable ranges, allowing the project to implement water management and recharge strategies effectively
A5. Necessary data on groundwater resources, land use, and climate patterns are accessible, reliable and statistically significant for conducting comprehensive assessments and planning
A6. National and local water management institutions possess the necessary capacity and expertise to implement and sustain the project's initiatives effectively or gain it within the project's lifetime

Drivers

D1. Existing frameworks and agreements, such as the East African Community (EAC) protocols and the Nile Basin Initiative, LVBC, other bilateral agreements that promote collaboration and sustainable management of shared water resources
D2. Growing populations in Kenya and Tanzania lead to heightened demand for water resources, creating urgency for sustainable groundwater management solutions.
D3. Heightened awareness of climate change impacts on water resources encourages stakeholders to adopt resilient water management practices and prioritize aquifer protection
D4. Innovations in groundwater monitoring and data management technologies facilitate more effective assessment and management of aquifer resources
D5. Commitment to the SDGs, particularly Goal 6 (Clean Water and Sanitation) and Goal 13 (Climate Action), drives initiatives aimed at improving water governance and resilience in the region.
D6. Increased recognition of the importance of involving local communities and marginalized groups in water management decisions enhances collaborative efforts and local ownership of the resources

- 28. The KTAS project is designed with a long-term, systems-based perspective that directly responds to the future risks and vulnerabilities outlined in the scenario analysis and "future narratives." These include increasing climate variability, population growth, land-use change, ecosystem degradation, and institutional fragmentation. The project logic is built on strengthening the enabling conditions—scientific, institutional, legal, and socio-economic—that are essential for sustainable and adaptive transboundary groundwater management in the Kilimanjaro region.

  29. To operationalize this systems-based approach, three binational Technical Working Groups (TWGs) were established during the PPG phase to guide project preparation and ensure strong country ownership. The TWGs bring together specialists from line ministries, basin and park authorities, utilities, and universities in Kenya and Tanzania, and are respectively mandated to (i) coordinate drilling design and groundwater assessment, (ii) lead geological, geophysical and hydrogeological investigations, and (iii) address forest, land-use and ecosystem protection in the upper recharge areas. Throughout the PPG process, these Working Groups have provided critical technical knowledge, reviewed and validated baseline data, identified priority information gaps, and helped refine the project's activities and risk analysis, thereby strengthening the overall quality and feasibility of the ProDoc. These Working Groups will be maintained and further strengthened under the full project to provide continuous technical backstopping, facilitate cross-sectoral coordination and anchor the project's results within national institutions.

  30. To ensure that outcomes are enduring, the project prioritizes:

- The establishment and institutionalization of a permanent transboundary consultation mechanism for KTAS, legally embedded within national and regional water governance frameworks.
- The development, national validation, and political endorsement of a Strategic Action Programme (SAP) that secures long-term government commitment to coordinated reforms, investments, and policy implementation over a 10–20-year horizon.
- Integration of KTAS hydrogeological datasets and monitoring protocols into national water information systems and UNESCO's tools, enabling long-term monitoring and evidence-based decision-making.

31. To enhance resilience to future environmental, socio-economic, and institutional changes, the project strategically invests in:

- Strengthening technical and human capacities in groundwater assessment, Managed Aquifer Recharge (MAR), ecosystem-based management, and climate-resilient water governance at local, national, and regional levels.

32. The KTAS project recognizes that the long-term sustainability of transboundary groundwater governance relies on enhanced technical competencies and institutional knowledge across both Kenya and Tanzania. Results of PPG (Working Group 1) highlighted key capacity gaps in hydrogeological modeling, directional drilling for deep confined fractured aquifers, and groundwater-surface water interaction analysis, particularly in the context of the complex volcanic systems that define the KTAS. Currently, there is a notable shortage of trained volcanologists and groundwater modelers, in both countries.

- Mainstreaming nature-based solutions (NbS) and Payment for Ecosystem Services (PES) schemes to safeguard recharge areas such as cloud forests, while ensuring that NbS are applied based on rigorous analysis of local ecological and social conditions. This approach will promote solutions that are context-specific, equitable, and environmentally sound, avoiding unintended impacts such as ecosystem degradation or reinforcement of existing inequalities.

33. During the PPG phase, it has been reaffirmed that the cloud forests on the slopes of Mt. Kilimanjaro play a critical role in sustaining groundwater recharge and regulating baseflows. However, these ecosystems are under increasing pressure from deforestation, agricultural expansion, and infrastructure development. An underlying issue is mainly linked to existing forest policies that are often sectoral, poorly enforced, and insufficiently linked to hydrogeological sensitivities.

Assumptions and Risks of NBS:

34. While NbS offer significant potential to enhance recharge, regulate flows, and build climate resilience, critiques highlight risks that they may underperform or exacerbate

degradation and social inequalities if poorly designed. To mitigate this, all NbS interventions under the project will be:

- Evidence-based, informed by site-specific hydrological, ecological, and socio-economic assessments;
- Equity-focused, ensuring fair distribution of benefits and active participation of women, youth, and marginalized groups;
- Adaptive, with continuous monitoring and evaluation to track performance and adjust approaches as needed;
- Complementary, implemented alongside technical and policy measures to avoid over-reliance on NbS alone.

35. This safeguards approach will ensure that NbS are not only technically effective but also socially just and environmentally sustainable.

- Supporting adaptive policy and legal reform processes in both countries, including the revision of outdated forest and water policies, integration of transboundary aquifer management principles, and harmonization of data-sharing and enforcement protocols.

36. The project's participatory design—driven by inclusive stakeholder engagement, community-based interventions, and capacity-building at multiple scales—further anchors the outcomes in local realities and enhances social and institutional ownership. Co-financing contributions and/or technical partnerships with Water Funds and the private sector, as well as with regional platforms such as the East African Community (EAC), the Intergovernmental Authority on Development (IGAD), the African Ministers' Council on Water (AMCOW), and the Lake Victoria Basin Commission (LVBC), will strengthen the institutional legitimacy and sustainability of project outcomes well beyond the GEF implementation period. Partnerships with the Water Funds—such as the Jumuiya Water Fund and similar initiatives in Tanzania—will bring innovative financing mechanisms that link upstream ecosystem restoration and recharge protection with downstream water users, ensuring long-term investment in nature-based solutions. Together, these partnerships will help mobilize additional resources, embed sustainability within market systems, and create enduring models for collaborative water stewardship in the Kilimanjaro region and beyond.

37. The KTAS project embeds risk-aware planning, cross-sectoral integration, and adaptive governance into its core logic, establishing a resilient and forward-looking framework capable of delivering sustained benefits across a range of future scenarios.

Project Components and Activities

Component 1: Groundwater assessment: making the invisible visible

Outcome 1.1: Countries improve their common understanding of the hydrological characteristics and socio-economic impacts related to the potential and current state of the shared groundwater resources of the Kilimanjaro region.

Indicator 1: Assessment of the Hydrogeology of the Kilimanjaro Aquifer System and dependent ecosystems successfully conducted with the participation of experts from the beneficiary countries.

Indicator 2: Countries agreement on TDA findings and recommendations

38. The project initiation will commence with the formation of a collaborative team of Kenyan and Tanzanian experts, supported by the project PMU and international experts. This multidisciplinary team will undertake the development of a scientifically grounded comprehensive assessment and conceptual model of the groundwater resources originating from Mount Kilimanjaro, as well as a Diagnostic Analysis focused on identifying issues of transboundary concern related to groundwater and surface water uses, their underlying causes, and potential solutions. The methodology applied will align with the 'Level 2 GEF TWAP Transboundary Aquifers Assessment Methodology' framework. This comprehensive study will not only draw from existing relevant information and data but will also involve additional elements such as volcanological surveys, geophysical surveys (resistivity soundings, and possibly gravimetry), satellite data analysis, hydro and gas geochemistry and stable environmental and water isotopes surveys in the Mzima Springs area – a critical water source for Mombasa. The assessment will extend to explore the feasibility of exploiting the deeper confined aquifers possibly present in the subsurface of the plains surrounding the Kilimanjaro edifice (down to 500m depth), and of the groundwater resources contained within the fracture systems of the main volcanic edifice, incorporating advanced techniques like directional drilling .

39. For this project, aquifer delineation will apply an integrated and innovative approach that combines geology, volcanology, hydrogeology, and hydrogeochemistry to define the true spatial extent, structure, and dynamics of the Kilimanjaro Transboundary Aquifer System (KTAS). The process will merge geological and structural mapping with targeted geophysical surveys to identify key lithological and fault boundaries, integrate hydrogeological data from boreholes, springs, and baseflow records to characterize flow paths and recharge zones, and apply hydrochemical and isotope analyses to trace water sources, residence times, and transboundary connectivity. This triangulated “triple-evidence” approach will generate the first scientifically validated aquifer boundary and hydrostratigraphic model for KTAS, reducing uncertainties common in volcanic terrains. The methodology—linking structural geology, groundwater dynamics, and geochemical fingerprinting—represents an innovative model for future GEF transboundary groundwater projects seeking robust, science-based delineation that directly informs sustainable management and monitoring frameworks.

40. During PPG, the Working Groups identified critical technical gaps in both countries, particularly in specialized domains such as volcanology and directional drilling. While Kenya has access to airborne geophysical data through the Army Geophysical Survey Unit and NOCK, the lack of targeted expertise in interpreting volcanic aquifer dynamics and applying directional drilling methods remains a key limitation. Addressing these gaps will require technical assistance and hands-on training in volcanic hydrogeology, supported by GEF and co-finance modalities.

41. Stakeholder management will be anchored in a comprehensive analysis that maps and characterizes the attributes, roles, and needs of each relevant group. This analysis will guide the design of inclusive participation strategies tailored to ensure that all voices (men, women and youth) are represented in decision-making. Within the Diagnostic Analysis, stakeholder inputs will be mobilized around key themes, including: protection of recharge areas through reforestation; understanding the dynamics of surface–groundwater interactions; integrating climate change projections; capturing indigenous knowledge; enhancing the role of women in water management; addressing conflicts within the water–food–energy nexus; mitigating agriculture related pollution; exploring conjunctive management of surface and groundwater; identifying areas suitable for Managed Aquifer Recharge (MAR); and developing equitable Water Allocation Plans for the Kilimanjaro Aquifer.

42. In terms of Knowledge Management (KM) the project aims to establish and share knowledge about the characteristics and functioning of the KTAS. This knowledge will be documented in the Conceptual Model of the aquifer system, which will be agreed upon and adopted by the beneficiary countries under Component 1.

43. Output 1.1.1: The Conceptual three-dimensional hydrogeological model of the KTAS developed and validated

44. Activity 1.1.1.1: Existing Information Gathering: Collect existing data on KTAS groundwater resources, including hydrological studies, geological surveys, water quality reports, and ecological assessments.

Literature Review: Conduct a thorough review of relevant scientific literature, previous research findings, and governmental reports about the KTAS region, including surface water bodies such as Lakes Chala and Jipe.

Engagement with Local Communities: Engage with local stakeholders, including community members, indigenous groups, and local authorities to gather indigenous knowledge and historical usage patterns of groundwater resources. Attention to include women local informants will be ensured.

45. Activity 1.1.1.2: Based on the findings of Activity 1.1.1.1, define the extent, location and scope of new scientific surveys needed to fill information gaps on the aquifer three-dimensional extent and geo-structural characteristics:

Volcanological Surveys to understand the geological and volcanic context of the KTAS area, including assessment of recent seismicity and of active neotectonics features that might affect groundwater. Geophysical Surveys: Use geophysical techniques (e.g.: resistivity, gravimetric, seismic surveys) to gather information about subsurface geological structures and aquifer extents.

Hydrogeological Analysis: Implement hydrogeological assessments to determine aquifer characteristics, groundwater flow patterns, recharge areas, and dependent ecosystems.

Hydrogeochemical Sampling: Collect water samples from various locations (including wells, springs, rivers, and lakes) for chemical analysis to assess water quality, contaminants, and overall groundwater health.

46. Activity 1.1.1.3 Conceptual model development: Integrate data from all sources (existing literature, modern surveys, stakeholder inputs) to create a comprehensive overview of the KTAS groundwater resources and dependent ecosystems and develop the conceptual model that represents the groundwater systems in the KTAS area, including flow dynamics, recharge mechanisms, and connections to dependent ecosystems. Validate the conceptual model by comparing it against field observations and stakeholder feedback to ensure accuracy and reliability, and refine the model based on additional findings, feedback from experts, and community input.

47. Activity 1.1.1.4. Reporting and dissemination: Compile all findings, methodologies, and models into a comprehensive report, and develop maps, charts, and other visual aids to effectively communicate the characteristics of groundwater resources and their dependent ecosystems to stakeholders. Dissemination of Results: Share reports and findings with stakeholders, community members, and relevant authorities through presentations, workshops, or community meetings.

By following these structured activities, the assessment, characterization, and definition of the conceptual model of KTAS groundwater resources and their dependent ecosystems will be comprehensive and actionable.

48. Output 1.1.2: Stable isotope survey of major springs (e.g., Mzima), production wells, and lakes (Chala, Jipe) conducted and analyzed to characterize their relationships with the Kilimanjaro and adjoining Chyulu Hills aquifers

49. Activity 1.1.2.1 Field sampling and laboratory analysis: Conduct joint field surveys (with national institutions and IRD/AU support) to collect water samples from priority springs, boreholes, rivers, and lakes, ensuring coverage of key seasons (e.g. wet/dry) and hydrological conditions where feasible. During sampling, measure in situ physico-chemical parameters (e.g. temperature, pH, electrical conductivity, dissolved oxygen) and record metadata (e.g. GPS location, elevation, discharge, land use, sampling depth). Analyse collected samples for stable isotopes of water (δ^2H, $\delta^{18}O$) and selected complementary tracers (e.g. major ions, groundwater age indicators where feasible) in accredited laboratories, applying standard chain-of-custody, quality assurance and quality control procedures, and providing on-the-job training to national staff in sampling and basic isotope data handling.

50. Activity 1.1.2.2: Isotope interpretation for recharge areas and sources: Jointly interpret the stable isotope and hydrochemical data to assess the relationships between sampled springs, lakes, rivers and the underlying aquifers, supported by IRD/AU and national experts. Use isotope signatures and hydrochemical “fingerprints” to identify recharge areas and altitudes, evaporation effects, mixing between shallow and deep groundwater, and indicative residence times where age tracers are available. Compare isotope signatures from lakes and springs with potential recharge sources in the Kilimanjaro and Chyulu Hills aquifers to determine transboundary connectivity, and produce maps and simple typologies of recharge zones and source areas that will directly inform Component 2 interventions on protection and restoration of critical recharge areas and the Transboundary Diagnostic Analysis (TDA).

51. Activity 1.1.2.3 – Numerical groundwater modelling: Using the conceptual model developed under Output 1.1.1, together with isotope-derived recharge zones (Activity 1.1.2.3) and the aquifer geometry from Activity 1.1.2.4, develop and calibrate a preliminary numerical (or equivalent) groundwater-flow model for KTAS. Use the model to test simple recharge and abstraction scenarios, assess the sensitivity of key springs and lakes, and provide decision support for prioritising protection, MAR and abstraction management measures under Components 2 and 3.

Box 1. **Lessons learnt from GGRETA and PBF projects.** *Why is the KTAS difficult to model and how do we propose to overcome this?* Numerical groundwater modeling of the KTAS faces two fundamental challenges. The first is the prevalence of fracture-dominated flow, which introduces significant complexity in characterizing hydraulic properties, flow dynamics and groundwater pathways. This challenge necessitates alternative modeling approaches beyond conventional porous media frameworks. The second challenge stems from the regional extent of the system. Adequately representing the spatial heterogeneity and structural complexity inherent in such a large-scale hydrogeological system requires substantial data and computational resources that are often difficult to obtain.

The intersection of these two challenges creates a modeling conundrum that exceeds the capabilities of standard approaches. In this GEF proposal, we put forward an innovative approach that addresses issues. The main idea is to develop a hybrid multi-scale model. A "conventional" groundwater porous flow model (such as MODFLOW) is used to estimate regional flow patterns and water budget. It is then coupled at a much smaller scale to a general neural network model capable of capturing the high variability induced by fractures on groundwater level at boreholes and springs.

This is made possible thanks to the strong modelling experience that our UNESCO team has developed in modelling complex and transboundary aquifers. In particular, during the GGRETA project (2018-2023), we built a new cloud-based modelling platform to enable large scale modelling through direct communication between our groundwater model and input data from remote sensing. For the Peace Building Fund in Madagascar (2025-2027), UNESCO has also developed a unique neural network model capable of capturing groundwater dynamics in data scarce, complex and heterogeneous situations.

52. Activity 1.1.2.4 Aquifer delineation: Apply an integrated “triple-evidence” approach—combining structural geology, targeted geophysical surveys and hydrogeological/hydrochemical/isotope information—to define the spatial extent and hydrostratigraphy of the KTAS. Develop and refine an aquifer boundary and hydrostratigraphic model, validate it against field observations and expert/stakeholder inputs, and use the results to guide monitoring network design and MAR/recharge-protection planning.

53. Activity 1.1.2.5 – Synthesis, reporting and stakeholder validation: Compile the isotope, delineation and modelling results into a technical report, GIS-based maps and summary products explaining groundwater–surface water relationships and management implications; integrate these findings into the Transboundary Diagnostic Analysis (TDA) and other Component 1 outputs; and present them through stakeholder workshops and consultations to support a shared, country-owned basis for protection and use of KTAS recharge areas.

54. Output 1.1.3: Transboundary Diagnostic Analysis (TDA) developed, validated, and endorsed by both countries, integrating hydrogeological assessments (1.1.1 and 1.1.2), governance, socio-economic, legal, gender aspects, and future climatic scenarios

55. Activity 1.1.3.1: Scoping, data review and stakeholder mapping: Analyze the relevant data and findings from Outputs 1.1.1 and 1.1.2 to understand the current context and issues tackled in previous analyses, summarize key points that will feed into the Diagnostic Analysis, and identify key stakeholders relevant to the transboundary issues, including women's organizations, indigenous representatives, and local communities, creating a comprehensive stakeholder map to engage with a broad spectrum of views and expertise.

56. Activity 1.1.3.2: Stakeholder consultations and issue analysis: Develop a consultation plan outlining how to engage with the identified stakeholders (e.g., meetings, surveys, focus groups), set goals for each consultation session to ensure thorough topic coverage, and engage with stakeholders through various methods like interviews, workshops, and surveys. Focus will be on gathering insights about transboundary concerns, their root causes, consequences for local communities and biodiversity, and potential solutions. Special attention will be paid to including gender-balanced

perspectives and the experiences of women and indigenous communities. Compile and analyze data collected from the consultations and existing findings, identify recurring themes, issues, and solutions suggested by stakeholders. Consider how future climatic scenarios might affect the identified issues and communities.

57. Activity 1.1.3.3: Drafting, validation and dissemination of the TDA: Drafting the Diagnostic Analysis organizing the analytical results into a coherent structure that identifies and describes key transboundary issues, causes, potential solutions, and future impacts on local communities and biodiversity. Ensure the findings reflect the various assessments conducted through consultations and incorporate relevant perspectives from all engaged stakeholders. Share the draft document with a selected group of stakeholders and experts for feedback and validation, and revise the document based on the feedback received to enhance accuracy and inclusivity. Prepare the final report incorporating all input and ensuring clarity, coherence, and relevance. Share the final Transboundary Diagnostic Analysis with stakeholders, relevant government bodies, NGOs, and the broader community, and organize presentations or discussions to communicate the findings and encourage dialogue on the issues identified.

Component 2: Expanding groundwater resources, and enhancing underground storage capacity

Outcome 2.1: Increased access to, quantity and sustainability of groundwater reserves.

Indicator 3: The results of the drilling campaign enhance the groundwater resource base by assessing the potential of confined aquifers at depths that are economically viable.

Indicator 4: Conjunctive surface and groundwater management: Plan for underground water storage and flood management submitted for adoption by governments.

Indicator 5: Cloud forests protection system in place and operational.

Indicator 6:Number of WRUAs/WUAs engaged in PES schemes or catchment restoration with Water Resources Authority technical support for WRUAs and JWF support for WUAs

Indicator 7: Comprehensive water demand analysis completed for major sectors, including agriculture and urban centers.

Based on the findings of Component 1, the PMU will organize and lead four main lines of action that will produce the following outputs:

58. Output 2.1.1: Exploratory deep wells drilled and tested in priority areas (informed by Component 1 findings) to identify and characterize new confined aquifers at economically viable depths

59. Activity 2.1.1.1 – Deep exploratory drilling and testing: Deep exploratory wells (max. depth 500m) will be strategically sited based on the Conceptual Model of the KTAS and drilled in targeted locations within the volcanic edifice and surrounding plains to assess the presence and quality of confined aquifers at depths that are economically feasible. In areas characterized by predominantly fractured volcanic formations, directional drilling techniques will be explored. The purpose is to ascertain the presence of confined aquifers so far unexploited that could help countries to respond to the growing water needs for domestic and agricultural uses.

60. Output 2.1.2: Sites for Managed Aquifer Recharge identified and regional underground water storage and flood management plans developed

61. Activity 2.1.2.1 Integrated feasibility assessment and site screening for MAR/ASR: Managed Aquifer Recharge (MAR) interventions will be preceded by a structured, expert-led feasibility study to identify, prioritise, and design site-specific solutions. The study will compile hydrogeological baselines (recharge potential, aquifer properties, water quality risks), hydrologic and flood analyses, land tenure/access, and social and environmental considerations. Given the basin's heterogeneity, designs will be tailored to micro-catchment conditions (e.g., infiltration basins, recharge weirs, swales, zai pits, check dams, sand dams and subsurface dams), with site-specific drawings, bills of quantities, O&M plans, and safeguards instruments. A qualified multidisciplinary team (hydrogeologist, hydrologist, geotechnical/civil engineer, environmental and social specialists, and community mobilisation experts) will guide feasibility, design, permitting, and supervision, and will build capacity of WRUAs/WUAs and local authorities for long-term operation and maintenance.

To prepare a regional underground water storage and flood water management plan utilizing nature-based solutions tested in pilot demonstrations, the feasibility study will consolidate historical data on flooding events, rainfall patterns, groundwater levels, and soil characteristics. Conduct field surveys of potential pilot sites, evaluating hydrology, soil, vegetation, and proximity to water infrastructure. Analyze outcomes from MWF-supported NbS demonstrations (e.g., recharge basins, check dams, swales) to identify effective techniques and challenges.

62. Activity 2.1.2.2 Preliminary design and portfolio of MAR/ASR and NbS options

For priority sites, prepare a portfolio of MAR/ASR and complementary nature-based solutions (e.g. recharge basins, check dams, swales, zai pits, sand/subsurface dams), including concept designs, outline bills of quantities and indicative O&M arrangements, as a technical basis for pilot implementation and regional planning under Output 2.1.3.

The sites of pilot demonstrations of infiltration schemes through nature-based solutions : (i) managed underground water storage/retrieval systems, and/or of (ii) flood water management, will be determined on the basis of the results of the aquifer assessment conducted in Component. These demonstrations will build on the successful experience of the TNC (Jumuiya Water Fund), which has already piloted soil and water conservation technologies such as recharge basins, check dams, swales, zai pits, and water bunds in critical recharge areas. Lessons from these ongoing interventions will guide site selection, design, and scaling-up under the KTAS project, ensuring synergies and co-financing leverage. At this stage, it is not possible to predict the exact impacts of these pilot projects in terms of water storage capacity and flood mitigation; however, the integration with the MWF portfolio provides a tested foundation to generate measurable results during implementation.

At this stage, it is not possible to predict the impacts of these pilot projects in terms of water storage capacity and flood mitigation.

63. Output 2.1.3: Pilot demonstrations of (i) managed underground water storage/retrieval systems and (ii) flood water management solutions (including nature-based and technical approaches) implemented and documented

64. It is anticipated that these pilot initiatives will facilitate the formulation and implementation of regional plans under the same Component. By leveraging the insights gained from the pilot demonstrations, the development and adoption of regional plans will be streamlined, setting the stage for more effective and informed decision-making processes. The pilot demonstrations will build on ongoing co-financed interventions supported by the Jumuiya Water Fund which has tested soil and water conservation technologies such as recharge basins, check dams, swales, zai pits, and bunds.

Lessons learned from these interventions will guide site selection, technical design, and scaling-up in the Kilimanjaro Transboundary Aquifer System (KTAS) context.

65. The project will explore initiatives to foster collaboration between different water management entities, promote a holistic approach to water resource management, and ensure that groundwater considerations are fully integrated into existing surface water governance mechanisms.

66. Activity 2.1.3.1 – Design, implementation and monitoring of pilot schemes. Refine designs and implement pilot MAR, ASR and flood attenuation schemes in selected micro-catchments. Incorporate inclusive community mobilisation, safeguards, and a monitoring system using hydrometric stations, groundwater observation wells and community-based monitoring to assess performance and inform scale-up. Pilot demonstrations and restoration activities will be implemented in collaboration with existing WRUAs (Kenya) and WUAs (Tanzania), building on their statutory roles in water governance and leveraging the TNC/Jumuiya Water Fund's experience in catchment restoration and PES schemes. Results will be monitored using hydrometric and groundwater observation points, supplemented by community-based monitoring to inform scale-up. In Kenya, engagement with WRUAs will be channelled through the Water Resources Authority, under which WRUAs are anchored by law; where needed, the project will support WRUA formation and the development/updating of Sub-Catchment Management Plans to underpin restoration and sustainability. In Tanzania, engagement with WUAs will be coordinated through the Basin Water Boards/Authorities that recognise and oversee WUAs; where needed, the project will likewise support WUA formation and the development/updating of sub-catchment/catchment management plans to enable effective implementation and long-term stewardship.

67. Activity 2.1.3.2 Conjunctive surface–groundwater management and capacity building: Establish a joint working group of groundwater and surface water authorities to promote conjunctive management. Develop an integrated water resources management (IWRM) framework that explicitly addresses surface–groundwater interactions, building on the Pangani River Basin Management project. Conduct capacity-building workshops on conjunctive water management for basin authorities, utilities, and community groups. Compile results from the pilots into a comprehensive regional underground water storage and flood water management plan, validated through multi-stakeholder consultations and disseminated for adoption and implementation.

68. Activity 2.1.3.3: Regional underground storage and flood management plan: Synthesize lessons from the pilots and feasibility work into a regional underground water storage and flood water management plan, including priority investment options, institutional roles and gender-responsive community arrangements. Validate the plan through multi-stakeholder consultations and submit it for adoption by the relevant authorities in both countries.

- **ASR and MAR are nature-based solutions**

The primary goal of aquifer storage and recovery (ASR) is to address imbalances between water supply and demand, particularly during drought periods. ASR involves storing water in a suitable aquifer through a well when water is abundant, then recovering it from the same well when needed. Managed aquifer recharge (MAR) shares similarities with ASR but focuses on supplementing natural groundwater recharge patterns, primarily from rain and snow. Unlike ASR, MAR does not involve storage and subsequent recovery. Managed Aquifer Recharge (MAR) provides an integrated solution that allows aquifer storage with flood waters to complement surface water storage.

69. Output 2.1.4: Recharge-area protection and restoration measures implemented in priority zones (including Kilimanjaro cloud forests), with inclusive community participation

70. Reforestation of the KTAS major groundwater recharge areas, in particular the cloud forests of the Kilimanjaro. The cloud forests in Mount Kilimanjaro face various threats, including:

- Deforestation: The stakeholder consultations have informed that the major causes of deforestation are illegal logging and land clearance for agriculture, infrastructure development, and human settlement contribute to the loss of cloud forest cover.
- Climate Change: Rising temperatures and altered precipitation patterns impact cloud forest ecosystems, affecting plant and animal species adapted to specific climatic conditions.
- Fire: Uncontrolled fires, often caused by human activities such as slash-and-burn agriculture or accidental ignition, can rapidly destroy large areas of cloud forest habitat.
- Invasive Species: Introduced plant species can outcompete native vegetation, leading to habitat degradation and loss of biodiversity in cloud forest ecosystems.
- Fragmentation: Fragmentation of cloud forest habitats due to human activities such as road construction or agricultural expansion disrupts ecological connectivity and reduces habitat quality for many species.
- Tourism Pressure: High levels of tourism activity, if not managed sustainably, can result in habitat disturbance, soil erosion, and pollution in cloud forest areas.

The cloud forest protection system will tackle the underlying causes of degradation by building on experience gained through several successful conservation projects in the Cloud Forests of Mt Kilimanjaro and similar regions and implementing a range of coordinated strategies. These include:

- 71. Activity 2.1.4.1 Fire management and risk reduction: Install and operate fire alarm and control systems to prevent, detect and manage forest fires effectively in cloud forests and critical recharge zones, complemented by community-based fire awareness and response arrangements to reduce the risk and impact of uncontrolled burns.

72. Activity 2.1.4.2 Restoration and sustainable land management in recharge areas

Establish and support tree nurseries and implement direct restoration of at least 660 ha of degraded forest and groundwater recharge areas. This direct restoration will form a core, measurable contribution within a broader landscape programme target of 40,000 ha under improved management, achieved through a bundle of measures: assisted natural regeneration and protection of existing forests, riparian set-backs, soil and water conservation structures, invasive species control, and community patrols led by WRUAs/WUAs, complemented by co-financing (e.g. JWF partners, county/district budgets, private ESG investments). The project's monitoring framework will therefore report (i) direct restoration hectares (≥660 ha) and (ii) total hectares under improved management toward the 40,000 ha co-indicator, verified through georeferenced activity records, sample plots and periodic remote-sensing checks. In parallel, promote Farmer-Managed Natural Regeneration (FMNR) and Sustainable Land Management (SLM) practices—such as terracing, agroforestry, fodder diversification and improved crop/livestock husbandry—to enhance infiltration, soil stability and community livelihoods.

73. Activity 2.1.4.3 Incentives and PES Schemes

Introduce economic incentives and operationalize Payment for Ecosystem Services (PES) schemes that link downstream water users (utilities, commercial agriculture, tourism operators, beverage companies) with upstream forest stewards.

74. Activity 2.1.4.4 Awareness and Education Campaigns

Conduct targeted awareness campaigns to educate and engage local communities on forest conservation and sustainable land management practices.

75. Activity 2.1.4.5 – Conservation planning, monitoring and learning

Develop an Integrated Ecosystem Conservation Plan for Kilimanjaro cloud forests and adjacent recharge areas, apply and track METT scores (aiming for at least a 15% improvement by 2032), and strengthen research and monitoring systems that combine scientific and indigenous knowledge to guide adaptive management at landscape scale.

76. The project will also explore other viable interventions in consideration of specific geographic contexts. By employing these simultaneous and complementary approaches, the cloud forest protection system aims to address the multifaceted challenges facing the region's delicate ecosystems, promoting long-term sustainability and biodiversity preservation. It is expected that upon project completion, at least 4% of the cloud forest total surface of 1,775 sq Kms will be under protection measures (71,000 ha). Furthermore, implementation of these interventions will contribute to Sustainable Land Management (SLM) initiatives in Tanzania that aims to restore highly degraded areas in Pangani Basin by up to 50% by 2032.

77. Kijani Pamoja is advancing community-led conservation in Arusha through integrated watershed and landscape restoration—reforesting degraded hillslopes and riparian buffers, promoting climate-smart agroforestry, protecting springs and wetlands, and organizing women and youth groups for sustainable livelihood alternatives that reduce pressure on water and forest resources. Their work couples on-the-ground rehabilitation (tree growing, soil and water conservation, rangeland management) with participatory monitoring and environmental education in surrounding communities, schools, and water user associations. Given this practical footprint and local trust, Kijani Pamoja can collaborate with the Jumuiya Water Fund (JWF) under Component 2 to co-design and scale nature-based solutions (e.g., riparian restoration, farm-level water harvesting, and catchment stewardship), align incentives for upstream land managers, and strengthen results monitoring—thereby accelerating measurable hydrological and socio-economic benefits across the KTAS recharge and use areas.

78. Indigenous communities and many rural women play a crucial role in protecting Cloud Forests due to their intimate knowledge of the local ecosystems, traditional land use practices, and cultural connections to the environment. Respecting and valuing their knowledge and rights, and engaging them as active actors in conservation efforts fosters effective partnerships and promotes shared stewardship of Cloud Forests. The Jumuiya Water Fund has been involving the Maasai communities in tree planting activities within the Chyulu Hills, a catchment area for the Mzima springs in Taita Taveta county, under a public-private partnership for conserving watershed for nature, water, and people. Involving indigenous perspectives in decision-making processes can lead to more holistic and sustainable conservation outcomes. Overall, recognizing and supporting the rights and roles of indigenous communities and women in protecting Cloud Forests is essential for promoting conservation efforts that are inclusive, sustainable, and effective in safeguarding these critical ecosystems for future generations.

WRUA/WUA involvement:

79. WRUAs in Kenya and WUAs in Tanzania will be formal co-implementers for community-level restoration and water resources management activities under Component 2. Building on their statutory roles, they will lead micro-catchment mobilisation, nursery establishment, seedling production, out-planting, and survival monitoring, working with village natural resource committees and local governments. In Arusha, for example, existing WUA networks are already propagating indigenous seedlings across the basin; the project will scale these efforts with technical support, small grants, and performance-based incentives. Comparable WRUA initiatives on the Kenya side will be supported to expand seedling pipelines, rehabilitate riparian buffers, and protect recharge zones.

80. To ensure accountability and inclusion, WRUAs/WUAs will apply transparent workplans and community agreements, track survival rates and hectares treated, and integrate women and youth groups into livelihood activities (e.g., nursery enterprises and maintenance contracts). The PMU and JWF will provide training (silviculture, soil and water conservation, monitoring), standard operating procedures, and simple digital tools to record inputs (seedlings raised/planted) and outcomes (hectares restored/protected), with periodic joint verifications.

Lessons learned from indigenous communities:

81. Indigenous communities in Kenya and Tanzania, such as the Ogiek, Maasai, and Hadza, have preserved biodiversity and adapted to climate challenges through their rich cultural knowledge. Their traditional practices in land restoration, wildlife management, and resource conservation offer valuable insights for addressing environmental challenges while maintaining harmony with nature, and therefore, should be considered for planning sustainable land management practices.

82. The Maasai, who inhabit the arid and semi-arid lands (ASALs) across southern Kenya and northern Tanzania, have used their indigenous knowledge to coexist with local flora and fauna. As pastoralists, the Maasai's livestock-based livelihood aligns with the natural behavior of wildlife, reducing conflict between them and wild animals. Understanding that the wildlife mating season occurs annually between May and July—when animals can be more aggressive—the Maasai keep their distance, allowing the animals to reproduce without disturbances. In these ASALs, trees and shrubs provide medicinal value for both humans and livestock. The Maasai avoid cutting down trees and instead use sticks, dried branches, and bark for various purposes, including building traditional huts known as 'enkang' and for cooking. Species such as Acacia nilotica, Albizia anthelmintica, Warburgia ugandensis, and Solanum incanum are especially protected due to their medicinal properties. Culturally, the Maasai believe that cutting down trees brings curses and can lead to poverty by disrupting the food chain for both domestic animals and wildlife. They also perform cultural rituals and sacrifices beneath the sacred Ficus thonningii (Mugumo tree). During conflicts, the Maasai preserve the sandpaper tree, known locally as 'Oseki', a symbol of peace. In unresolved disputes, a branch of 'Oseki' is placed between warring parties as a gesture of reconciliation.

83. The Maasai have continued to manage water sources such as springs, streams and rivers for livestock and wildlife watering purposes. The decision on water source management and use is determined by a male elder because the Maasai are a patriarchal society. The Maasai are residing in UNESCO-designated Biosphere Reserves of Amboseli and Lake Manyara under ongoing initiatives.

84. In Kenya, the Ogiek community, who live in forested areas, plant specific species like Carissa spinarum, Plectranthus barbatus, and Caesalpinia decapetala to restore degraded land and attract bees. These plants are also vital for soil stabilization, erosion control, and managing surface water runoff, particularly in the hilly regions where the Ogiek reside. The Ogiek traditionally manages water resources through protecting water catchment areas, using natural springs, and employing rotational grazing near water sources to prevent overuse.

85. In northern Tanzania, the Hadza people, a protected hunter-gatherer group, have long contributed to the conservation of the rich biodiversity and natural systems they have lived alongside for millennia. They rely on wild animals and plants for food and medicine. The baobab tree, for instance, plays a crucial role in the Hadza's diet, with its fruit constituting about a third of their nutrition. The baobab trees also conceal beehives that provide honey, another important food source. Like the Maasai, the Hadza do not kill animals for sport, instead hunting only older wildlife, such as the dik-dik, for meat. They are skilled in determining the age of animals and focus on hunting the elderly. Their diet includes meat, tubers, baobab fruit, berries, and honey, varying by season. During the dry season, animals gather at a few water sources, making it easier for hunters to procure meat from large prey such as antelope, monkeys, and bush pigs. In the rainy season, the Hadza rely more on plant-based food. They traditionally manage water resources by tapping into seasonal waterholes and relying on natural springs. The elders inform the community that a certain spring has been overused, and they should move to another spring to avoid over-extraction. They also share water sources with wildlife. The Hadza community reside in UNESCO designated Geopark called Ngorongoro Lengai Geopark.

86. In addition to the valuable lessons from the Maasai, the project also draws from other indigenous communities such as the Ogiek in Kenya and the Hadza in northern Tanzania. The Ogiek's practices of land restoration through planting species like Carissa spinarum and managing water catchment areas offer insights into sustainable land and water management. Similarly, the Hadza, a protected hunter-gatherer community, demonstrate how traditional knowledge can support biodiversity conservation and sustainable use of natural resources, as seen through their dietary reliance on the baobab tree and sustainable hunting practices. Considering and valuing these insights will enhance the project's ability to address environmental challenges in a culturally sensitive and sustainable manner.

87. Additionally, the experience of the Jumuiya Water Fund—working directly with local communities and stakeholders to safeguard water resources and strengthen livelihoods—provides a valuable reference model for designing and scaling community-driven interventions under the KTAS project.

Successful conservation projects in cloud forests

i. Agroforestry Projects focused on promoting sustainable agroforestry practices among local communities living around the Kilimanjaro region. By integrating trees into agricultural landscapes, farmers can improve soil fertility, reduce erosion, enhance water retention, and provide habitat for wildlife, contributing to the preservation of the Cloud Forest ecosystem.

ii. Community-Based Ecotourism Initiatives: Community-based ecotourism projects empower local communities to benefit from tourism while preserving the Cloud Forests. By offering guided tours, homestays, and artisanal products, communities can generate income, raising awareness about the importance of conservation and incentivizing the protection of these habitats. Women tend to have high involvement in these activities, and can therefore, benefit from them when they can receive incomes, increase their capacities and make business decisions on their own right.

iii. Forest Landscape Restoration Programs: Initiatives focused on restoring degraded areas within the Cloud Forests through tree planting, habitat restoration, and invasive species management have been successful in reviving biodiversity, enhancing ecosystem services, and improving the resilience of these ecosystems to climate change.

iv. Protected Area Management: Establishing and effectively managing protected areas within the Cloud Forests have been instrumental in conserving key habitats, regulating human activities, and

safeguarding biodiversity. Strict enforcement of regulations, community involvement, and monitoring programs are essential components of successful protected area management.

v. Research and Monitoring Projects: Scientific research and monitoring initiatives play a crucial role in understanding the ecology, dynamics, and threats facing Cloud Forest ecosystems. By collecting data on species distribution, habitat quality, and environmental changes, conservationists can develop evidence-based conservation strategies and adaptive management plans.

88. These successful conservation methods demonstrate the importance of integrating scientific and local/indigenous knowledge, community engagement, sustainable practices, and effective governance in protecting and restoring Cloud Forests for the benefit of both wildlife and local communities.

89. Output 2.1.5: Water demand and supply analysis for major sectors (including agriculture, WASH, urban, and industry) completed, integrating available projections to inform equitable and climate-resilient allocation

90. The analysis will be used to develop water demand allocation scenarios that balance economic development needs with environmental sustainability, considering the projected increase in water supply and demand. The purpose is to establish a comprehensive understanding of sectoral water demands to inform sustainable allocation strategies and address the growing gap between supply and consumption needs in the region. The project will apply integrated modeling tools such as WEAP (Water Evaluation and Planning) or AquaCrop, where appropriate, to simulate future demand scenarios under varying climate and development conditions.

91. In addition, the analysis will incorporate community livelihood dimensions by assessing opportunities for water-efficient practices and nature-based enterprises (e.g., beekeeping, fodder diversification, and agroforestry), ensuring that demand-side solutions also contribute to resilience, poverty reduction, and gender-responsive livelihood diversification.

92. Activity 2.1.5.1 Data compilation and stakeholder validation: Collect and consolidate sectoral water demand data (WASH, irrigation, livestock, industry, hydropower) from national and local authorities, integrating Jumuiya Water Fund datasets on coastal supply–demand gaps, and validate preliminary estimates through consultations with utilities, producers, community organisations and equal participation of women and men.

93. Activity 2.1.5.2 – Scenario modelling of demand and supply under climate change: Apply tools such as WEAP and AquaCrop, where appropriate, to simulate future water demand and supply scenarios under different climate and development trajectories, incorporating ecological flow requirements and sustainable groundwater abstraction thresholds.

94. Activity 2.1.5.3 Allocation options and water-efficient livelihood pathways: Develop and discuss draft allocation scenarios that balance economic development with environmental sustainability and assess water footprints and efficiency options for key sectors (e.g. agriculture, industrial, domestic and ecosystems), highlighting gender-responsive and youth-inclusive livelihood diversification that reduces pressure on groundwater.

95. Activity 2.1.5.4 Finalisation and dissemination of the water demand analysis: Finalise the water demand analysis and preferred allocation scenarios and disseminate them to national and county/district authorities, basin organisations and utilities as an evidence base for integrated water resources management and investment planning.

96. Activity 2.1.5.1 Data Collection and Integration Collect and consolidate sectoral water demand data (WASH, irrigation, industry, hydropower, livestock) from national and local authorities, integrating MWF datasets on coastal water demand and supply gaps.

Component 3 - Establishing essential groundwater management tools

Outcome 3.1: Countries practicing sustainable conjunctive management of the surface and groundwater resources of the Kilimanjaro region

Indicator 8: Design of groundwater monitoring networks agreed upon by Countries.

Indicator 9: The Kilimanjaro Hydro -environmental Observatory established and operational.

Outcome 3.2: Increased capacity of national water managers and local communities including women to conjunctively manage surface and groundwater.

Indicator 10: Number of female and male (F/M) gender balanced national agencies staff and local communities' representatives participate to training programs.

97. The emphasis of the Component is on establishing an enabling environment for the sustainable management of groundwater conjunctively in watershed contexts. This indicates a strategic focus on facilitating the conditions and mechanisms necessary to support the effective implementation of integrated groundwater management practices within the broader framework of watershed management. Creating an enabling environment typically involves, as part of providing tools and technical capacity, addressing institutional, policy, regulatory, and capacity-related aspects to ensure that stakeholders have the necessary support, tools, and frameworks to successfully adopt and implement sustainable groundwater management strategies.

98. In the context of watershed management, this approach recognizes the interconnected nature of surface water and groundwater resources and aims to encourage coordinated and holistic approaches that optimize water use and support ecosystem health. As part of Component 3, the project aims to equip both national and local entities in the countries involved with the necessary tools and capacities for the sustainable management of their groundwater resources ensuring social inclusion and equality.

99. Output 3.1.1: Design of multi-purpose monitoring networks of groundwater quality and quantity based on equipment, methodologies, indicators and protocols agreed upon by the two countries

100. Activity 3.1.1.1 Stakeholder engagement needs assessment and best-practices review: Organize meetings with representatives from both countries to discuss, based on the Conceptual Model of the aquifer, the objectives of the monitoring network and to gather input on monitoring gaps and needs. Conduct a literature review of groundwater quality and quantity monitoring practices within and outside the region to identify best methodologies, indicators and protocols that are relevant to the Kilimanjaro context.

101. Activity 3.1.1.2 Network design, equipment and indicator selection, and protocols: Evaluate and select appropriate monitoring equipment that meets the technical requirements and budget constraints of both countries, and develop standardized methodologies for data collection, including sampling techniques, frequency and analysis procedures. Identify key indicators that reflect groundwater quality and quantity concerns in the project area, and draft protocols for operation, maintenance and calibration of monitoring equipment, as well as data reporting and management, ensuring that these are harmonized and jointly endorsed by both countries.

102. Activity 3.1.1.3 – Training on monitoring network implementation: Organize and deliver training for personnel from both countries on the agreed monitoring equipment, methodologies, indicators and protocols to ensure consistent application across the transboundary system, building practical skills in field measurements, data handling, equipment maintenance and basic quality control.

103. Output 3.1.2: Pilot monitoring demonstrations: ad hoc wells drilled in irrigation and local communities' contexts and instrumented with modern equipment for real time data transmission

104. Activity 3.1.2.1 Site Selection: Identify suitable locations in irrigation areas and local communities for the ad hoc wells, considering factors like groundwater availability and stakeholder accessibility, and consult with local communities to inform them about the project, gather input, and obtain necessary permissions for drilling.

105. Activity 3.1.2.2 Well Drilling: Coordinate with drilling contractors to implement the construction of the selected monitoring wells, ensuring proper techniques are used for groundwater access. Select and install modern monitoring equipment in the wells, ensuring capabilities for real-time data transmission.

106. Activity 3.1.2.3 System integration, field testing and optimization: Integrate the monitoring tools with data management platforms for effective data collection and analysis. Conduct initial testing of the monitoring systems to verify functionality and ensure that real-time data transmission is effective, begin regular data collection and establish a consistent schedule for monitoring and reporting. Analyse the collected data and make necessary adjustments to improve monitoring effectiveness and reliability.

107. Activity 3.1.2.4 Documentation, capacity building and validation: Prepare comprehensive documentation outlining the design, methodologies, indicators and protocols used for the pilot monitoring wells, serving as a reference for replication and compliance. Provide training for local users and technical staff on the operation and maintenance of the monitoring equipment and data transmission systems. Present the final pilot design and results to stakeholders from both countries for review and approval, ensuring their interests and lessons learnt are reflected in subsequent scale-up.

108. Output 3.1.3: Groundwater Information Management System, harmonized in the two countries, to enable storage, retrieval, processing, visualizing groundwater data and information

109. Activity 3.1.3.1 Needs assessment and governance for GIMS development: Conduct a thorough analysis of the data management needs of both countries to identify essential features and functionalities required for GIMS. Establish a collaborative group including representatives from key institutions in both countries to guide system development, ensure that all requirements are captured, and provide oversight of standards and data-sharing arrangements.

110. Activity 3.1.3.2 System and database design, including data standards: Develop a detailed design for the GIMS, focusing on user interface, data structure and interoperability with existing national and regional systems. Choose appropriate software and tools that support data storage, retrieval, processing and visualization in formats compatible for both countries. System development and testing: Build the GIMS according to the agreed design, incorporating features for user access control, data visualization and reporting functionalities. Conduct rigorous testing of the system to ensure functionality, reliability and user-friendliness, making adjustments based on feedback from pilot users in both countries.

111. Activity 3.1.3.3 Database Setup: Establish a centralized database (or federated structure as appropriate) that can accommodate groundwater data and facilitates easy access and management.

Define and implement standardized data formats and protocols for data entry, storage and retrieval to ensure consistency and harmonization across both countries.

112. Activity 3.1.3.4 Training, launch and ongoing support: Provide training sessions for users in both countries on how to navigate and utilize the GIMS effectively, and formally launch the system, establishing ongoing technical support to address any issues and to maintain and upgrade the system post-implementation.

113. Output 3.1.4: Hydro-environmental Observatory of the Kilimanjaro Water Tower established and operational as a reference information center

114. Creating a 'Hydro-environmental Observatory' of the Kilimanjaro Water Tower. Establishing this Observatory is paramount. The observatory will serve as a centralized hub for historical and current data on the KTAS region, hosting a digital information system encompassing maps, hydrometeorological data, biodiversity, climate change, and more. It will act as a reference center, facilitating the flow and analysis of information on critical issues related to surface and groundwater in the Kilimanjaro region. The observatory will play a central role in supporting the implementation and long-term monitoring of the Strategic Action Programme (SAP), ensuring that progress on transboundary governance, aquifer health, and ecosystem resilience is tracked against agreed performance indicators. It will also interface with global platforms such as IW:LEARN and UNESCO's IHP-WINS, enabling knowledge exchange and visibility of project outcomes. The observatory will also involve contributions from the governmental institutions (see box below), and the technical and scientific communities, ensuring a collaborative approach to water security initiatives. It will receive data from national monitoring networks, harmonizing technology and protocols at the transboundary level. Additionally, the project will support the harmonization of national networks, fill gaps in existing networks, enhance monitoring capacities, introduce real-time data transmission, and provide training for technical personnel operating the observatory.

Key governmental institutions responsible for hydrological and environmental monitoring, data collection, analysis, and information dissemination

Kenya

115. Ministry of Water and Sanitation: The ministry is responsible for water resources management, including hydrological monitoring, water quality assessment.

Water Resources Authority (WRA): WRA is tasked with regulating and managing water resources in Kenya, including monitoring and assessing water availability, allocation, and use.

Kenya Meteorological Department (KMD): KMD is responsible for weather forecasting, climate monitoring, and provision of meteorological information, including rainfall data crucial for hydrological monitoring.

National Environment Management Authority (NEMA): NEMA oversees environmental monitoring, assessment, and compliance with environmental regulations in Kenya, including aspects related to water quality and environmental impact assessments.

Regional Water Resource Authorities: Various regional water resource authorities at the basin level are responsible for hydrological monitoring and management within specific river basins in Kenya.

Tanzania

116. Ministry of Water and Irrigation: The ministry oversees water resources management and development in Tanzania, including hydrological monitoring, water allocation, and infrastructure planning.

Tanzania Meteorological Authority (TMA): TMA is responsible for weather forecasting, climate monitoring, and provision of meteorological data essential for hydrological assessments.

Tanzania Hydrology and Meteorology Institute (TMA): The institute conducts research, provides training, and supports hydrological and meteorological monitoring programs in Tanzania.

National Environmental Management Council (NEMC): NEMC is responsible for coordinating environmental management, conducting environmental impact assessments, and monitoring environmental compliance in Tanzania.

Basin Water Boards: Tanzania has several basin water boards responsible for water resources management at the basin level, including hydrological monitoring, water allocation, and addressing water-related challenges within specific basins.

117. Activity 3.1.4.1 – Feasibility, design and site selection for the Observatory: Conduct a feasibility study to assess needs, goals and potential challenges for establishing the Hydro-environmental Observatory, including institutional roles, links with national monitoring networks and global platforms (e.g. IW:LEARN, UNESCO IHP-WINS). Involve relevant stakeholders and key governmental institutions from both countries to gather input, build support and ensure that the Observatory responds to regional priorities. Identify an appropriate location (or coordinated structure) for the Observatory that provides accessibility to data sources and monitoring networks, and prepare a comprehensive design plan specifying infrastructure, technology requirements and the operational framework.

118. Activity 3.1.4.2 Technology harmonization and infrastructure development: Establish standardized technologies and protocols for data collection and monitoring to ensure seamless integration with existing and new national networks and sectoral systems, harmonizing technology and procedures at the transboundary level. Develop a framework for collecting, storing and managing data from various monitoring networks (hydrological, meteorological, environmental, biodiversity), ensuring compatibility and accessibility. Construct or equip the necessary facilities and install the required hardware and software for data reception, analysis and dissemination.

119. Activity 3.1.4.3 Capacity building for Observatory operations: Train personnel from both countries on observatory operations, data management and the use of technologies for analysis and visualization, ensuring that technical staff can operate, maintain and further develop the Observatory systems over time.

120. Activity 3.1.4.4 Pilot operations, refinement and formalization of the Observatory: Launch a pilot phase of Observatory operations to test systems, workflows and data flows, making adjustments based on operational feedback from participating institutions. Officially inaugurate the Observatory as a central reference information center for the Kilimanjaro Water Tower, establish procedures for regular data updates from national networks, and promote its role in supporting SAP implementation, long-term monitoring of transboundary governance, aquifer health and ecosystem resilience, and regional and global knowledge exchange.

121. Output 3.1.5: Gender-responsive training programmes on groundwater and conjunctive water management delivered to national agencies and local communities

122. This initiative will focus on strengthening the capabilities of relevant national agencies and local communities in the Kilimanjaro region, with a specific emphasis on promoting gender equality and empowering women in participation and capacity-building. The program will include on-site training courses and a selection of fellowships for advanced university degrees in hydrogeology, tailored specifically for volcanic areas. The training will cover topics such as groundwater vulnerability mapping, Managed Aquifer Recharge (MAR) as a climate mitigation measure, International Water Law principles, and global experiences from key directives, conventions, and guidelines. Land and water administrators will have access to a crucial management tool: a harmonized groundwater information management system spanning both countries. This system will facilitate the storage, retrieval, processing, visualization, and display of groundwater data and information.

123. Activity 3.1.5.1 Learning Needs Assessment: Conduct a survey to identify specific training needs of national agency staff and local communities related to groundwater management considering specific women's learning needs. Design inclusive training curricula that focus on key project outputs, groundwater management, surface/groundwater interactions, and the integration of gender issues in water resource management.

124. Activity 3.1.5.2 Recruitment of Trainers and Implementation: Engage qualified trainers with experience in hydrogeology and gender-responsive approaches to design and deliver the training programs. Organize and conduct on-site training courses for national agencies and local communities, ensuring active participation and engagement of women and men.

125. Activity 3.1.5.3 Fellowship Program Design: Develop and promote fellowship opportunities for advanced university degrees in hydrogeology, specifically targeting women and individuals from local communities.

126. Activity 3.1.5.4 Capacity Development and community support: Promote women's active participation and leadership in communal groundwater management assigning technical and decision-making roles to trained women, and create a support network of women and men community leaders for trainees, allowing for ongoing collaboration, sharing of experiences, and capacity building in groundwater-related topics.

Component 4 - Strengthening transboundary cooperation and groundwater management capacity

Outcome 4.1 : Countries commence efforts to cooperate in the management of the KTAS and strengthen their commitment to undertake agreed priority reforms and investments.

Indicator 11: ToRs of the consultation mechanism submitted to governments for approval.

Indicator 12: The SAP endorsed at ministerial level.

Indicator 13: Strengthened national and local groundwater governance in both countries

127. The aim of the Component is to reach an agreement on the creation and functioning of a permanent transboundary consultation body of the Kilimanjaro Transboundary Aquifer System, and the definition and agreement on a Strategic Action Program (SAP) to be implemented in the short term.

To do so, and based on Component 1 results, Component 4 will facilitate dialogue between technical experts and inter-ministerial representatives of the two countries and other key stakeholders (e.g.: the private sector, civil society). The importance and effectiveness of intersectoral committees in

promoting collaborative water management approaches, fostering community mobilisation and stakeholder engagement, and addressing complex water challenges through coordinated efforts across different sectors and jurisdictions cannot be underestimated. To establish such a Committee - that will be active throughout the project duration - the project will follow a structured methodology: (i) Stakeholder Mapping: Identify key stakeholders from relevant sectors such as government agencies, private sector, civil society organizations, and local communities involved in water management; (ii) Needs Assessment: Conduct a needs assessment to understand the current water management challenges, priorities, and gaps that require intersectoral collaboration; (iii) Objective Setting: Define the objectives and scope of the intersectoral committees, outlining the goals and expected outcomes of the collaborative water management efforts; (iv) Committee Structure: Establish a clear organizational structure for the intersectoral committees, including defining roles, responsibilities, and decision-making processes.

128. Gender mainstreaming will be essential for ensuring equitable and sustainable water resource management recognizing the diverse roles, needs, and vulnerabilities of women and men. The Component will seek to include and value women's voices in shaping policies and actions related to the management of the Kilimanjaro Transboundary Aquifer System (KTAS) through gender-responsive consultations across sectors and disciplines, involvement of civil society and indigenous women in joint management discussions, gender-balanced representation in the agreed transboundary frameworks, among others.

129. Output 4.1.1: Terms of reference for the creation and functioning of a permanent transboundary consultation and information exchange body on the Kilimanjaro transboundary aquifer system, prepared and submitted for governments approval

130. The Task of developing the Terms of Reference (ToR) for the establishment and operational framework of a permanent transboundary consultative body focused on the Kilimanjaro Transboundary Aquifer and its associated freshwater ecosystems, namely Lake Chala and Lake Jipe, will fall under the purview of a joint expert group. This group will operate with the backing of the intersectoral committee and will build upon the framework established by the Joint Memorandum of Understanding (MoU) concerning Lakes Jipe and Chala. Upon completion, the drafted document will be submitted for approval by the relevant government authorities.

131. The proposed transboundary consultative body will emphasize and facilitate the following key activities:

i. Conduct Transboundary Environmental Impact Assessments: To identify and mitigate potential transboundary impacts and to better comprehend the groundwater flow dynamics.

ii. Promote Equitable Use of Groundwater Resources: Facilitate agreements that ensure the fair and sustainable utilization of the groundwater resources shared among the respective countries.

iii. Enhance Sustainability of Groundwater-Dependent Ecosystems: Implement measures to prevent overexploitation by maintaining a balanced relationship between groundwater supply and demand.

iv. Engage in Joint Monitoring Efforts: Establish collaborative initiatives to assess both the quality and quantity of the transboundary groundwater resources.

v. Foster Joint Activities and Peace Initiatives: Plan and execute joint programs to promote sustainable peace among communities that depend on these resources.

vi. Address Regional Conflicts: Particularly focus on conflict resolution in areas such as Taveta-Loitoktok, where tensions have arisen between pastoralists and agriculturalists, implementing local peace initiatives to mitigate disputes.

vii. Facilitate Information Exchange and Coordination: Ensure that relevant projects and initiatives are aligned and information flows smoothly among stakeholders.

132. Activity 4.1.1.1 Formation of the Joint Expert Group and intersectoral committee: Identify and appoint experts from the two countries to form a Joint Expert Group, ensuring balanced gender and sectoral representation (government agencies, basin authorities, utilities, civil society, indigenous and women's organisations, private sector). Convene or strengthen an intersectoral committee to provide oversight, guidance and support throughout the drafting of the ToR, including clarifying roles, responsibilities and decision-making processes for the future consultative body.

133. Activity 4.1.1.2 Document review and multi-level consultations for ToR design: Review the existing Joint MoU on Lakes Jipe and Chala and other relevant bilateral, regional and international instruments, policies and technical reports to inform the ToR. Engage local communities, indigenous representatives, women's groups, government officials and other stakeholders through targeted consultations to gather inputs on collaboration needs, transboundary issues (e.g. conflicts between pastoralists and agriculturalists in Taveta–Loitoktok), priorities for joint monitoring and information exchange, and expectations regarding peace initiatives and ecosystem protection.

134. Activity 4.1.1.3 Drafting the Terms of Reference: Compiling the information and insights gathered into a cohesive draft of the ToR, and circulate the draft among the Joint Expert Group and the intersectoral committee for feedback, followed by revisions based on the collected insights. Prepare the final version of the ToR and formal submission to the governmental entities of the involved countries for approval.

135. Activity 4.1.1.4 Establishment of the Consultative Body: Once approved, organizing an inaugural meeting to launch the consultative body and outline its upcoming activities and governance structure.

136. Output 4.1.2: The Kilimanjaro Aquifer System Strategic Action Program (SAP) for the long-term environmentally sustainable management of the groundwater resources in the project region, prepared and submitted for government approval at ministerial level

137. The SAP will focus on the policy and legislative reforms, including the establishment of integrated water governance mechanisms to facilitate conjunctive surface and groundwater management within watershed contexts, and the investments needed to improve water quality and quantity, climate resilience, and environmental sustainability in the Kilimanjaro region, addressing key aspects such as the protection of groundwater recharge areas (cloud forests) in Mt Kilimanjaro, the exploitation of deep confined groundwater resources, the management of shared lakes and other freshwater ecosystems, and the consolidation of joint management mechanisms and tools. The SAP will prioritize nature-based solutions that have been proved to be environmentally and socially sound and have the potential to benefit (and cause no harm to) both women and men, and consider the creation of financial mechanisms and incentives.

138. Once technically cleared, the SAP will be submitted to the governments for adoption at the ministerial level. This collaborative process ensures that the SAP aligns with the shared vision and goals of both countries, promoting joint efforts in achieving sustainable and effective water resource management in the Kilimanjaro region. The SAP will include a Monitoring and Evaluation (M&E) framework with gender-responsive indicators, timelines, and responsible entities to guide

implementation and measure effectiveness. This framework will ensure that the proposed reforms and investments are delivered accountably and that corrective actions can be taken where needed.

139. To produce the Kilimanjaro Aquifer System Strategic Action Program (SAP), a comprehensive approach is necessary, including collaboration among key relevant stakeholders, systematic planning, and methodical documentation. The following activities will be needed:

140. Activity 4.1.2.1 Formation of a Multi-Stakeholder Task Force: Assemble representatives from relevant government agencies, local communities, NGOs, and scientific institutions to form a task force dedicated to developing the SAP ensuring a balance gender and minority representation.

141. Activity 4.1.2.2. Situation Analysis and Data Gathering: Based on the TDA (Output 1.1.3) conduct a detailed assessment of Key Issues and Challenges. Facilitate stakeholder workshops and consultations to highlight the critical challenges related to groundwater management, identifying issues such as pollution, over-extraction, and the effects of climate change.

142. Activity 4.1.2.3 Development of Policy and Legislative Reforms: Based on the needs assessment, draft proposed policy and legislative reforms aimed at enhancing integrated water governance mechanisms, promoting conjunctive surface and groundwater management within watershed contexts.

143. Activity 4. 1. 2. 4 Investment Planning: Outline necessary investments to improve water quality and availability, incorporating strategies to enhance climate resilience and environmental sustainability. This includes assessing infrastructure needs for water conservation and management. Prioritize nature-based solutions ensuring that initiatives not only address environmental concerns but also promote socioeconomic equity, explicitly benefiting both women and men.

144. Activity 4.1.2.5 Development of Financial Mechanisms: Explore and propose sustainable financial mechanisms and incentives to support the implementation of SAP strategies, including potential funding sources and revenue-generating initiatives.

145. Activity 4.1.2.6 Drafting the Strategic Action Program: Compile all findings, recommendations, and proposed actions into a cohesive, organized document that outlines the SAP, including specific goals, objectives, timelines, and responsible parties. The SAP will include the Gender Action Plans. Share the draft with relevant stakeholders for feedback and validation, facilitating discussions to refine and improve the proposed SAP. Incorporate stakeholder input and finalize the SAP. Prepare a formal submission document for government approval at the ministerial level, ensuring compliance with national and regional directives.

146. Output 4.1.3: A partnership conference aimed at consolidating international support for the SAP implementation convened with broad participation of the donor community

147. To organize a successful partnership conference focused on garnering international support for the Strategic Action Program (SAP), the following activities are necessary:

148. Activity 4.1.3.1 Conference Planning Committee Formation, and identification of Goals and Objectives: Establish a planning committee that includes key stakeholders, government representatives, and community leaders to oversee the preparation of the conference. Clearly define the main objectives of the conference, including key messages to be conveyed to potential donors and partners regarding the SAP. Target Audience Identification, and development of Conference Agenda:

Identify and create a list of potential international donors, development agencies, and partners who would be crucial to the SAP's implementation. Design a comprehensive agenda that includes key presentations, panel discussions, workshops, and networking opportunities aimed at engaging participants and encouraging collaboration.

149. Activity 4.1.3.2 Venue Selection and preparation of Conference Materials. Choose a suitable venue for the conference, considering accessibility and capacity for participants, and arrange necessary logistics such as catering, audiovisual equipment, and accommodations. Develop and send out invitations to targeted donors, IFIs, stakeholders and the media. Create informational documents, presentations, and other materials that will be distributed during the conference to communicate the goals and benefits of the SAP effectively. Invite influential speakers and facilitators with expertise or vested interest in groundwater sustainability to share insights and enhance discussions.

150. Output 4.1.4: A comprehensive review of existing groundwater policies and regulations in both Kenya and Tanzania, identifying gaps and inconsistencies and opportunities for improvement

To successfully conduct a comprehensive review of groundwater policies and regulations in Kenya and Tanzania, the following activities are essential:

151. Activity 4.1.4.1 Team mobilisation, document collection and scoping: Assemble a bi-national team of experts in water policy, law and governance to lead the review. Collect and catalogue all relevant policies, acts, regulations, strategies and by-laws related to groundwater management in Kenya and Tanzania, including cross-cutting instruments (environment, land, climate), as well as applicable international agreements and regional guidelines (e.g. basin treaties, African and global frameworks). Define the scope of the review, including explicit attention to gender equality, indigenous rights and local customary water management practices.

152. Activity 4.1.4.2 Analytical framework, policy/regulatory review and stakeholder consultation: Develop an analysis framework and criteria to assess the effectiveness, relevance, coherence and enforceability of existing groundwater-related policies and regulations, including institutional roles, allocation rules, quality protection, monitoring and data-sharing. Apply this framework to evaluate the collected documents and identify gaps, overlaps, inconsistencies and implementation challenges. Conduct stakeholder consultations with government authorities, basin organisations, WRUAs/WUAs, NGOs, indigenous groups, women's organisations, private sector and academic experts to gather practical perspectives on how current policies and laws work in practice and where improvements are needed.

153. Activity 4.1.4.3 Best-practice benchmarking and report drafting: Identify and document relevant best practices and innovative approaches to groundwater governance from other regions or countries that could be adapted to the Kenyan and Tanzanian contexts (e.g. allocation regimes, protection of recharge zones, economic instruments, participation of women and communities). Compile the findings into a comprehensive review report that details gaps, inconsistencies and actionable recommendations for policy and regulatory enhancement in both countries.

154. Activity 4.1.4.5 Finalization and Submission

Circulate the draft report among stakeholders for feedback and validation, making necessary revisions based on their input. Finalize the report and submit it to relevant authorities in both countries, en s.suring that it includes practical recommendations for improving groundwater policies and regulation

Component 5 - Coordination, knowledge management, stakeholder's engagement and

Dissemination

Outcome 5.1: Structured and effective gender-responsive engagement of relevant stakeholders in project activities, inclusive integration of local communities' perspectives, enhanced public awareness and information accessibility, and active involvement of the productive sector contribute to the realization of the project's outcomes and the broader commitment to the implementation of SAP reforms and investments.

Indicator 14: Regional and District administrators, and relevant stakeholders actively and meaningfully participate to structured consultations contributing to participatory design of SAP definition and adoption.

Indicator 15: Local-national-regional awareness-raising events and other knowledge products delivered and promoted through appropriate channels, including IW:LEARN.

155. This component operationalizes inclusive and structured stakeholder engagement mechanisms to build ownership, enhance local knowledge, and strengthen the enabling environment for long-term sustainability of groundwater governance.

156. Through a dedicated analysis and characterization of relevant stakeholders, appropriate engagement strategies have been designed (see Annex J) to ensure meaningful and effective participation of all identified groups. Specific attention will be devoted to ensure that no one is left behind, facilitating a participatory involvement of local communities, indigenous people, youth and women’s organizations proactively trying to address potential barriers to their relevant engagement in project activities.

157. Throughout the project's duration, this component will implement activities to enhance project visibility at the national and regional levels and establish knowledge-exchange and coordination mechanisms with other relevant projects and initiatives, in particular with the World Bank-funded program “Groundwater for Resilience” covering the Horn of Africa. High-level and high-quality events with broad public and media participation will be organized to highlight project progress and achievements. A core element of this component will be the upscaling and institutionalization of the Kilimanjaro Water Stewardship Platform (KWSP), originally established by the World Bank in the Usa-River sub-catchment . The project will support expanding the KWSP into a transboundary coordination mechanism, engaging stakeholders across both Kenya and Tanzania to improve catchment governance, promote stewardship standards, and ensure long-term sustainability of SAP implementation. Additionally, gender mainstreaming and women empowerment activities will be developed according to the findings and recommendations of the Gender Analysis (part of the TDA) and the Gender Integration approach designed for the project.

158. Consistent with the practices of GEF IW projects, this component will facilitate participation in IW LEARN activities. This includes the establishment of a dedicated project website, the publication and dissemination of key project documents, experience notes, lessons learned, and active involvement in biannual IW Conferences.

159. Output 5.1.1: Stakeholder consultation mechanisms established and operational, including engagement with private sector, women, youth, and local communities

To implement structured and meaningful periodic stakeholder consultations, and identify and engage key actors from government, civil society, academia, indigenous communities, youth, and the private sector, the project will (i) create a targeted stakeholders engagement strategy outlining the objectives, methods, and desired outcomes of the consultations, and prepare informational materials that clearly

communicate the objectives of the consultations, project background, and how stakeholders can contribute; and (ii) Choose appropriate consultation formats, such as workshops, focus groups, and interviews, tailored to the preferences and needs of different stakeholder groups. Arrange dates, venues, and logistics for consultations, ensuring accessibility for all participants, particularly women and youth

160. Activity 5.1.1.1 Implementation and follow-up of structured stakeholder consultations: Conduct periodic consultations using the agreed formats to gather inputs on project activities, SAP definition and adoption, and implementation of reforms and investments. Ensure that voices of local communities, indigenous peoples, women, youth and private sector actors are actively included and heard. Document contributions, concerns and recommendations, provide feedback to participants, and systematically channel the results into project decision-making, SAP finalisation and communication products.

161. Output 5.1.2: Knowledge-exchange and coordination mechanisms with relevant projects and initiatives established and operational

162. Activity 5.1.2.1 Identification of Relevant Projects: Research and identify existing projects and initiatives related to groundwater management and environmental sustainability that align with the objectives of the current project. Reach out to key stakeholders involved in the identified projects to build relationships and discuss potential collaboration opportunities.

163. Activity 5.1.2.2 Development of Coordination Framework and Organizing Coordination Meetings”

Create a framework that outlines the goals, structures, and processes for knowledge exchange and coordination among the various initiatives, and schedule and facilitate regular meetings or workshops with representatives from different projects to share updates, best practices, and lessons learned.

164. Activity 5.1.2.3: Twinning and Knowledge-Exchange Workshop with the GEF-FAO-SPC Project on Volcanic Islands in the Pacific: Organize a dedicated south-south and north-south learning exchange between the KTAS project and the GEF-FAO-SPC initiative on groundwater management in volcanic island systems of the Pacific.

The workshop will facilitate mutual learning on the management of water towers, volcanic hydrogeology, recharge protection, and community-based approaches to groundwater resilience. It will serve as a platform to discuss the establishment of a network of water towers across continents, enabling long-term collaboration and joint research between African and Pacific island counterparts. Key outputs will include IW:LEARN Experience Notes, joint knowledge products, and a roadmap for continued exchange of information, lessons learned, and best practices for managing groundwater resources in volcanic regions.

165. Output 5.1.3: National and regional outreach events conducted to disseminate project progress and results

To successfully organize high-profile outreach events that showcase the project’s progress and achievements:

166. Activity 5.1.3.1 Planning, delivery and follow-up of high-profile outreach events: Plan and implement high-profile national and regional outreach events to showcase project progress and achievements, including SAP milestones and flagship field interventions.

Establish an event planning committee with representatives from key partners to define objectives, identify and invite priority stakeholders (e.g. government officials, basin authorities, WRUAs/WUAs, indigenous and women's organisations, private sector, media, development partners), and design professional agendas featuring substantive presentations, panel discussions and networking sessions. Prepare high-quality communication materials (briefing notes, brochures, policy summaries, multimedia presentations) to effectively convey results and priority messages. Ensure efficient logistical arrangements and facilitation so that events run smoothly and provide meaningful engagement opportunities. Following each event, document proceedings and key messages, collect feedback from participants, and disseminate a concise outcome note and agreed next steps to sustain momentum and strengthen partnerships.

167. Output 5.1.4: Project knowledge management system established and operational, including active engagement with IW: LEARN, a functional project website, and dissemination of key project outputs

168. Activity 5.1.4.1 Active participation in activities organized by IW LEARN: This will include the establishment of a dedicated project website, utilization of various knowledge management tools, and the publication and dissemination of key project documents such as the Transboundary Diagnostic Analysis (TDA), Strategic Action Program (SAP), and Experience Notes.

Participation in GEF biennial International Waters Conferences. Share KTAS lessons on transboundary groundwater governance, volcanic aquifers, gender integration and nature-based solutions, and incorporate learning from other basins into project implementation.

Monitoring and Evaluation:

Outcome 6.1: Operational project M&E systems successfully implemented and informing adaptive management

Indicator 16: Recommendations from operational M&E systems fed back into project implementation

169. Output 6.1.1: A gender-responsive project M&E system designed and operational

Monitoring responsibilities will be shared with national partners, including water and environment ministries and basin-level agencies, to promote institutional learning and ensure sustainability of data collection and reporting beyond the life of the project. Regular learning loops will feed evidence from field implementation into planning cycles.

170. Output 6.1.2: Independent Mid-term Review and Terminal Evaluation undertaken with results fed back to project management including substantive reporting of gender-specific results

Independent Mid-term Review and Terminal Evaluation undertaken with results fed back to project management including substantive reporting of gender-specific results. In addition to project-level reviews, the findings will inform the review of the Strategic Action Programme (SAP), helping to prioritize feasible policy and investment pathways. Lessons learned will be published and shared via IW: LEARN, UNESCO's IHP-WINS, FAO's channels, and other knowledge platforms.

171. Under this Outcome an effective adaptive management and governance system will be established to ensure that the programme achieves its intended outcomes and key lessons are captured. The M&E system will adopt a results-based management approach aligned with GEF guidance, with clear baselines, targets, and timelines. It will incorporate indicators disaggregated by

sex, age, and stakeholder group, enabling tracking of gender equality outcomes and social inclusion across all components.

Global Environmental Benefits

172. The project is set to generate significant global environmental benefits (GEBs) and adaptation benefits that would not have materialized without the intervention of the Global Environment Facility (GEF). This will be achieved through several interconnected strategies and objectives, detailed as follows:

i. Strengthening Transboundary Cooperation:

173. The project will foster collaboration between Kenya and Tanzania, enhancing joint management of the Kilimanjaro Transboundary Aquifer System. This cooperation will enable better sharing of knowledge, resources, and best practices for sustainable groundwater management, ultimately leading to improved water security for local communities and ecosystems.

ii. Enhanced Water Security

174. By prioritizing the sustainable management of the Kilimanjaro Aquifer and its associated ecosystems, the project addresses critical water scarcity issues, benefiting both humans and biodiversity. Developing reliable and equitable water sources enhances resilience to climate impacts, supporting adaptation efforts in vulnerable communities.

iii. Knowledge Generation and Dissemination

175. The GEF's intervention will facilitate comprehensive studies on the hydrogeological characteristics and groundwater potential of the Kilimanjaro region. By utilizing modern scientific methodologies and technology, the project aims to fill the knowledge gaps concerning optimal water exploitation and management strategies, thus influencing groundwater resource development in similar volcanic landscapes globally.

iv. Promotion of Climate Resilience

176. The project not only focuses on immediate water security but also emphasizes adaptation to climate change impacts. By protecting and restoring critical ecosystems, such as the cloud forests, the project strengthens the region's resilience to climate variability, ultimately safeguarding the hydrological cycle and maintaining ecosystem services.

v. Biodiversity Protection through Ecosystem Conservation

177. Although the project does not directly target biodiversity benefits, it has a clear impact on preserving groundwater recharge areas. The restoration and protection of the Kilimanjaro's cloud forests—covering approximately 4% of the total area (71,000 hectares)—will aid in maintaining biodiversity and contribute to the Kunming-Montreal Global Biodiversity Framework targets, particularly Target 3 focused on conserving 30% of land and water.

vi. Global Knowledge Transfer:

178. The insights derived from this project, particularly regarding volcanic aquifers, can serve as a valuable reference for similar settings worldwide. Sharing these findings with a global audience has

the potential to drive innovative groundwater management practices in other volcanic regions, promoting sustainable resource utilization on a broader scale.

179. In conclusion, the GEF project's intervention is crucial not only for addressing local and regional water security challenges but also for catalyzing global ecological benefits, driving adaptation to climate change, and promoting sustainable resource management practices that are applicable in various contexts worldwide.

STAKEHOLDER ENGAGEMENT

Stakeholder Engagement and Institutional Roles

180. The inception workshop, held from 4–6 March 2025 at the Mount Meru Hotel in Arusha, Tanzania, served as a pivotal starting point for the KTAS Project's Project Preparation Grant (PPG) phase. The meeting brought together key stakeholders from the Ministry of Water, Sanitation and Irrigation (MoWSI) in Kenya and the Ministry of Water in Tanzania, including government officials, regional water authorities, international development partners, academic experts, and community representatives. The primary objectives of the meeting were to establish a common understanding of the project goals, refine the implementation strategy, highlight the key gaps in the Project Identification Form (PIF), ensure stakeholder alignment for the next steps in project execution, reach an agreement on the roadmap and timeline to deliver the Project Document.

181. Organized under the leadership of FAO (GEF Implementing Agency) and UNESCO (Lead Executing Agency), the inception meeting laid the groundwork for a participatory process throughout the PPG phase. Stakeholders jointly validated the roadmap and timeline for developing the full project document and contributed to an initial mapping of roles, interests, and technical capacities. This process directly informed the formation of thematic working groups and the stakeholder engagement plan, ensuring that national priorities and local realities would be embedded in the design of the KTAS Project from the outset.

182. The KTAS Project is structured as a multi-stakeholder and cross-sectoral initiative, strategically aligning national, basin-level, and community interests to deliver sustained environmental, water security, and climate adaptation benefits. Government institutions, including the Ministries of Water in Kenya and Tanzania, will provide overall leadership for national coordination, policy alignment, and mainstreaming of project outcomes into public investment and planning frameworks.

183. Basin authorities—namely the Pangani Basin Water Board and Kenya’s Water Resources Authority—will play a central technical role by overseeing aquifer diagnostic assessments and monitoring activities, facilitating multi-stakeholder dialogue, and operationalizing integrated water resources management (IWRM) approaches at subnational levels. Co-executing partners nominated by governments, including the Kenya Electricity Generating Company (KenGen), the National Oil Corporation of Kenya (NOCK), the Kenya Meteorological Department (KMD), and the Kenya Army Geophysical Unit, will contribute specialized scientific, technical, and logistical expertise, particularly in groundwater investigations, geophysical surveys, and hydrometeorological assessments.

184. Research and academic institutions—including the Regional Centre on Groundwater Resources Education Training and Research (RCGW), the University of Nairobi, and the Nelson Mandela African Institution of Science and Technology (NM-AIST)—will support the co-development of the aquifer conceptual model, applied research, capacity development, and training. Their engagement

ensures a robust scientific foundation for decision-making, promotes innovation, and strengthens the evidence base for long-term groundwater governance.

185. At the community level, Water Resources Users Associations (WRUAs), Water User Associations (WUAs), Community Forest Associations (CFAs), and local civil society organizations will support the implementation of nature-based solutions (NbS), reforestation of recharge zones, and community-based monitoring systems. These actions will strengthen local ownership, reinforce ecosystem stewardship, and enhance the sustainability of project outcomes.

186. Private sector stakeholders, including entities such as TPC Ltd. and the Jumuiya Water Fund, will engage through public–private platforms to promote responsible groundwater use, support catchment protection, and mobilize investments for Payment for Ecosystem Services (PES) schemes. These partnerships will contribute to reducing pressures on the aquifer while leveraging additional financial and technical resources.

187. At the regional level, UNESCO-IHP, as the Lead Executing Agency, in collaboration with the East African Community (EAC), Lake Victoria Basin Commission (LVBC), IGAD, and AMCOW, will ensure coherence with regional water and climate frameworks and facilitate transboundary coordination and knowledge exchange.

188. Stakeholders have been actively engaged throughout the PPG phase and will continue to play a central role during project implementation. Their sustained participation is essential to achieving the project's overarching objectives related to groundwater security, transboundary cooperation, and climate-resilient ecosystem protection within the Kilimanjaro region.

189. Universities and research institutions from Kenya and Tanzania—such as the University of Dar es Salaam, the University of Nairobi, and NM-AIST—have already provided critical scientific and technical inputs to project design. During implementation, they will support hydrogeological assessments, field data collection, groundwater modelling, and monitoring system design, including the application of isotopic techniques and advanced geophysical methods to improve understanding of the volcanic aquifer system.

190. National and subnational water authorities, including Kenya's Water Resources Authority, Tanzania's Basin Water Boards, and regional offices of the Ministries of Water, are responsible for water resources planning, regulation, licensing, and enforcement. These institutions will benefit directly from targeted capacity-building interventions, including training on managed aquifer recharge (MAR), groundwater monitoring, conjunctive water management, and data integration.

191. Local communities, including indigenous groups such as the Maasai and Chagga populations inhabiting the Kilimanjaro highlands and surrounding lowlands, are foundational partners in the project. As custodians of key recharge areas and direct users of groundwater resources, their engagement—guided by a dedicated community engagement plan that integrates traditional knowledge and local governance systems—will underpin participatory activities such as reforestation, ecosystem-based monitoring, and awareness-raising on sustainable land and water management practices.

192. Civil society organizations, non-governmental organizations, and women's organizations—including the Eastern Arc Mountains Conservation Endowment Fund (EAMCEF), the Jumuiya Water Fund, and women-led cooperatives—will play a key role in implementing NbS and PES schemes. Their experience in inclusive community engagement will support gender-responsive approaches,

youth participation, and the promotion of sustainable livelihood opportunities such as beekeeping and agroforestry.

193. Engagement with the private sector will span large-scale agricultural enterprises, such as the Tanzania Planting Company and commercial farms in the Loitokitok area, as well as small and medium-sized enterprises involved in horticulture and water-related activities. These stakeholders will be engaged in water allocation planning, groundwater demand management, and recharge protection, and may contribute to watershed restoration through corporate social responsibility (CSR) or green value-chain initiatives.

194. The finalization of Fugro's engagement experienced a short delay due to differing perspectives on the scope of technical responsibilities and modalities of collaboration. UNESCO ensured that the process remained aligned with country expectations, project objectives, and FAO's implementation framework, safeguarding coherence, transparency, and national ownership.

195. Overall, this multi-stakeholder approach ensures a holistic, inclusive, and technically sound project design and implementation. By embedding stakeholders across scientific assessments, policy dialogue, and field-level interventions, the project strengthens shared accountability, institutional capacity, and resilience.

196. This collaborative model will not only support the effective implementation of the Strategic Action Programme (SAP) but will also generate long-term co-benefits, including enhanced water security, improved ecosystem services, strengthened transboundary governance, and increased social equity. These outcomes are expected to endure well beyond the GEF funding cycle (see Stakeholder Engagement Plan, Annex J).

Private Sector Engagement

197. Private sector engagement in drilling activities in Kenya and Tanzania will be based on transparent and competitive procurement processes aimed at mobilizing companies with proven technical capacity and strong environmental, social, and health and safety (ESHS) performance. In Kenya, this includes firms such as the Kenya Electricity Generating Company (KenGen), whose experience in deep drilling, geophysical investigations, and geothermal well development is highly relevant for complex exploratory and monitoring boreholes in hard-rock and volcanic formations, as well as other qualified groundwater drilling contractors. In Tanzania, companies such as the Tanzania Geothermal Development Company (TGDC), TPC Ltd., and other licensed drilling firms will be engaged where their operational presence and technical expertise align with project needs.

198. All drilling contracts will be competitively tendered and governed by clear technical specifications, performance standards, and data-sharing requirements. Contractors will be required to provide complete subsurface datasets, including lithological logs, borehole construction details, and pumping test results, which will be integrated into the project's Groundwater Information Management System. This approach ensures high-quality technical outputs while contributing to the strengthening of a professional, accountable groundwater services market in both countries.

199. Fugro, an international geoscience company specializing in geological, geotechnical, and hydrogeological data acquisition and analysis, is recognized as a potential technical partner under the KTAS Project. Fugro's expertise in groundwater exploration, borehole siting, drilling supervision, remote sensing, and data management—including through platforms such as GeoDin—may support the design and implementation of the Groundwater Information Management System and associated capacity-building activities under Component 3. Any engagement will be aligned with country

expectations, project objectives, and FAO implementation frameworks, ensuring coherence, transparency, and national ownership.

200. Beyond technical service provision, the project recognizes the private sector as a critical stakeholder in the sustainable management of groundwater resources and associated ecosystems. As both a water user and a potential steward of natural resources, private sector actors have the capacity to influence water demand patterns, support ecosystem restoration, and catalyze long-term investments aligned with the Strategic Action Programme (SAP).

Sectoral Diversity and Engagement Modalities

201. Private sector actors engaged in the project span a broad spectrum, including large commercial agricultural enterprises (such as the Tanzania Planting Company and flower farms in the Loitokitok area), smallholder farmers, eco-tourism operators, bottled water producers, and nature-based product enterprises (e.g. honey and herbal products). These actors either abstract groundwater directly or depend on ecosystem services linked to recharge areas, including the cloud forests of Mount Kilimanjaro.

202. The project will engage private sector stakeholders through inclusive dialogue platforms, joint stewardship initiatives, and public–private partnerships focused on water use efficiency, pollution prevention, and recharge area protection. Particular emphasis will be placed on promoting green business practices, encouraging the adoption of water stewardship standards (such as Alliance for Water Stewardship certification), and facilitating co-investment in watershed restoration and conservation activities.

Contribution to Project Implementation

203. The private sector will contribute across multiple project components. Under Component 1, major agricultural water users, including TPC Ltd., will support the project by sharing data from existing groundwater monitoring systems and participating in assessments of abstraction patterns. These inputs will inform the refinement of the hydrogeological conceptual model and the development of equitable and sustainable water allocation scenarios.

204. Private drilling companies operating in Kenya and Tanzania and identified through the project's technical working groups will also be engaged to share borehole data, drilling logs, and lithological profiles. Their field-level experience and access to subsurface information will complement public datasets and enhance understanding of aquifer geometry, depth, and spatial variability in groundwater quantity and quality across the transboundary system.

205. Under Component 3, agribusinesses, tourism operators, and other enterprises located in recharge-sensitive areas will be targeted for participation in Payment for Ecosystem Services (PES) schemes, contributing financially to the conservation and restoration of upstream forests and recharge zones that underpin long-term water security.

206. Under Component 5, business associations and chambers of commerce will be engaged in awareness-raising initiatives, communication campaigns, and cross-border dialogues to promote a shared commitment to sustainable groundwater governance and the objectives of the KTAS Project.

Co-Benefits, Incentives, and Long-Term Partnerships

207. Engagement with the private sector will generate mutual benefits. Companies dependent on reliable groundwater supplies will benefit from improved aquifer management, reduced environmental

risks, and greater long-term water security, while the project will leverage private sector support for ecosystem restoration and governance interventions. Models such as the Jumuiya Water Fund illustrate how downstream beneficiaries—including hotels, exporters, and utilities—can invest in upstream conservation to safeguard recharge areas and reduce sedimentation.

208. The project will explore incentive mechanisms to encourage sustained private sector participation, including environmentally linked tax incentives where applicable, eco-certification schemes, and access to premium markets for companies adopting sustainable water and land use practices.

209. To ensure continuity beyond the GEF funding cycle, the project will promote the establishment or strengthening of multi-stakeholder water stewardship platforms, building on experiences such as the Kilimanjaro Water Stewardship Platform. These platforms will facilitate dialogue, knowledge exchange, and joint planning, embedding private sector engagement within long-term aquifer governance frameworks at local, national, and transboundary levels.

210. Overall, the project positions the private sector not merely as a beneficiary, but as an active partner and co-investor in the protection of the Kilimanjaro Transboundary Aquifer System. Through structured engagement, aligned incentives, and co-investment mechanisms, KTAS will support the mainstreaming of environmental sustainability within business practices and secure durable groundwater and ecosystem benefits.

Innovation & Transformative Change, Knowledge Management, Policy Coherence and Capacity Development

211. An integrated Knowledge Management and Learning (KML) strategy has been developed during the Project Preparation phase and is embedded across all components of the KTAS project. The approach is aligned with the GEF Knowledge Management Strategy (GEF/C.48/07/Rev.01) and reflects UNESCO-IHP's principles of open science, stakeholder-driven learning, and regional water cooperation. Activities have been clearly budgeted under the ProDoc, with an indicative delivery timeline and outputs described in the Results Framework and the KM implementation roadmap.

212. The KML approach aims to ensure that knowledge generated across the project cycle—scientific, institutional, community-based, and policy-related—is captured, synthesized, shared, and applied to enhance decision-making and support replication of good practices across other transboundary aquifers in Africa and beyond.

213. The KTAS PPG phase laid the groundwork for learning through participatory Working Groups (WG1–Drilling campaigns, WG2–Scientific and technical expertise, WG3–Recharge/Ecosystems), which co-produced key technical baselines and will remain active throughout implementation. This participatory methodology will be scaled up during the full project, including the development of joint monitoring tools, policy briefs, and pilot site learnings, ensuring continuity and feedback loops. Further, the project will benefit from relevant lessons from the Groundwater Governance GEF project (FAO-UNESCO-World Bank), the Lakes Jipe and Chala bilateral MoUs, EAC's water policy framework, and regional basin initiatives such as the Lake Victoria Basin Commission (LVBC).

214. As part of the project preparation phase, the formation of three Technical Working Groups (TWGs) was undertaken through a participatory and country-led process. The Ministries responsible for water in Kenya and Tanzania were formally consulted and tasked with nominating experts to the working groups based on thematic relevance and institutional mandates. The process ensured balanced representation from key government agencies, research institutions, and specialized technical bodies, including groundwater authorities, meteorological departments, and geological surveys. Each TWG

was aligned with a specific thematic area—hydrogeology and water resources, ecosystem and recharge management (including cloud forests), and governance and data-sharing frameworks. These working groups served as platforms for joint diagnostics, priority-setting, and knowledge exchange, and their composition reflected the transboundary and multi-sectoral nature of the Kilimanjaro Aquifer System. The TWGs played a critical role in consolidating baseline data, identifying knowledge gaps, validating conceptual models, and informing the design of project components and activities. Their inclusive formation and iterative engagement provided a strong foundation for regional ownership and technical coherence across the project.

Generation of New Knowledge

215. The project will generate new knowledge through field-based assessments, pilot interventions, and participatory engagement processes. Key knowledge products include the Transboundary Diagnostic Analysis (TDA), the Strategic Action Programme (SAP), harmonized hydrogeological and groundwater vulnerability maps, monitoring and data protocols, guidelines for Managed Aquifer Recharge (MAR) and cloud forest protection, policy briefs, institutional review documents, and documentation of traditional ecological knowledge.

216. These outputs will be informed by both scientific inquiry and co-production of knowledge with local stakeholders, including women and youth, indigenous knowledge holders, and community-based water user associations.

Knowledge Capture, Storage, capacity building and Reporting

217. UNESCO, as the Lead Executing Agency, will host the Hydro-Environmental Observatory (HEO), which will function as the central repository for project-generated data and knowledge. The HEO will standardize, quality-control, geo-reference, and store datasets in interoperable formats, and will be integrated with national information systems in Kenya and Tanzania, as well as regional and global platforms such as IHP-WINS and IW:LEARN.

218. Raw and processed datasets—including groundwater levels, water quality parameters, and socio-economic information—will be securely stored and periodically updated. Training needs identified during the PPG phase will inform targeted capacity-building activities for national experts, community water managers, and youth groups, emphasizing action-based learning, peer-to-peer exchange, and iterative learning processes.

219. Knowledge indicators and milestones are embedded in the Results Framework, including the number of knowledge products disseminated, stakeholders trained, and policies influenced. Annual knowledge synthesis reports and mid-term learning reviews will capture emerging lessons and inform adaptive management. Oversight will be provided by the Transboundary Technical Advisory Group and national coordination mechanisms.

Dissemination, Learning and Application

220. Knowledge will be disseminated through multiple pathways, including community feedback mechanisms and outreach materials in local languages; annual cross-border learning forums; targeted policy dialogues with national and regional institutions; training modules and toolkits for WRUAs, WUAs, forest user groups, and local authorities; and open-access platforms such as IW:LEARN, IHP-WINS, and the project's dedicated portal. Visual storytelling and documentary outputs will further enhance visibility and uptake.

221. A Knowledge Management and Learning Plan will be maintained and updated annually by the Project Management Unit, specifying responsibilities, timelines, and formats for key outputs.

222. Knowledge products will be designed to ensure applicability and scalability across similar transboundary aquifer contexts. Lessons from KTAS will inform regional dialogues under AMCOW's Strategic Groundwater Programme and EAC cooperation frameworks, and will provide replicable models for conjunctive water management, participatory monitoring, and ecosystem-based groundwater governance.

Contribution to Policy Coherence and Strategy Development

223. The PPG phase identified fragmentation and weak coherence across water, forest, land, and environmental policies in Kenya and Tanzania. While both countries possess robust legal frameworks, groundwater–forest linkages and transboundary governance mechanisms remain insufficiently addressed. Existing regional frameworks under the EAC, LVBC, and AMCOW provide valuable cooperation models but lack operational integration with national groundwater systems, underscoring the need for harmonized, science-based, and participatory policies to manage KTAS as a shared resource.

224. Through Component 4, the project will strengthen policy coherence by delivering a Strategic Action Programme and establishing a transboundary consultation mechanism. These instruments will define joint reforms, investment priorities, and governance arrangements for conjunctive surface- and groundwater management, while informing national policy updates related to recharge protection, MAR, and groundwater vulnerability mapping.

225. Alignment with regional instruments—including EAC environmental protocols, LVBC strategies, and AMCOW initiatives—will further reinforce policy coherence. Lessons from other GEF transboundary aquifer projects will inform the institutional and legal architecture of KTAS, promoting cooperative groundwater governance.

226. Partnerships with Water Funds and private-sector actors will support the translation of policy reforms into practice through innovative financing and stewardship mechanisms such as Payment for Ecosystem Services, recharge-zone restoration, and data-sharing initiatives, ensuring sustainability beyond the GEF funding cycle.

Leveraging Human, Institutional and Technical Capacities

227. Strengthening human, institutional, and technical capacities is central to the success of the KTAS Project. Capacity gaps identified during the PPG phase—including disparities in hydrogeological expertise, groundwater modelling, policy coordination, and enforcement—will be addressed through targeted interventions at national, subnational, and community levels, with attention to gender balance and the empowerment of women in technical roles.

228. Human capacity development will focus on national institutions such as Kenya's Water Resources Authority and Tanzania's Basin Water Boards, as well as decentralized entities. Training will cover groundwater monitoring, participatory mapping, vulnerability assessment, and environmental safeguards, while reinforcing the role of WRUAs and WUAs and promoting inclusive participation of women and youth.

229. At the institutional level, the project will support cross-border cooperation mechanisms, implementation of the Strategic Action Programme, and alignment of legal and institutional

frameworks. Peer learning will be facilitated through exchanges with basin organizations and shared aquifer initiatives in Africa and other regions.

230. Technically, the project will establish modern monitoring systems, including telemetry-enabled boreholes, GIS-based vulnerability mapping, and real-time data sharing through the HEO. Identified gaps in volcanology and advanced drilling techniques will be addressed through partnerships with academic institutions, applied training, and structured knowledge exchange.

231. Capacity-building efforts will be supported through GEF resources and co-financing from national governments, UNESCO, FAO, and local partners. These investments will enhance climate resilience, improve data-driven governance, and empower communities to sustainably manage groundwater resources.

Transformative Nature and Scaling-Up Potential

232. The KTAS Project is designed as a transformative model for integrated groundwater and ecosystem management in transboundary mountain systems. Its innovation lies in establishing a comprehensive science-policy-practice framework that addresses groundwater–forest–climate linkages in a shared aquifer originating in a mountain water tower.

233. Institutionally, the project will pioneer a Strategic Action Programme and a binational consultation body that can serve as a blueprint for future transboundary aquifer cooperation. The Hydro-Environmental Observatory and harmonized data protocols will institutionalize cross-border data exchange and provide a scalable governance model for other shared aquifers.

234. Financial and operational sustainability will be strengthened through partnerships with Water Funds, private-sector actors, and basin organizations, piloting Payment for Ecosystem Services and blended-finance approaches that link upstream recharge restoration with downstream water users.

235. Scaling-up will occur through horizontal replication across other aquifers, vertical integration into national and basin planning frameworks, and knowledge dissemination via IW:LEARN, South–South exchanges, and a proposed global “Network of Water Towers.”

236. Together, these pathways ensure that KTAS delivers long-term transformative impact, demonstrating how science-based governance, ecosystem protection, and sustainable financing can be scaled to secure groundwater resources across Africa’s critical water towers.

Gender Equality and Women’s Empowerment:

237. The project will be aligned with the GEF and FAO Policies on Gender Equality, the UNESCO Gender Equality Priority guidelines, and the GEF Gender Implementation Strategy. Moreover, it will also follow the guidelines contained in the TDA/SAP Manual being updated by IW Learn. The project is also in line with SDG 5 on Gender Equality, and the empowerment of women and girls, and it will therefore devote efforts to improve the meaningful participation of women in technical positions and in decision-making, particularly in groundwater management, and in the design and implementation of effective transboundary governance mechanisms. A Gender Integration, Equality and Social Safeguard Approach for Transboundary Aquifers (KTAS-GIESS) has been specifically developed for this project, with the overall goal of ensuring an equitable participation of women and ethnic minorities in project activities, and of fostering the empowerment of women in the KTAS, responding to the gender equality challenges identified (Annex K-1). It aims at providing a roadmap for full integration of

gender considerations into the project long-term Vision as well as inform and contribute to the SAP preparation. Details are provided in Annex K-2

238. The Water and Gender Action Plan (GAP) is provided in Annex K to ensure that gender considerations are taken into account during project formulation through a gender-responsive approach, and through specific activities directed to strengthen women's participation in decision-making.

239. During early project implementation, gender actions will be consolidated throughout the following interventions:

- TDA, including water, gender and livelihood analyses
- Capacity development to national stakeholders on the impacts of groundwater management and aquifer recharge on women and men's livelihoods.
- Creation of a system with Gender Focal Points at project levels to share information related to gender issues in groundwater management and groundwater-dependent livelihoods.

240. Gender mainstreaming is essential for ensuring equitable and sustainable water resource management recognizing the diverse roles, needs, and vulnerabilities of women and men. By integrating gender considerations, the project will enhance water security, promote sustainable development, and improve the well-being of all communities in the region.

241. The project will seek to amplify women's voices in shaping policies and actions related to the management of the Kilimanjaro Transboundary Aquifer System (KTAS) through gender-responsive consultations across sectors and disciplines, involvement of civil society and indigenous women in joint management discussions, gender-balanced representation in the agreed transboundary frameworks, among others. Currently, women are involved in various roles including as community citizen scientists at meteorological stations, river gauging stations and groundwater monitoring wells and contributing to a national target of 30% of women involvement.

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Footnote

[1] GW4R The program fosters cooperation with Ethiopia, Kenya, Somalia, and the Intergovernmental Authority on Development (IGAD), who will work together to tap into the region's largely untapped groundwater resources to cope with and adapt to drought and other climate stressors impacting their vulnerable borderlands. Djibouti and South Sudan have also expressed interest in joining the program subsequent phases.

[2] The Kilimanjaro volcano is not considered as totally extinct, but "dormant". Hence, groundwater contained within the volcanic edifice might have a geothermal potential that could be exploited for the cold storage of agricultural products, and many other uses.

[3] It is expected that at least two "basin infiltration schemes" for flood waters will be constructed, likely located in the lower slopes of Mt. Kilimanjaro (estimated cost 0,13$/m3 for 0,5Mm3/year scheme).

[4] The Kilimanjaro Water Stewardship Platform (KWSP) was established by the World Bank in the Usa-River sub-catchment within the Pangani Basin to include the stakeholders in the entire basin (both countries). The current role of the KWSP include improving catchment management,

strengthening IWRM governance, promoting water stewardship standards and enhancing water use efficiency. Expanding the platform's reach can facilitate long-term engagement and coordination among stakeholders throughout the aquifer, ensuring a more comprehensive and collaborative approach to water management in the Kilimanjaro region.

Institutional Arrangement and Coordination with Ongoing Initiatives and Project.

Please describe the Institutional Arrangements for the execution of this project, including financial management and procurement. If possible, please summarize the flow of funds (diagram), accountabilities for project management and financial reporting (organogram), including audit, and staffing plans. (max. 500 words, approximately 1 page)

- 242. As the GEF IA, FAO holds overall accountability and responsibility to the GEF for delivery of the results. FAO will provide oversight of project implementation and technical and support services as established in the GEF Policy to ensure that the project is being carried out in accordance with agreed standards and requirements. In the IA role, FAO will utilize the GEF fees to establish a Project Task Force (PTF) to provide technical support and guidance to the project. The PTF will also be supported by the relevant offices in FAO HQ such as the finance office, legal office, and administrative support from the FAO-GEF Unit (OCBD) as needed. The following actors compose the PTF:

  a. The Budget Holder (BH), based at FAO Regional Office in Accra, will provide oversight of day-to-day project execution;

  b. The Lead Technical Officer (LTO), FAO Regional Office in Accra, will provide oversight/support to the project's technical work;

  c. The Funding Liaison Officer(s) and the GEF Technical Officers (GTO) within FAO Headquarter will monitor and support the project cycle to ensure that the project is being designed and carried out in accordance with FAO and GEF minimum fiduciary and technical standards.

  Specifically, FAO responsibilities, as GEF agency, will include:

  - Administration of funds from GEF in accordance with the rules and procedures of FAO;
  - Overseeing project implementation in accordance with the project document, work plans, budgets, agreements with co-financiers including IMO and other rules and procedures of FAO;
  - Providing technical guidance to ensure that appropriate technical quality is applied to all activities concerned;
  - Conducting at least one supervision mission per year;
  - Reporting to the GEF Secretariat and Evaluation Office, through the annual Project Implementation Review, the Mid Term Review, the Terminal Evaluation and the Project Closure Report on project progress; and
  - Financial reporting to the GEF Trustee.

243. The United Nations Educational, Scientific and Cultural Organization (UNESCO) Regional Office for Eastern Africa will serve as the lead Executing Agency (Operational Partner – OP) for the

project. UNESCO will be responsible for the day-to-day coordination, management, and implementation of project activities in full compliance with the UN-to-UN Agreement signed with the Food and Agriculture Organization (FAO). As OP, UNESCO is accountable to FAO for the delivery of project results, operational oversight, timely reporting, and the effective and transparent use of GEF resources in line with FAO and GEF policies and fiduciary requirements. UNESCO's responsibilities, as GEF EA, will include:

a. Establishing and supporting the Project Management Unit (PMU)

b. Acting as Secretariat for the PSC;

c. Ensuring that the project is executed according to the agreed work plan and budget;

d. Reviewing and submitting the required reporting obligations to the IA in accordance with the FAO and GEF requirements as regulated in the UN-to-UN Agreement that will be established between FAO and UNESCO after the CEO Endorsement of the project;

e. Ensuring all procurement is done in compliance with Agency standards; and

f. Communicating with and disseminating information to the relevant project's stakeholders.

244. The Project Steering Committee (PSC) is the project's governing body. Co-chaired by the two countries through their Transboundary/International Waters departments (MoWSI–Kenya and MoW–Tanzania), it provides strategic oversight, approves the annual work plan and budget (AWP/B), reviews performance, and issues high-level guidance to the PMU. Voting authority rests with the two countries; FAO (IA), UNESCO (EA/OP), and Jumuiya/TNC Water Fund as the co-executing partner attend as non-voting members to provide technical, fiduciary and compliance assurance. The PSC may invite additional observers on an ad-hoc basis when agenda items require specialized input —e.g IHP National Committees, basin authorities (WRA/PBWB), academia and private sector—on an as-needed basis. Decisions are consensus-based between the two voting members; where consensus cannot be reached, the matter may be deferred for further consultation. The PMU serves as PSC Secretariat, preparing agendas and documentation, recording decisions, and tracking follow-up.

245. Other Each member agency will designate a Focal Point to:

(i) provide technical oversight for their respective sectoral activities;

(ii) ensure information exchange between their institution and the project;

(iii) promote coordination with ongoing national and regional initiatives; and

(iv) facilitate provision and tracking of co-financing contributions.

246. The PSC meets at least annually (with inter-sessional meetings as needed), operates with a quorum of the two voting country representatives, and takes decisions by consensus; UNESCO and FAO participate as non-voting members. The Secretariat (PMU) circulates documentation in advance, records decisions, and tracks actions. This design reinforces accountability, country ownership and technical quality while keeping IA/EAs in advisory roles at the decision table—consistent with GEF IW practice.

247. The Project Management Unit (PMU), hosted by the UNESCO Regional Office for Eastern Africa, and led by an International Chief Technical Advisor, is responsible for day to day operational

control of the project, technical coordination, financial management, monitoring and reporting , and communication across the two countries. The PMU will function as the secretariat to the PSC. The PMU serves as the central hub for inputs—consolidating and channeling feedback from national mechanisms, the Technical Committee (TC), the Knowledge & Scientific Advisory Board (KSAB), the Project Steering Committee (PSC), the Executing Agency (EA), and co-executing partners.

248. Technical leadership is channelled through a Technical Committee (TC) comprising country-appointed experts (strengthening the PPG Technical Working Groups) and National Coordinators. Drawn from ministries, basin water authorities and universities (e.g., University of Nairobi, Taita Taveta University, Sokoine University of Agriculture, NM-AIST, University of Dar es Salaam), the TC provides operational and thematic guidance on hydrogeology, ecosystems, data and information management, and gender and social inclusion. Participation in the TC is voluntary.

249. The Knowledge and Scientific Advisory Board (KSAB) consists of a distinguished group of regional and international experts in the fields of hydrogeology, volcanology, and hydrogeochemistry. This board serves as a valuable resource for providing on-demand advice to the Project Management Unit (PMU) and the Project Steering Committee (PSC). In addition, the SAB may also be consulted by the Technical Committees (TCs) when relevant expertise is needed. It is important to note that the KSAB operates in an advisory capacity only and does not hold any management or governance authority. When invited, members of the SAB participate in PSC sessions as non-voting observers, offering their insights and clarifications on specific matters. Participation in the SAB is entirely voluntary, allowing for flexibility in engagement while ensuring that the project benefits from the highest level of scientific guidance.

250. The project will ensure sustained and meaningful engagement of the Knowledge and Scientific Advisory Board (KSAB) and the Technical Committees (TCs) throughout the project lifecycle through structured and institutionalized mechanisms, despite their voluntary and advisory nature. This will include: (i) Formal integration into project processes: KSAB and TC inputs will be systematically linked to key deliverables and milestones (e.g., TDA, SAP, monitoring frameworks), with clearly defined roles and expected contributions; (ii) Scheduled and budgeted engagement: Regular meetings will be planned and aligned with critical project stages, ensuring predictable and continuous participation throughout implementation; (iii) Task-based contributions: Members will be engaged through targeted technical assignments and reviews of specific outputs, ensuring their expertise is applied where most relevant and impactful; (iv) Flexible participation modalities: Hybrid participation (virtual and in-person) will be enabled to facilitate consistent engagement across geographically dispersed members; (v) Documentation and continuity: Inputs, recommendations, and decisions will be systematically recorded and integrated into project outputs to ensure continuity and institutional memory; and (vi) Recognition and visibility: Contributions of KSAB and TC members will be acknowledged in key project outputs, knowledge products, and dissemination platforms, supporting sustained motivation and ownership.

251. During the PPG phase, three Technical Working Groups were established and actively engaged, demonstrating the practicality and effectiveness of structured technical engagement in supporting project design and decision-making. These mechanisms will ensure that engagement is structured, predictable, and directly linked to project implementation, thereby maintaining continuity and maximizing the value of expert contributions throughout the project duration. While the contributions of the Knowledge and Scientific Advisory Board (KSAB) and Technical Committees (TCs) are voluntary in nature, experience from similar transboundary groundwater and GEF-supported projects shows that sustained engagement can be effectively maintained through a combination of professional recognition, meaningful participation, and facilitation support. Incentives to encourage continued participation will therefore include: facilitation to participate in in-person workshops, technical meetings, learning exchanges, and selected field missions; opportunities for

professional networking and collaboration with regional and international experts and institutions; access to project data, knowledge products, and ecognition of members' technical contributions in key project outputs, scientific publications, policy briefs, and knowledge products; opportunities to contribute to high-level regional and transboundary policy and governance processes; technical learning platforms; and participation in visibility and dissemination events that strengthen institutional and individual profiles. In addition, the project will ensure that KSAB and TC contributions are directly linked to tangible project outputs and decision-making processes, thereby reinforcing ownership, relevance, and professional value throughout the project lifecycle.

252. The project's co-execution is led by the Transboundary/International Waters Departments within the two ministries—MoWSI (Kenya) and MoWI (Tanzania). Each will appoint a National Coordinator who serves as the country focal point to the PMU and leads the Technical Committee (TC) from each side, ensuring technical coordination, alignment with national programmes, and timely reporting on project's activities. Alongside these government leads, the Jumuiya Water Fund (JWF/TNC) is designated as a co-executing partner to implement agreed work packages and contribute to knowledge, stakeholder engagement, and on-the-ground delivery under UNESCO-managed agreements and co-financing arrangements. Together, these partners operationalize country-level execution while maintaining close coordination with the PMU, PSC, and KSAB The full description and terms of reference for the various bodies/agencies in the project governance is included in Annex B1.

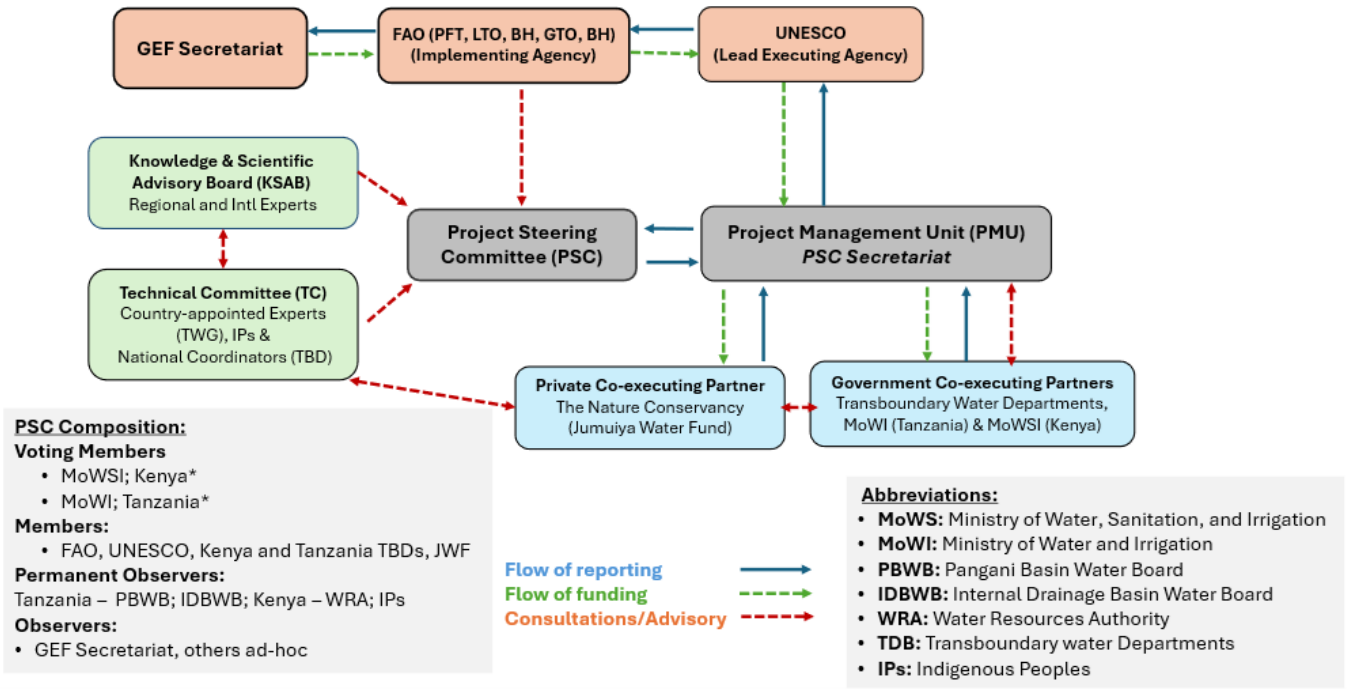
253. An Inception Workshop will take place within 3 months of the project's official start date of the Project with participation of the implementing and executing agencies, as well as key partners, to establish the PSC, agree on the specific details of the coordination mechanisms, as well as a project-level Knowledge Management and Communications strategy, partnership strategy, and arrangements for a cohesive project M&E plan.

Flow of Funding and Reporting

254. Funds from the GEF Trust Fund will be channelled to FAO (Implementing Agency), which will in turn be disbursed to UNESCO (Executing Agency). UNESCO will transfer funds to the co-executing partners through sub-contracts and activities implemented by national institutions (Transboundary Department in the MoWSI, Kenya and Transboundary Department, MoWI, Tanzania and Jumuiya water Funds. Reporting flows upward from implementing partners and the PMU to UNESCO, then to FAO and the GEF Secretariat, as illustrated below.

FIGURE 1: ORGANISATIONAL CHART FOR THE PROJECT

GEF11547: Institutional Arrangements, Flow of Funds and Reporting Duties



Footnote

[5] It should be noted that the identified Operational Partner(s) may change due to FAO internal due diligence and agreement procedures if not yet been concluded at the time of submission of the CEO Endorsement Request.

Will the GEF Agency play an execution role on this project?

If so, please describe that role here and the justification.

Also, please add a short explanation to describe cooperation with ongoing initiatives and projects, including potential for co-location and/or sharing of expertise/staffing (max. 500 words, approximately 1 page)

Core Indicators

Indicate expected results in each relevant indicator using methodologies indicated in the GEF-8 Results Measurement Framework Guidelines. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Indicator 3 Area of land and ecosystems under restoration

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

40000	71000	0	0

Indicator 3.1 Area of degraded agricultural lands under restoration

Disaggregation Type	Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

Indicator 3.2 Area of forest and forest land under restoration

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
40,000.00	71,000.00		

Indicator 3.3 Area of natural grass and woodland under restoration

Disaggregation Type	Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

Indicator 3.4 Area of wetlands (including estuaries, mangroves) under restoration

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

Indicator 7 Shared water ecosystems 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	Kilimanjaro Aquifer	Kilimanjaro Aquifer		
Count	1	1	0	0

Indicator 7.1 Level of Transboundary Diagonostic 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)
Kilimanjaro Aquifer	1	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)
Kilimanjaro Aquifer	1	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)
Kilimanjaro Aquifer	1	1		

Indicator 7.4 Level of engagement in IWLEARN throgh 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)
Kilimanjaro Aquifer	1	1		

Indicator 11 People benefiting from GEF-financed investments

	Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
Female	50,000	50,000		
Male	50,000	50,000		
Total	**100,000**	**100,000**	0	**0**

Explain the methodological approach and underlying logic to justify target levels for Core and Sub-Indicators (max. 250 words, approximately 1/2 page)

The project will generate results to be measured under Core Indicator 3 (area of land and ecosystems under restoration), more precisely its sub-indicators 3.2 (area of forest and forest land under restoration) estimated in 71,000 ha of the total cloud forest area in the intervention region (1,775,000 ha). The aim of the project is to restore the existing cloud forest rather than to create new protected areas. Target levels for Core and Sub-Indicators (7) correspond to those of GEF IW foundational projects.

The project, aimed at promoting transboundary cooperation for the sustainable management of the Kilimanjaro transboundary aquifer will contribute to Core Indicator 7 (shared water ecosystems under new or improved cooperative management).

For core indicator 11 (number of high and low intensity beneficiaries), the estimated value of 100,000, representing the population living in the aquifer region, half of whom are women, is confirmed.

Methodological Approach for Core Indicators

The methodological approach for establishing target levels for Core and Sub-Indicators will be grounded in a structured and data-driven framework that ensures relevance, accuracy, and alignment with the GEF Core Indicator Guidelines. Target values, including the 71,000 hectares under Sub-indicator 3.2, will be derived from baseline assessments, spatial delineation of intervention areas, and validated assumptions consistent with GEF principles.

The project will prioritize the restoration and improved management of existing ecosystems—particularly cloud forests and associated recharge areas—rather than the creation of new protected areas. The target of 71,000 hectares represents approximately 4% of the estimated 1,775,000 hectares of cloud forest systems within the broader intervention landscape. This proportion has been determined based on the spatial delineation of priority recharge zones, feasibility of interventions within the project timeframe, and alignment with available financing and implementation capacity, rather than a uniform landscape-wide coverage. Interventions will therefore be concentrated in priority areas where restoration, protection, and sustainable land and water management practices can generate the highest hydrological and ecosystem benefits. This targeted approach ensures that the project delivers measurable and impactful results, while establishing replicable models for scaling up beyond the project area.

The estimation will be supported by geospatial analysis, stakeholder consultations, and alignment with comparable GEF Integrated Water (IW) projects, ensuring methodological consistency and credibility. Intervention areas will include recharge zones, pilot landscapes, and groundwater-dependent ecosystems where improved practices will generate measurable environmental benefits.

In addition, the project's transboundary cooperation framework for the sustainable management of the Kilimanjaro aquifer will contribute to Core Indicator 7, reflecting strengthened cooperation over shared water systems. The project will also contribute to Core Indicator 11, with an estimated 100,000 direct beneficiaries, including a strong emphasis on women and vulnerable groups, ensuring that social inclusion and gender equality are integrated into project outcomes. Overall, this methodological framework will support robust monitoring and evaluation throughout implementation, combining spatial tracking, field verification, and national data systems. This will enable adaptive management and ensure that results remain measurable, verifiable, and aligned with GEF requirements.

Key Risks

	Rating	Explanation of risk and mitigation measures
CONTEXT		
Climate	Moderate	Risk: IPCC forecasts indicate that both countries will be heavily impacted by CC in terms of temperatures, precipitation, extreme events etc. all of which might complicate estimates of aquifer recharge, and other hydrogeological parameters. Mitigation: The Comprehensive Climate Impact Assessment incorporates historical data on temperature, precipitation, and extreme weather events alongside future projections. This will allow to implement Adaptive Management Strategies, including setting operational thresholds for groundwater extraction that can be adjusted as climate conditions change. Impacts of climate variability and change on the aquifer functioning (Component 1) will be factored in the assessment of present and future exploitable groundwater resources.
Environmental and Social	Low	Risks: Decreasing freshwater resources availability may lead to conflicts at the water-food-environment nexus. Mitigation: Improved understanding at the national, regional and local levels of the aquifer system extent, vulnerability, and potentialities will help reconcile competing uses of surface and groundwater. Increased availability of groundwater produced by the project might cause over-exploitation. Mitigation: Advanced monitoring equipment installed by the project will detect over-abstraction in real time. Although this will not prevent over-abstraction per se, the activities funded by the project will encourage the development and implementation of appropriate policies and regulations.

Political and Governance	Moderate	Risk: Legislative and policy changes aimed at reforming informal institutions and behaviours required to ensure the long-term sustainability of groundwater exploitation are novel to the region. Mitigation: Targeted capacity reinforcement involving all administrative levels and local communities, facilitating the introduction of innovative approaches to groundwater governance and management.
INNOVATION		
Institutional and Policy	Low	Risk: Differences in institutional arrangements, policy approaches, and administrative procedures between Kenya and Tanzania may require additional time and coordination to fully harmonize groundwater management frameworks and operationalize transboundary cooperation mechanisms for the Kilimanjaro Transboundary Aquifer System. Periodic changes in institutional leadership or policy focus could influence the pace of policy alignment and joint decision-making processes. Mitigation: The project addresses this risk by strengthening existing binational technical working groups, supporting the development and ministerial endorsement of a jointly agreed SAP, and institutionalizing a permanent transboundary consultation and information-exchange mechanism. An adaptive project governance and M&E framework, including regular policy and risk reviews, will enable timely adjustments and reinforce sustained institutional engagement throughout implementation.
Technological	Low	Risk: The project will introduce modern technologies for groundwater exploratory surveys and drilling, multi-purpose real time aquifer monitoring and data management that are novel to the region. Mitigation: Adopted technologies have been proven effective in similar geologic and socioeconomic contexts.
Financial and Business Model	Low	Risk: Macroeconomic volatility or shifts in national budgetary priorities in Kenya and Tanzania could affect the timely mobilization of co-financing and increase the costs of key project inputs such as drilling services, monitoring equipment, and nature-based solutions. These factors may pose risks to implementation efficiency and the long-term financial sustainability of groundwater monitoring and recharge protection measures. Mitigation: The project mitigates this risk through diversified co-financing, phased implementation, and an adaptive M&E framework with periodic financial and risk reviews. Long-term sustainability is strengthened by integrating groundwater management costs into national and basin-level budgets and by promoting complementary financing mechanisms, including water funds and payment for ecosystem services schemes.
EXECUTION		
Capacity	Low	Risk: The Executing Agency will engage national entities and experts in all project activities. Mitigation: Throughout its implementation the project will build capacity of countries' relevant entities in groundwater assessment and management.

Fiduciary	Low	Risk: Mismanagement of donor funds. Mitigation: UNESCO and FAO have comprehensive financial management and procurement systems in place that ensure no misuse of GEF funds occurs. FAO and UNESCO will be fully responsible for administering the funds in accordance with their financial regulations, rules, policies and procedures, and administrative instructions, in accordance with the common UN practices.
Stakeholder	Low	Risk: Inadequate participation, engagement and inclusion of stakeholders, may impact results and may affect country ownership and partnerships. Mitigation: Full stakeholders' participation to project design and implementation – in particular of local communities, women, and the private sector - is one of the key targets and mode of operation of the project.

Other	Moderate	Land Access for Managed Aquifer Recharge (MAR) Risk: Securing land access and tenure rights for the implementation of MAR structures and recharge interventions may face delays due to unclear ownership, competing land uses, or community resistance. Mitigation: Early stakeholder engagement and participatory site selection will ensure alignment with community priorities and local development plans. Agreements with landowners and local authorities will be formalized prior to construction. The project will prioritize community-based recharge schemes and integrate land-use planning to minimize potential conflicts. Lands authorities will also be engaged in both countries at the early stages of the project Mitigation: Early stakeholder engagement and participatory site selection will ensure alignment with community priorities and local development plans. Agreements with landowners and local authorities will be formalized prior to construction. The project will prioritize community-based recharge schemes and integrate land-use planning to minimize potential conflicts. Lands authorities will also be engaged in both countries at the early stages of the project.

Overall Risk Rating	Low	The overall project risk is considered low, given the strong institutional framework, adaptive management approach, and extensive stakeholder participation. Moderate risks related to climate, governance, monitoring, and land access for MAR are adequately mitigated through targeted capacity-building, participatory planning, and institutional coordination.

C. ALIGNMENT WITH GEF-8 PROGRAMMING STRATEGIES AND COUNTRY/REGIONAL PRIORITIES

Explain how the proposed interventions are aligned with GEF- 8 programming strategies and country and regional priorities, including how these country strategies and plans relate to the multilateral environmental agreements.

For projects aiming to generate biodiversity benefits (regardless of what the source of the resources is - i.e., BD, CC or LD), please identify which of the 23 targets of the Kunming-Montreal Global Biodiversity Framework the project contributes to and explain how.

Confirm if any country policies that might contradict with intended outcomes of the project have been identified, and how the project will address this. (max. 500 words, approximately 1 page)

255. The proposed project aligns with Objective 3 of the GEF-8 Programming Directions for the International Waters focal area, which emphasizes the enhancement of water security in shared freshwater ecosystems. Recognizing the critical role of groundwater in ensuring food, water, and ecosystem security, as well as resilience to a changing climate, the project is designed to introduce transformative changes in the management of shared water resources. In accordance with the Programming Directions, the project will support various actions, including the formulation of Transboundary Diagnostic Analysis and Strategic Action Programs, implementation of conjunctive surface and groundwater management, capacity-building for synthesizing scientific and local knowledge, and mainstreaming these insights into decision-making processes. Additionally, the project aims to contribute to the achievement of SDG 6.5 and 6.6 targets, as well as compliance with the Water Convention (UNECE) and the UNGA Resolution on Transboundary Aquifers.

256. In addition, the proposed project is fully aligned with the pertinent river basin management plans and environmental priorities of both Kenya and Tanzania. It adheres to the broader objective of sustainably developing groundwater resources by bolstering transboundary cooperation and enhancing hydrogeological knowledge. The project is poised to actively support the implementation of Water Sector Development Plans and National Environmental Master Plans in both countries. This support will be achieved through the creation of the enabling conditions for the establishment of robust governance frameworks for transboundary groundwater resources, including comprehensive assessments and quantification of shared water resources, harmonized monitoring protocols, and sustained engagement of national and local stakeholders (all Components).

257. The project's approach is deeply rooted in the strong foundation of transboundary water governance established by Kenya and Tanzania through various regional initiatives. Building on the East African Community (EAC) framework, and in particular Article 40 on Environmental Management of the protocol, which was established in 1999, and other key subsequent protocols such as the 2002 Protocol on Shared Watercourses and the 2003 Protocol for Sustainable Development of the Lake Victoria Basin, the project seeks to create robust linkages with regional bodies like the and the ,Nile Basin Initiative (NBI), EAC and the Lake Victoria Basin Commission (LVBC). By leveraging these connections, the project aims to facilitate joint studies on transboundary water resources and develop effective management arrangements for transboundary aquifers. The experience gained from major projects such as LVEMP II and the Mara River Basin Projects co-implemented by both Kenya and Tanzania further strengthens the project's capacity to contribute to sustainable water resource management across borders by leveraging on lessons learnt. This strategic collaboration is intended to set a regional benchmark in hydrogeological assessments, diagnostics, and the formulation of groundwater governance frameworks at both national and transboundary levels. SADC's experience in regional collaboration and policy development can guide the creation of effective governance structures and ensure successful data sharing and stakeholder engagement, ultimately leading to a more efficient and sustainable management system for the Kilimanjaro Aquifer.

258. Moreover, the project aligns with the Blue Economy Strategy and Action Plan for the East African Community (EAC) under the Strategic priority 3 on “Implementing regional initiatives on watershed management”. This strategic priority area advocates for regional activities to be implemented in-line with a watershed management approach. Watershed management takes a broader spatial perspective of management and also includes the surface management of land, rivers, lakes, wetlands and swamplands in a holistic and integrated manner.

259. It is foreseen that the project will provide evidence and knowledge to expand the content of the Action Plan to include the transboundary groundwater element and the conjunctive management of the freshwater resources within the watershed.

260. The element of groundwater has not been well articulated in the EAC and the project will provide an opportunity to a paradigm shift form a surface water driven approach to a more water security approach integrating the concepts of IWRM and flood and drought management.

Alignment with NDCs, NBSAPs and related national frameworks

261. The project is fully aligned with national commitments under Multilateral Environmental Agreements (MEAs), including Nationally Determined Contributions (NDCs) and National Biodiversity Strategies and Action Plans (NBSAPs), by strengthening climate-resilient groundwater management, protecting critical ecosystems, and supporting sustainable and inclusive water governance frameworks in both Kenya and the United Republic of Tanzania.

Kenya – Alignment with NDCs, NBSAPs and related national frameworks

262. In Kenya, KTAS is designed to operationalize national climate and biodiversity commitments by shifting groundwater management in the Kilimanjaro–Amboseli–Tsavo landscape from fragmented approaches toward a data-driven, climate-resilient and ecosystem-based framework. The project aligns with Kenya's climate priorities under the Paris Agreement by strengthening groundwater as a strategic climate buffer in water-stressed ASAL areas (notably Kajiado and Taita Taveta), through improved understanding of aquifer dynamics, recharge processes, and groundwater–surface water interactions. This directly supports Kenya's adaptation objectives on water security, drought risk management and nature-based solutions (Kenya NDC 2031–2035; NCCAP 2023–2027; National Adaptation Plan 2015–2030).

263. KTAS also supports biodiversity commitments by protecting and restoring recharge ecosystems and groundwater-dependent ecosystems (GDEs) that sustain springs, wetlands and key conservation landscapes, including linkages relevant to Amboseli and other downstream ecosystems. By prioritizing protection and restoration of critical recharge zones (including cloud-forest recharge areas) and integrating ecosystem safeguards into groundwater planning, the project advances national goals on ecosystem restoration, conservation of priority areas, and sustainable water use (Kenya NBSAP 2019–2030; Kenya NBSAP 2025–2030; Forest Conservation and Management Act, 2016).

264. Institutionally, KTAS reinforces Kenya's policy direction on strengthened water governance, monitoring and evidence-based regulation by supporting modern groundwater monitoring networks (including telemetry-enabled observation systems), harmonized data standards, and decision-support tools for allocation and risk management, consistent with national water and planning frameworks (Water Act, 2016; National Water Master Plan 2030; National Water Resources Strategy 2020–2025; Kenya Vision 2030). The project further advances inclusive governance commitments by strengthening participation and leadership of women and local stakeholders in water management structures such as WRUAs, consistent with Kenya's national and GEF gender objectives.

United Republic of Tanzania – Alignment with NDCs, NBSAPs and related national frameworks

265. In Tanzania, KTAS is designed to advance national climate and biodiversity commitments by strengthening climate-resilient water resources management and safeguarding ecosystems that sustain recharge, baseflows, and groundwater-dependent services in the Kilimanjaro "water tower" landscape. The project aligns with Tanzania's adaptation priorities under the Paris Agreement by improving the evidence base for groundwater sustainability and drought preparedness through aquifer characterization, recharge-zone mapping, harmonized monitoring, and climate-informed assessment to support resilient water supply for households, agriculture, and productive sectors (Tanzania Updated NDC, 2021; Tanzania National Climate Change Strategy). By strengthening long-term underground storage functions and linking groundwater planning to

climate variability and extremes, KTAS supports Tanzania's commitments on water security, risk reduction, and institutional capacity development (Tanzania Updated NDC, 2021).

266. KTAS also supports Tanzania's biodiversity priorities by protecting and restoring critical recharge ecosystems—including cloud forests and associated wetlands—and improving the management of aquifer-supported ecosystems that underpin biodiversity and community livelihoods. By embedding ecosystem safeguards into water planning and strengthening monitoring and information systems, the project contributes to national priorities on ecosystem restoration, protection of key habitats, sustainable natural resource management, and strengthened environmental governance consistent with the Kunming–Montreal Global Biodiversity Framework (Tanzania NBSAP 2025–2030). The project's approach will also reinforce inclusive governance, including meaningful participation of women and local resource users in recharge stewardship, ecosystem protection, and adaptive water management processes (Tanzania NBSAP 2025–2030; Tanzania Updated NDC, 2021).

267. Institutionally, KTAS reinforces Tanzania's national direction on strengthened water governance and sector coordination by supporting harmonized transboundary monitoring protocols, shared information products, and cooperative decision-making mechanisms that enhance accountability and evidence-based planning (Tanzania National Water Policy; Water Sector Development Programme). At sub-basin level, KTAS will align technically with ongoing Tanzanian initiatives that strengthen catchment conservation incentives and ecosystem resilience—such as efforts in the Kikuletwa catchment and Lake Chala management—so that recharge protection and monitoring approaches are mutually reinforcing and sustainable (relevant Ministry-led programmes). Overall, KTAS provides a practical pathway to translate Tanzania's national climate and biodiversity commitments into coordinated, transboundary action with durable water-security, ecosystem, and resilience benefits.

Coordination with Regional and Transboundary Initiatives

268. The project will benefit from and build upon similar initiatives in the region focusing on the management and governance of transboundary aquifers, including GEF Project ID 9912 and ongoing cooperation efforts in the Nile Basin and East Africa.

Coordination across these initiatives will be systematically operationalized through:

- joint technical planning and alignment during the inception phase
- harmonization of methodologies, tools, and data standards (e.g., hydrogeological assessments, monitoring systems)
- integration and interoperability of groundwater data platforms
- regular coordination meetings and technical exchanges at national and transboundary levels
- participation in shared regional knowledge platforms and communities of practice

269. UNESCO, as Executing Agency, will ensure coordination across its Regional Office for Eastern Africa, national offices, and headquarters, while working closely with FAO (Implementing Agency) to ensure alignment in safeguards, stakeholder engagement, monitoring and evaluation, and reporting. This approach ensures that the project leverages existing investments, avoids duplication, enhances cost-effectiveness, and maximizes co-financing impact in line with GEF principles.

(i) Coordination with UNESCO-led and Regional Programmes

270. The project will leverage a portfolio of complementary UNESCO-led and regional programmes that directly reinforce KTAS components.

These include:

- GW4R / IGAD Groundwater Information System (GWIS): KTAS will align its data architecture, standards, and monitoring protocols with GWIS to ensure interoperability and regional data integration.

- Horn of Africa Groundwater Access Facility (HoA-GaFa): KTAS will adopt and adapt governance and diagnostic approaches developed under HoA-GaFa, particularly for transboundary cooperation.

- CRIDA application in the Pangani Basin: KTAS will integrate climate risk-informed decision-making approaches into groundwater use planning and investment prioritization.

- Lake Turkana initiative (UNESCO–WFP): Lessons on groundwater–livelihood linkages and climate resilience in ASAL contexts will inform KTAS pilot interventions.

- Adaptation for Water Access and Resilience in Ewaso Nyiro River Basin (AWARE) Project (Adaptation Fund): KTAS will directly build on MAR design, nature-based solutions, and multi-agency coordination mechanisms developed under AWARE.

Operational coordination will be ensured through:

- shared technical teams and cross-project participation in design and implementation activities

- alignment of pilot interventions and methodologies (e.g., MAR, NbS, monitoring systems)

- joint knowledge products and dissemination platforms

- regular internal coordination within UNESCO and with partners

(ii) Coordination with World Bank and GEF Investments

271. The project will establish strong synergies with major investment programmes, including the Groundwater for Resilience (GW4R) Programme and other World Bank-supported initiatives.

KTAS will:

- provide hydrogeological data, assessments, and transboundary frameworks to inform investment decisions

- align monitoring systems and data platforms to ensure compatibility with GW4R/GWIS systems

- ensure that KTAS outputs directly inform infrastructure investments (e.g., boreholes, irrigation schemes, water supply systems)

- reduce risks of over-abstraction through coordinated planning and shared data

272. This ensures that KTAS functions as an upstream knowledge and governance platform that strengthens the sustainability and impact of downstream investments.

(iii) Coordination with Ongoing Projects in Tanzania

273. In Tanzania, coordination will be ensured through structured engagement with Ministry-led and donor-supported initiatives.

This includes:

- alignment of recharge zone protection, ecosystem restoration, and monitoring approaches with initiatives such as the Kikuletwa catchment and Lake Chala programmes
- technical coordination with GIZ-supported programmes on water security and climate resilience
- strengthening collaboration with the Pangani Basin Water Office (PBWO), including integration of groundwater data, regulatory frameworks, and private sector engagement

Operational mechanisms include:

- participation in basin-level coordination platforms
- joint planning sessions with Basin Water Boards and sector agencies
- harmonization of monitoring and data systems
- coordinated engagement with NGOs, CBOs, and research institutions

(iv) Coordination with Ongoing Projects in Kenya

274. In Kenya, KTAS will coordinate closely with major national programmes and investments in water security and climate resilience.

These include:

- Kenya Water Security and Climate Resilience Project (KWSCRP-1)
- Groundwater Resource Mapping and Modelling Programme
- Groundwater for Resilience (GW4R) Programme

Coordination will be operationalized through:

- integration of KTAS data and assessments into national groundwater information systems
- alignment of transboundary frameworks with national regulatory and planning processes
- joint technical reviews and validation of outputs with implementing agencies through the project technical working groups
- coordination of investments to ensure sustainable abstraction and allocation

275. The project will also build on co-financed initiatives such as the Jumuiya Water Fund, including its engagement through the Arusha office in Tanzania, thereby strengthening its role at the transboundary aquifer (TBA) level. KTAS will adapt and scale tested approaches across both countries, including:

- nature-based solutions (NbS) for recharge and catchment restoration

- payment for ecosystem services (PES) schemes
- community-based engagement and monitoring systems

276. This transboundary collaboration will ensure harmonized approaches to catchment management, incentive mechanisms, and stakeholder engagement across the shared aquifer system.

Furthermore, KTAS will strengthen collaboration with national regulatory institutions, including the Water Resources Authority (WRA) in Kenya and corresponding authorities in Tanzania, to:

- support regulatory functions, permitting processes, and sustainable groundwater allocation
- enhance groundwater monitoring and data management systems
- promote participatory water governance through Water Resource Users Associations (WRUAs/WUAs) and related community structures

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Footnote

[6] Focus will be on Tanzania's Pangani Basin Authority and Internal Basin Authority.

D. POLICY REQUIREMENTS

Gender Equality and Women's Empowerment

We confirm that gender dimensions relevant to the project have been addressed during Project Preparation as per GEF Policy and are clearly articulated in the Project Description (Section B).

Yes

1) Does the project expect to include any gender-responsive-measures to address gender gaps or promote gender equality and women's empowerment?

Yes

If the project expects to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment, please indicate in which results area(s) the project is expected to contribute to gender equality:

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

2) Does the project's results framework or logical framework include gender-sensitive indicators?

Yes

Stakeholder Engagement

We confirm that key stakeholders were consulted during Project Preparation as required per GEF policy, their relevant roles to project outcomes has been clearly articulated in the Project Description (Section B) and that a Stakeholder Engagement Plan has been developed before CEO endorsement**.**

Yes

Select what role civil society will play in the Project

Consulted only;

Member of Advisory Body; Contractor; Yes

Co-financier;

Member of project steering committee or equivalent decision-making body ;

Executor or co-executor;

Other (Please explain)

Private Sector

Will there be private sector engagement in the project?

Yes

And if so, has its role been described and justified in section B project description?

Yes

Environmental and Social Safeguards

We confirm that we have provided information regarding Environmental and Social risks associated with the proposed project or program, including risk screenings/ assessments and, if applicable, management plans or other measures to address identified risks and impacts (this information should be presented in Annex E).

Yes

Please provide overall Project/Program Risk Classification

Overall Project/Program Risk Classification

PIF	CEO Endorsement/Approval	MTR	TE
Low	Low		

E. OTHER REQUIREMENTS

Knowledge management

We confirm that an approach to Knowledge Management and Learning has been clearly described during Project Preparation in the Project Description and that these activities have been budgeted and an anticipated timeline for delivery of relevant outputs has been provided.

Yes

Socio-economic Benefits

We confirm that the project design has considered socio-economic benefits to be delivered by the project and these have been clearly described in the Project Description and will be monitored and reported on during project implementation (at MTR and TER).

277. The KTAS Project generates significant socio-economic co-benefits by strengthening water security, climate resilience, and ecosystem integrity across the transboundary Mount Kilimanjaro region shared by Kenya and Tanzania. By improving scientific understanding, governance, and sustainable use of groundwater resources through an integrated surface–groundwater and ecosystem-based approach, the project enhances livelihoods, food security, and economic stability for communities dependent on the Kilimanjaro Water Tower. These benefits directly support the Global Environment Facility's (GEF) "Healthy Planet, Healthy People" framework, ensuring that improved groundwater management translates into tangible and lasting social and economic outcomes.

278. At the community and household level, improved access to reliable and safer groundwater supplies will reduce vulnerability to droughts, seasonal water scarcity, and climate variability. Enhanced groundwater availability for domestic use, livestock, and small-scale irrigation will lower the time and labor burden associated with water collection—particularly for women and girls—freeing time for education, income-generating activities, and community participation. The project's attention to groundwater quality, including fluoride assessment and mitigation measures, will contribute to better public health outcomes by reducing exposure to water-related diseases.

279. At the livelihood and local economy level, the project supports more resilient agricultural and pastoral systems by stabilizing water availability during dry periods and improving conjunctive use of surface and groundwater resources. Increased water reliability will help sustain crop production, livestock health, and related value chains, thereby reducing income volatility for farmers and pastoralists. Nature-based solutions, recharge protection measures, and managed aquifer recharge pilots will create short- and medium-term employment opportunities in ecosystem restoration, forest protection, monitoring, and maintenance activities, with deliberate inclusion of women, youth, and local community groups.

280. At the institutional and capacity-development level, the project will strengthen human capital and professional opportunities in groundwater science, water governance, and environmental management. Targeted training programs, technical exchanges, and the establishment of the Kilimanjaro Hydro-Environmental Observatory will professionalize groundwater-related careers and build a skilled cohort of technicians, data analysts, water managers, and planners in both countries. These investments contribute to

decent rural employment by enhancing job stability, technical competencies, and long-term career pathways in the water and environmental sectors.

281. At the transboundary and governance level, improved cooperation between Kenya and Tanzania will reduce conflict risks associated with water scarcity and competing water uses. The development of a Transboundary Diagnostic Analysis (TDA), the endorsement of a Strategic Action Programme (SAP), harmonized monitoring systems, and a permanent consultation mechanism will strengthen policy coherence, transparency, and trust between institutions. This enabling environment will attract future public and private investments in climate-resilient water infrastructure, sustainable agriculture, ecosystem restoration, and water-efficient technologies, generating broader economic spillover effects across the region.

282. These socio-economic benefits enhance resilience to climate change, support inclusive and gender-responsive development, and safeguard the natural capital underpinning the Kilimanjaro region's economies. By linking groundwater sustainability with livelihoods, health, and institutional strengthening, the KTAS Project ensures that environmental gains are translated into equitable and durable socio-economic improvements for present and future generations.

ANNEX A: FINANCING TABLES

GEF Financing Table

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

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Programming of Funds	Grant / Non-Grant	GEF Project Grant($)	Agency Fee($)	Total GEF Financing ($)
FAO	GET	Regional	International Waters	International Waters: IW-3	Grant	7,105,936.00	675,064.00	7,781,000.00
Total GEF Resources ($)						**7,105,936.00**	**675,064.00**	**7,781,000.00**

Project Preparation Grant (PPG)

Was a Project Preparation Grant requested?

true

PPG Amount ($)

200000

PPG Agency Fee ($)

19000

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Programming of Funds	PPG($)	Agency Fee($)	Total PPG Funding($)

FAO	GET	Regional	International Waters	International Waters: IW-3	200,000.00	19,000.00	219,000.00
Total PPG Amount ($)					**200,000.00**	**19,000.00**	**219,000.00**

Please provide Justification

Sources of Funds for Country Star Allocation

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Sources of Funds	Total($)
Total GEF Resources					**0.00**

Focal Area Elements

Programming Directions	Trust Fund	GEF Project Financing($)	Co-financing($)
IW-3	GET	7,105,936.00	56534759
Total Project Cost		**7,105,936.00**	**56,534,759.00**

Confirmed Co-financing for the project, by name and type

Please include evidence for each co-financing source for this project in the tab of the portal

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount($)
Recipient Country Government	MoWSI - Kenya	In-kind	Recurrent expenditures	23000000
Recipient Country Government	MoW - Tanzania	In-kind	Recurrent expenditures	5324000
Recipient Country Government	MoW - Tanzania	Public Investment	Investment mobilized	5926000
Others	UNESCO	In-kind	Recurrent expenditures	448000
GEF Agency	FAO	Grant	Investment mobilized	14707175
Others	JWF	Grant	Investment mobilized	1000000
GEF Agency	FAO	In-kind	Recurrent expenditures	327584
Others	UNESCO	Grant	Investment mobilized	5802000
Total Co-financing				**56,534,759.00**

Please describe the investment mobilized portion of the co-financing

USD 5,926,000 Government of Tanzania – Enhancing Climate Change Resilience Through Lake Chala Management is a Government of Tanzania initiative focused on strengthening climate resilience in the Lake Chala area. This investment supports strategic actions related to groundwater protection and development that are closely aligned with, and complementary to, the objectives of the KTAS project.

USD 14,707,175 FAO - this amount corresponds to a number of projects implemented by FAO in the same region that directly and indirectly contribute to the same objectives of the proposed Kilimanjaro Water Tower project. The proposed co-financing will be fully detailed in the corresponding co-financing letter from FAO at the CEO endorsement stage.

Digital Land Governance Programme (DLGP) –GCP/KEN/111/EC and Land and Justice Assessments towards Tenure Security – TCP/KEN/4005

- The expected outcome of both the DLGP and the Land Justice Assessment towards Tenure Security, i.e. improved security of tenure and equitable access to land and natural resources for enhancement of livelihoods and sustainable socioeconomic development complements and reinforces the KTAS projects outcomes. As the DLGP and its related project helps to improve the land tenure and equitable access to land, the KTAS aims to address key barriers such as Inadequate Groundwater Governance Frameworks will ensure that communities do not only have land tenure security but also have equitable access to water resources to improve and enhance sustainable livelihoods.

Boosting Sustainable Food Production in Kenya (BSFPK) – UNJP/KEN/117/EC

- One of the results areas expected by the BSFPK project is to “Promote adoption and establishment of innovative water harvesting techniques, including efficient utilization of water for productive use” This aligns with and will contribute to the a number of KTAS outputs including Output 2.1.3, Pilot demonstrations of (i) managed underground water storage/retrieval systems, and of (ii) flood water management including through nature-based and other technical solutions and output 2.1.5 as well as outcome 3.2: Increased capacity of national water managers and local communities including women to conjunctively manage surface and groundwater. The BSFPK result area is not only complementary and contributory but also lessons learnt from the BSFPK project can be adapted and/or scaled up to achieve the KTAS outcomes and outputs.

Inclusive and sustainable coffee value chain in Kenya (UNJP/KEN/206/UNJ)

- Outcome 2 Intensified sustainable production of the Inclusive and sustainable coffee value chain in Kenya project contributes to and reinforces the KTAS project outcomes.

Enabling Gender Responsive Circular and Sustainable Blue Economies for Kenya s Coastal Communities (UNJP/KEN/131/UNJ)

-The specific output of this project i.e. “Increased inclusive and sustainable green and blue production, investments, and technologies (including digital) in the productive, service sectors and sustainable consumption to create resilient livelihoods for the benefit of youth, women, PWDs, people in ASALs and in urban informal settlements” complements and contributes to the global goals of the KTAS project global objectives and the lessons learnt from the Gender Responsive project will be instrumental in the implementation of the relevant outputs of the KTAS project.

Data for Digital Agriculture Transformation (UNJP/URT/167/UNJ)

-This project aligns and contributes to the outcomes and outputs under Component 5 of the KTAS project. The stakeholder coordination framework expected under the project will contribute indirectly to the achievement of the relevant KTAS project components and outcomes.

Strengthening Plant Health Services in Tanzania for enhanced Food safety (GCP /URT/162/EC)

- This project aligns with and contributes to the global objective of the KTAS project in insuring sustainable livelihoods.

TCP/URT/4004: Support on Policy Coordination to Strengthen Agri-Food Systems Transformation

-This project aligns with and contributes to the global objective of the KTAS project in insuring sustainable livelihoods.

1,000,000 Jumuiya Water Fund, TNC - Source Water Protection Program- Direct grant investment for establishment of Jumuiya Water Fund for conservation of all key water source for Mombasa city (a public – Private partnership) through investing in Nature Based solutions. Activities include establishment of long-term governance system, sustainable land management incentives scheme, training of River Water Users Associations, seedlings production and installation of automated, real-time river flow monitoring equipment as well as establishment of a relational database to track results.

UNESCO's USD 5,802,000 in mobilized investments is justified by its portfolio of ongoing, funded programmes that directly support and complement the KTAS project objectives across groundwater resilience, climate adaptation, livelihoods, and transboundary water governance in East Africa. In essence, the justification rests on three points:

- First, existing investments are already aligned with KTAS components. Projects on Lake Turkana, groundwater systems (GW4R, HoA-GaFa), flood resilience in the Tana Basin, and climate–peace linkages in Madagascar all generate tools, data systems, governance frameworks, and field-tested solutions that KTAS will directly use (e.g., groundwater information systems, early warning tools, aquifer mapping, and basin planning approaches).

- Second, a significant share of these project budgets is explicitly attributable as co-financing because their outputs, capacities, and infrastructure are not standalone—they are technically and operationally integrated into KTAS implementation. This includes data platforms, capacity building, policy support, and climate-resilient water management solutions applied in the same countries and transboundary contexts.

- Third, the programmes collectively strengthen regional impact and scalability, by supporting IGAD-level coordination, cross-border governance, and climate-resilient livelihoods. This ensures KTAS is not an isolated intervention but part of a broader, financed ecosystem of investments, reducing duplication and increasing effectiveness.

In short: UNESCO is not pledging new funds, but leveraging already committed investments that directly feed into KTAS outcomes, making them legitimate and quantifiable co-financing totaling USD 5,802,000. A detailed description it is provided in the co-financing letter.

ANNEX B: ENDORSEMENTS

GEF Agency(ies) Certification

GEF Agency Type	Date	Project Contact Person	Phone	Email
GEF Agency Coordinator	12/12/2025	Jeffrey Griffin		jeffrey.griffin@fao.org
Project Coordinator	12/12/2025	Lucilla Minelli		lucilla.minelli@fao.org
Project Coordinator	12/12/2025	Lorenzo Galbiati		lorenzo.galbiati@fao.org

Record of Endorsement of GEF Operational Focal Point (s) on Behalf of the Government(s):

Please attach the Operational Focal Point endorsement letter(s) with this template.

Name of GEF OFP	Position	Ministry	Date (MM/DD/YYYY)
Festus K. Ng'eno	PRINCIPAL SECRETARY	MINISTRY OF ENVIRONMENT, CLIMATE CHANGE & FORESTRY	4/12/2024
Kemilembe Mutasa	DIRECTOR OF ENVIRONMENT	VICE PRESIDENT'S OFFICE	4/15/2024

ANNEX C: PROJECT RESULTS FRAMEWORK

Please indicate the page number in the Project Document where the project results and M&E frameworks can be found. Please also paste below the Project Results Framework from the Agency document.

Component	Outcome	Output (s)	Indicator (s)	Baseline	End of project	Means of verification
Project Objective: The overall objective of this project is to enhance water security, climate resilience, and ecosystem health in the Mt Kilimanjaro region shared by Kenya and Tanzania through comprehensive groundwater assessment, transboundary cooperation, and sustainable management of the Kilimanjaro Transboundary Aquifer System (KTAS). **Contribution to Core Indicators**: CI 1: 17,295 Km^2 CI 3: 71,000 ha CI 7: 1 CI 11: 100,000						
Component 1: Ground water assessment – making the invisible visible	**Outcome 1.1:** Countries improve their common understanding of the socio-economic impacts related to the potential and current state of the	**Output 1.1.1:** The Conceptual three-dimensional hydrogeological model of the KTAS developed and validated.; **Output 1.1.2:** Stable isotope survey of major springs (e.g., Mzima), production wells, and lakes (Chala, Jipe)	**Indicator 1:** Assessment of the Hydrogeology of the Kilimanjaro Aquifer System and dependent ecosystems successfully conducted with the participation of experts from the beneficiary countries,	Limited coordinated understanding of KTAS hydrogeology and socio-economic linkages; fragmented and inconsistent data; weak knowledge of aquifer–ecosystem interactions.	Comprehensive joint hydrogeological assessment of KTAS completed, covering aquifer characteristics and dependent ecosystems, with documented participation of experts from all beneficiary countries.	Hydrogeological assessment report (methods, data, analyses, conclusions); attendance lists and records of expert contributions (sex-disaggregated) and incorporating Indigenous knowledge; peer review or technical validation notes.

	shared groundwater resources of the Kilimanjaro region.	conducted and analyzed to characterize their relationships with the Kilimanjaro and adjoining Chyulu Hills aquifers.	as well as the inclusion of indigenous knowledge.			
		Output 1.1.3: Transboundary Diagnostic Analysis (TDA) developed, validated, and endorsed by both countries, integrating hydrogeological assessments (1.1.1 and 1.1.2), governance, socio-economic, legal, gender.	**Indicator 2:** Countries' agreement on the findings and recommendations of the Transboundary Diagnostic Analysis (TDA).	No TDA exists and no formal agreement by countries on shared transboundary issues, causes and solutions.	TDA completed and formally agreed by both countries, including recommendations on priority concerns, drivers and response options.	Signed agreements/MoUs or endorsement letters from relevant authorities; minutes of national and joint TDA validation meetings; final TDA document disseminated.
Component 2: Expanding groundwater resources and enhancing underground storage capacity	**Outcome 2.1:** Increased access to, quantity and sustainability of groundwater reserves.	**Output 2.1.1:** Exploratory deep wells drilled and tested in priority areas (informed by Component 1 findings) to identify and characterize new confined aquifers at economically	**Indicator 3:** Drilling campaign results expand the groundwater resource base.	Insufficient and uneven access to groundwater; unsustainable extraction practices; limited knowledge of deeper confined aquifers and their potential.	Exploratory/production drilling campaigns completed and new, useable groundwater reserves identified, tested and made available for sustainable use in target areas.	Drilling and pumping-test reports; borehole logs and geological/hydrogeological maps; records of newly operational boreholes and associated abstraction permits or use data.

		viable depths.				
		Output 2.1.2: Sites for Managed Aquifer Recharge identified and regional underground water storage and flood management plans developed.; **Output 2.1.3**: Pilot demonstrations of (i) managed underground water storage/retrieval systems and (ii) flood water management solutions (including nature-based and technical approaches) implemented and documented.	**Indicator 4:** Plan for underground water storage and flood management submitted for adoption by governments.	No integrated plan for underground water storage and flood management; flood and storage issues addressed in a fragmented way.	Comprehensive underground water storage and flood-management plan (building on pilot MAR/NbS demonstrations) developed and officially submitted to the relevant ministries in both countries.	Draft and final plan documents; submission letters/acknowledgements from ministries; PSC/ministerial meeting minutes discussing the plan.
		Output 2.1.4: Recharge-area protection and restoration measures implemented	**Indicator 5:** Cloud-forest protection system in place and operational: (i)	Cloud-forest and groundwater recharge areas exposed to deforestation, encroachment, fire, climate	Functional protection system for priority cloud-forest/recharge zones established (protected	Legal designation/gazettement documents; cloud-forest management plans; METT or similar

		in priority zones (including Kilimanjaro cloud forests), with inclusive community participation.	hectares of recharge areas (including cloud forests) under restoration and improved management (aligned with GEF Core Indicator 3); (ii) number of community-based restoration and protection initiatives implemented, including participation of Indigenous Peoples and local communities; and (iii) (i) hectares of recharge areas (including cloud forests) under restoration and improved management (aligned with GEF Core Indicator	change and weak enforcement; limited PES and community-based protection measures in place.	status, management plans and community initiatives), and operational by end of project.	scorecards; monitoring data on ha restored and key biodiversity indicators; records of community participation. Number of culturally significant water sites (e.g., springs, wetlands) identified, mapped, and protected Geospatial maps and satellite imagery, validated by field verification reports and official management records, documenting hectares of recharge areas under restoration and improved management

			3); (ii) number of community-based restoration and protection initiatives implemented, including participation of Indigenous Peoples and local communities; and (iii) engagement of WRUAs/WUAs in PES schemes and catchment restoration activities..			
			Indicator 6: Number of WRUAs/WUAs engaged in PES schemes or catchment restoration with MWF support. Participation by F/M members in the WUAs/WRUAs,	Limited and ad-hoc engagement of WRUAs/WUAs in PES and catchment restoration activities linked to TNC Water funds; weak linkages to KTAS recharge areas.	Target number of WRUAs/WUAs in KTAS-relevant catchments formally engaged in PES schemes and/or structured catchment restoration partnerships with MWF and project partners (specific numeric targets to be defined at inception for	Signed PES agreements or MoUs; MWF/WRUA/WUA /Indegenous Peoles workplans and restoration reports; payment and performance records; monitoring data on restored area/structures implemented.

			including in the indigenous people in leadership positions.		Kenya and Tanzania).	
		Output 2.1.5: Comprehensive water demand analysis completed for major sectors, including agriculture and urban centres.	**Indicator 7:** Comprehensive water demand analysis completed for major sectors, including agriculture and urban centres.	No comprehensive, harmonized water demand analysis across sectors (domestic/WASH, agriculture, livestock, industry, hydropower, etc.); limited use of integrated modelling.	Water demand analysis across key sectors completed, including quantified demand projections, allocation scenarios and management recommendations, and made available to policy-makers.	Water demand analysis report and datasets; methodological annexes (e.g. WEAP/AquaCrop applications); policy briefs; records of presentations to and feedback from sector ministries and stakeholders.
Component 3: Establishing essential groundwater management tools	**Outcome 3.1:** Countries practicing sustainable conjunctive management of surface and groundwater resources in the Kilimanjaro region.	**Output 3.1.1:** Design of multi-purpose monitoring networks of groundwater quality and quantity agreed upon by the two countries.; **Output 3.1.2:** Pilot monitoring demonstrations with wells drilled and instrumented for real-time data transmission.	**Indicator 8:** Design of groundwater monitoring networks and standards agreed upon by countries.	Fragmented, inadequate and poorly maintained monitoring networks; no harmonized standards or jointly agreed design for groundwater monitoring.	Joint design of groundwater monitoring networks (locations, parameters, equipment and protocols) developed and agreed by both countries, including data-sharing standards.	Groundwater monitoring network design document; signed agreements or minutes confirming agreement on standards; documentation of training on the adopted standards; evidence that operational stations follow the design.

		; **Output 3.1.3:** Groundwater Information Management System harmonized in the two countries. **Output 3.1.4:** Hydro-environmental Observatory of the Kilimanjaro Water Tower established and operational as a reference information center.				
		Output 3.1.5: Gender-responsive training programmes on groundwater management and surface–groundwater interactions developed and delivered to national agency staff and local communities.	**Indicator 9:** The Kilimanjaro Hydro-environmental Observatory established and operational. Participation by F/M and indigenous People in the Kilimanjaro Hydro-environmental Observatory.	No dedicated hydro-environmental observatory for the Kilimanjaro Water Tower; data scattered across institutions and not integrated at transboundary level.	Hydro-environmental Observatory for the Kilimanjaro Water Tower fully established, staffed and producing/sharing regular data and analyses, integrated into national and regional information systems.	Observatory establishment and operations report; documentation of infrastructure, staffing and mandate; data-management procedures; examples of data products and usage in planning documents; evaluation of observatory performance.

	Outcome 3.2: Increased capacity of national water managers and local communities to conjunctively manage surface and groundwater.	**Output 4.1.1:** Terms of reference for the creation and functioning of a permanent transboundary consultation and information-exchange body on the Kilimanjaro transboundary aquifers prepared and submitted for government approval.	**Indicator 10:** Number of participants (disaggregated by gender, age, and Indigenous status) from national agencies and local communities completing training programmes	Limited training opportunities and low participation of women and local communities in conjunctive water management; weak skills on MAR, monitoring, groundwater governance, etc.	Minimum of 200 people (with gender balance) from national agencies and local communities complete training and/or fellowships on conjunctive surface–groundwater management, MAR, monitoring and governance.	Training attendance lists (sex-disaggregated); training materials; pre/post-training evaluations; participant feedback surveys; records of fellowships awarded and completed. Number of Indigenous community members trained and actively participating in groundwater monitoring and early warning systems
Component 4: Strengthening transboundary cooperation and groundwater management capacity	**Outcome 4.1:** Countries commence efforts to cooperate in the management of the KTAS and strengthen their commitment to undertake agreed	**Output 4.1.2:** Kilimanjaro Aquifer System Strategic Action Programme (SAP) for long-term environmentally sustainable groundwater management prepared and submitted for government approval at ministerial level.; **Output 4.1.3:**	**Indicator 11:** Terms of Reference of a consultation mechanism submitted to governments for approval.	Need for a permanent cooperation mechanism recognised, but no formal ToRs and institutionalized consultation body for KTAS yet in place.	Draft ToRs for a permanent transboundary consultation and information-exchange mechanism prepared and officially submitted to relevant government authorities in both countries for approval.	ToR document; submission letters/e-mails with date and acknowledgement; minutes of meetings where the ToR is discussed; records of follow-up by ministries. Number of interventions supporting recognition or strengthening of community land and water

	priority reforms and investments.	**A** Partnership conference aimed at consolidating international support for the SAP implementation convened with broad participation of the community.				tenure arrangements
		Output 4.1.4: Comprehensive review of existing groundwater policies and regulations in both Kenya and Tanzania, identifying gaps and inconsistencies and opportunities for improvement; harmonization roadmap for national groundwater laws and policies prepared and linked to SAP implementation.	**Indicator 12:** The Strategic Action Programme (SAP) endorsed at the ministerial level.	SAP in draft form and under technical discussion; no formal ministerial endorsement in either country.	KTAS SAP formally endorsed at ministerial (or equivalent) level in both countries and ready for implementation and resource mobilization.	Minutes of ministerial (or equivalent) meeting; endorsement communiqué or letters; final SAP document referencing the endorsement decision.

		Output 5.1.1: Stakeholder consultation mechanisms established and operational, including engagement with private sector, women, youth, and local communities.	**Indicator 13:** Strengthened national and local groundwater governance in both countries, including participation of Indigenous Peoples (disaggregated by gender and age) in governance mechanisms	Governance assessments indicate regulatory gaps, weak enforcement, limited local-level capacity and fragmented institutional arrangements.	Comprehensive groundwater-governance strategy/roadmap developed and tested in pilot areas, with evidence of improved practices and/or strengthened regulatory and institutional frameworks. A least 30% of women participate in governance mechanisms.	Governance strategy/roadmap; revised or new regulations/policies/ guidelines; assessments of governance performance in pilot areas; feedback from local communities and authorities; documentation of reforms linked to SAP implementation.
Component 5: Coordination, knowledge management, stakeholder engagement and dissemination	**Outcome 5.1:** Structured and effective gender-sensitive engagement of relevant stakeholders in project activities, integration of local communities' perspectives, enhanced public awareness and	**Output 5.1.2:** Knowledge-exchange and coordination mechanisms with relevant projects and initiatives established and operational.; **Output 5.1.3**: National and regional outreach events conducted to disseminate project progress and results.;	**Indicator 14:** Regional and district/county administrators and stakeholders actively participate in periodic consultations and contribute to SAP definition and adoption. Participation of members of relevant	Limited participation of regional/district/county authorities, productive sector, local communities, women, youth and indigenous groups in groundwater decision-making; few structured consultation processes.	Regular, structured consultations held in both countries with active participation of regional/district/county authorities, productive sector and community representatives, using gender-responsive approaches and ensuring inclusion of marginalised groups; stakeholder inputs reflected in SAP and project decisions.	Stakeholder analysis and engagement strategy; consultation plans and minutes; participant lists (sex- and stakeholder-disaggregated); feedback forms documenting perceived inclusiveness and influence on SAP content and project activities. Number of Indigenous communities engaged through Free, Prior and

	information accessibility, and active involvement of the productive sector in SAP reforms and investments.		stakeholders identified by gender, locality and ethnicity in the design and invitation to consultations.		Gender balanced participation in consultations is ensured.	Informed Consent (FPIC) processes
		Output 5.1.4: Project knowledge management system established and operational, including active engagement with IW: LEARN, a functional project website, and dissemination of key project outputs.	**Indicator 15:** Webinars, reports, publications, local awareness-raising events and other knowledge products delivered to IW:LEARN and disseminated.	Knowledge products (webinars, reports, publications) not systematically shared or tailored; infrequent awareness-raising; limited use of IW:LEARN and other platforms.	At least three relevant knowledge products per year shared via IW:LEARN and/or project website, plus regular local awareness events (e.g. quarterly) conducted with materials adapted to local languages and audiences.	Records of uploads to IW:LEARN and project website; dissemination lists; communication analytics (website, social media where relevant); event reports; participant feedback; number and typology of knowledge products produced and disseminated. Number of knowledge products (reports, tools, media) incorporating Indigenous knowledge and disseminated

Monitoring and Evaluation	**Outcome 6.1:** Operational project M&E systems successfully implemented and informing adaptive management.	**Output 6.1.1:** Gender-sensitive project M&E system designed and operational.; **Output 6.1.2:** Independent Mid-Term Review and Terminal Evaluation undertaken with results fed back to project management.	**Indicator 16:** Recommendations from operational M&E systems fed back into project implementation. Gender-responsive Monitoring and Evaluation (M&E) system using data disaggregated by sex, age and etchnicity and Indigenous status.	No project-specific gender-responsive M&E framework in place; no Mid-Term Review (MTR) or Terminal Evaluation (TE) yet undertaken.	Gender-responsive M&E framework finalized in year 1; independent MTR (around mid-term) and TE (at closure) completed; key recommendations reflected in updated workplans, budgets and management decisions.	Approved project M&E framework (with sex-disaggregated indicators); annual PIRs/progress reports; MTR and TE reports with management responses; revised workplans and PSC minutes showing actions taken in response to M&E findings.

ANNEX D: STATUS OF UTILIZATION OF PROJECT PREPARATION GRANT (PPG)

Provide detailed funding amount of the PPG activities financing status in the table below:

Project Preparation Activities Implemented	GETF/LDCF/SCCF Amount ($)		
	Budgeted Amount	Amount Spent To date	Amount Committed
Drafting and reviewing the FAO project document by consolidating inputs from the PPG team. (GEF project design expert)"	34,530.00	34,530.00	
Stakeholder Engagement Plan preparation and validation	10,080.00	10,080.00	
Gender Action Plan preparation and validation	10,897.00	10,897.00	
Travel and missions to contribute to the to PPG phase by PPG experts' team and national experts	29,000.00	17,952.00	11,048.00

Workshops to contribute to the PPG phase	35,000.00	35,000.00	
National Consultations to develop and validate Project Document in Kenya and Tanzania	30,000.00	10,763.00	19,237.00
LoA with UNESCO • Detailed Work Plan, agreed upon with the Senior Consultant (SC) and designated counterparts in the two countries, and Terms of Reference for staff • Completed annexes for the Final Draft of the ProDoc, aligned with GEF requirements and incorporating donor GEF comments, including cofinancing letters, agreements, and commitments from the Validation Meeting/Workshop	28,958.00	22,408.00	6,550.00
Development of a Climate Risk Assessment	21,535.00		21,535.00
Total	**200,000.00**	**141,630.00**	**58,370.00**

ANNEX E: PROJECT MAP AND COORDINATES

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

Location Name	Latitude	Longitude	GeoName ID
Upper Kikuletwa–Moshi Corridor (Tanzania)	-3.3650	37.3650	

Location Description:

Proposed approximate locations for five exploratory wells in Kenya and Tanzania

Activity Description:

High recharge influence from Mt. Kilimanjaro slopes; suitable for assessing volcanic aquifer productivity, recharge dynamics, and groundwater storage potential.

Location Name	Latitude	Longitude	GeoName ID
Lake Jipe – Mwanga Area (Tanzania)	-3.6080	37.7310	

Location Description:

Proposed approximate locations for five exploratory wells in Kenya and Tanzania

Activity Description:

Strategic transboundary groundwater–surface water interaction zone linked to Lake Jipe and downstream Kenyan systems.

Location Name	Latitude	Longitude	GeoName ID
Kahe Plains / Rundugai Area (Tanzania)	-3.4200	37.5200	

Location Description:

Proposed approximate locations for five exploratory wells in Kenya and Tanzania

Activity Description:

Important for evaluating deep volcanic aquifers, irrigation abstraction pressures, and groundwater availability in semi-arid zones.

Location Name	Latitude	Longitude	GeoName ID
Taveta – Njukini Area (Kenya)	-3.4200	37.6800	

Location Description:

Proposed approximate locations for five exploratory wells in Kenya and Tanzania

Activity Description:

Key downstream transboundary groundwater flow zone influenced by recharge from the Kilimanjaro massif in Tanzania.

Location Name	Latitude	Longitude	GeoName ID
Rombo / Lake Chala Corridor (Kenya)	-3.3200	37.7000	

Location Description:

Proposed approximate locations for five exploratory wells in Kenya and Tanzania

Activity Description:

Critical site for investigating groundwater interactions around Lake Chala and continuity of transboundary volcanic aquifer systems.

Location Name	Latitude	Longitude	GeoName ID
Taveta Floodplain / Lumi River Corridor (Kenya)	-3.3980	37.6830	

Location Description:

Proposed sites for MAR Pilots

Activity Description:

Suitable for Managed Aquifer Recharge (MAR) due to seasonal flood flows, shallow alluvial deposits, and strong hydraulic connection with transboundary groundwater systems. Potential for floodwater infiltration and groundwater storage enhancement.

Location Name	Latitude	Longitude	GeoName ID
Lake Chala – Njukini Recharge Zone (Kenya)	-3.3180	37.7050	

Location Description:

Proposed sites for MAR Pilots

Activity Description:

Strategic recharge area influenced by volcanic formations and localized runoff from Mt. Kilimanjaro slopes. Suitable for pilot recharge interventions, groundwater replenishment, and ecosystem protection linked to Lake Chala.

Location Name	Latitude	Longitude	GeoName ID
Kilimanjaro Cloud Forest – Marangu Corridor (Tanzania)	-3.2500	37.5200	

Location Description:

Proposed sites for Recharge/Cloud Forest Protection

Activity Description:

Critical upper catchment cloud forest area supporting groundwater recharge, spring flows, ecosystem conservation, and climate regulation within the KTAS system.

Location Name	Latitude	Longitude	GeoName ID
West Kilimanjaro Forest and Recharge Zone (Tanzania)	-3.0500	37.0500	

Location Description:

Proposed sites for Recharge/Cloud Forest Protection

Activity Description:

Important recharge area influenced by volcanic formations and montane forest systems contributing to transboundary groundwater replenishment.

Location Name	Latitude	Longitude	GeoName ID
Chyulu Hills Recharge Zone (Kenya)	-2.6500	37.8500	

Location Description:

Proposed sites for Recharge/Cloud Forest Protection

Activity Description:

Major volcanic recharge zone with highly permeable lava formations supporting regional groundwater flow toward Tsavo and Taveta systems.

Location Name	Latitude	Longitude	GeoName ID
Taita Hills Upper Catchment / Forest Zone (Kenya)	-3.4000	38.3500	

Location Description:

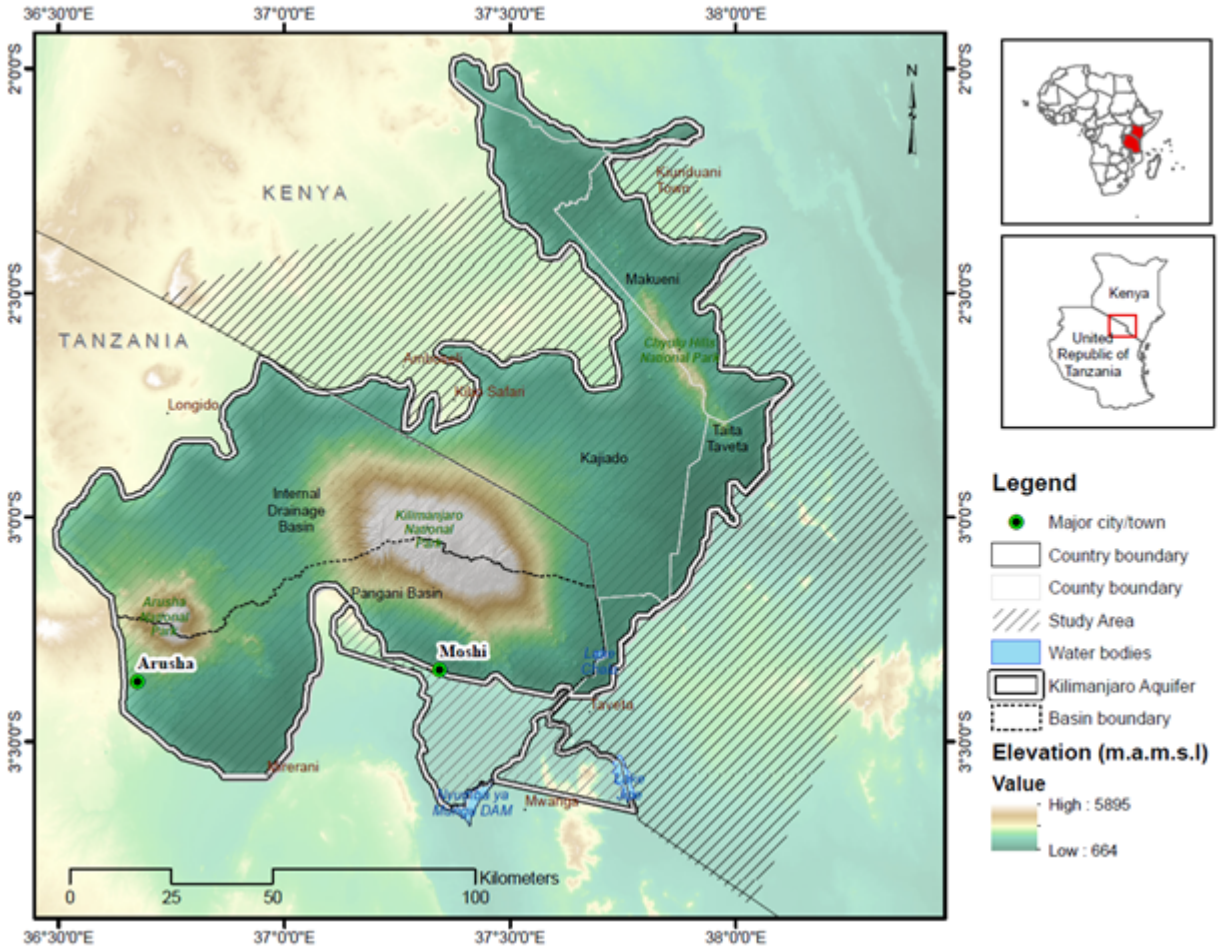
Proposed sites for Recharge/Cloud Forest Protection

Activity Description:

Strategic montane forest and recharge area contributing to watershed protection, groundwater recharge, and ecosystem resilience within downstream KTAS-linked systems.

Please provide any further geo-referenced information and map where project interventions are taking place as appropriate.

288. The Kilimanjaro Transboundary Aquifer System (KTAS) spans southeastern Kenya and northeastern Tanzania, between approximately 36.5°E to 38.3°E longitude and 2.0°S to 4.5°S latitude. Key Kenyan intervention areas include Rombo and Taveta districts, while on the Tanzanian side, activities will focus within Siha, Hai, Moshi DC, Moshi MC, Meru DC, Mwanga DC, Arusha DC, and Arusha MC. The aquifer underlies critical basins such as the Pangani Basin, Internal Drainage System, and the fringes of the Athi River Basin, encompassing both upland recharge zones in the cloud forests and lowland abstraction areas, including the vicinity of Nyumba ya Mungu Dam. The map below shows the study area. We have included a map showing areas of proposed interventions provided under Annex E. These areas will be further assessed in detail during the project implementation to establish the extent and verify the types of interventions needed.



ANNEX F: ENVIRONMENTAL AND SOCIAL SAFEGUARDS SCREEN AND RATING

Attach agency safeguard datasheet/assessment report(s), including ratings of risk types and overall project/program risk classification as well as any management plans or measures to address identified risks and impacts (as applicable).

Title
Full ES Risk Screening checklist for project 750589 (1)
Annex F-1 A_ESMP_GEF11547_KTAS_20112025

ANNEX G: BUDGET TABLE

Please upload the budget table here.

Budget Description	Comp. 1 Total	Comp. 2 Total	Comp. 3 Total	Comp. 4 Total	Comp. 5 Total	M&E Total	PMC	Total GEF Funding	Responsible Entity
Salaries professionals									
Chief Technical Advisor	**238,904**	**117,082**	**180,996**	**220,652**	-	-	165,796	**923,430**	**UNESCO**
Transboundary Groundwater Technical Specialist (TGTS)	**230,196**	**115,098**	**85,232**	**79,866**	-	-		**510,392**	**UNESCO**
Finance & Admin Specialist	-	-	-	-	-	-	158,678	**158,678**	**UNESCO**
Subtotal professional staff	**469,100**	**232,180**	**266,228**	**300,518**	**0**	**0**	**324,474**	**1,592,500**	
Consultants									
Individual Consultants – International									
1.1.1 **Senior Hydrogeologist:** Leads the developme	**45,000**	-	-	-	-	-		**45,000**	**UNESCO**

nt of the conceptual hydrogeological model of the aquifer system, including basin characterization, analysis of recharge and flow dynamics, and integration of geological and hydrological data to support groundwater assessments									
1.1.1 **Vulcanologist:** Provides specialized expertise on the volcanic structure of the aquifer system, including analysis of volcanic	**37,500**	-	-	-	-	-		**37,500**	**UNESCO**

formations, fracture systems, and lithological controls influencing groundwater occurrence, flow, and storage within the Kilimanjaro volcanic suite									
1.1.3 **Climate/water risk specialist :** Develops climate and water risk scenarios and conducts vulnerability assessments, integrating climate variability and change into groundwater and water resource analyses to inform the Transboundary	**46,486**	-	-	-	-	-		**46,486**	**UNESCO**

Diagnostic Analysis (TDA)									
GIS/Data Systems & MIS Expert (3.1.3, 4.1.1, 5.1.1): Provides technical expertise in the design and development of groundwater information systems, including system architecture, GIS integration, APIs, and data services (3.1.3), supporting interoperability and decision-support tools across components			**85,000**	**20,000**	**20,000**			**125,000**	**UNESCO**

4.1.1 **Institutional development specialist** : Provides expertise to design and operationalize transboundary institutional arrangements, including development of mandates, Terms of Reference, and coordination mechanisms (e.g., secretariat), to support effective governance and implementation of the SAP	-	-	-	**22,500**	-	-		**22,500**	**UNESCO**
4.1.1 **Legal/governance adviser** — Provides legal and	**-**	**-**	**-**	**22,500**	**-**	**-**		**22,500**	**UNESCO**

governance expertise to support alignment of the project with national, basin, and transboundary aquifer (TBA) frameworks, including development of institutional arrangements and regulatory guidance									
4.1.2 **SAP Development Consultant:** Leads the preparation of the Strategic Action Programme (SAP), including definition of priority actions, targets, and investment needs, and development of costed implementa	-	-	-	**22,500**	-	-		**22,500**	**UNESCO**

tion plans based on TDA findings and agreed governance frameworks									
Knowledge Management & Communication Specialist (s): Supports the development and dissemination of project knowledge products and communication materials, and facilitates stakeholder engagement and outreach, including participation in knowledge-sharing platforms (e.g.,					**57,200**			**57,200**	**UNESCO**

IW:LEARN), in line with Outputs 5.1.2 and 5.1.3									
6.1.1 **Risk and Procurement consultant:** Risk and procurement aligned with FAO/UNESCO and national procedures	-	-	-	-	-	**33,600**		**33,600**	**UNESCO**
Individual Consultants – National									
1.1.1 **National GIS Expert (s)** (Kenya and Tanzania)Supports GIS data collection, digitization, harmonization, and national database development for groundwater	**10,000**	-	-	-	-	-		**10,000**	**UNESCO**

assessments									
1.1.1 **Hydrogeologist numerical modeller**: Develop and calibrate the groundwater flow and (where relevant) transport models for the Kilimanjaro aquifer	**40,000**	-	-	-	-	-		**40,000**	**UNESCO**
1.1.1 **Remote-sensing specialist** — terrain/land cover & data integration: Produce baseline terrain and land cover maps	**15,000**	-	-	-	-	-		**15,000**	**UNESCO**
1.1.3 **National Gender & Socio-economic**	**10,000**	-	-	-	-	-		**10,000**	**UNESCO**

specialists : Supports socio-economic analysis, stakeholder mapping, and integration of gender and equity considerations into the SAP									
1.1.3 **TDA National Consultant** (Kenya + Tanzania): Supports the preparation, consolidation, and validation of the Transboundary Diagnostic Analysis (TDA), including integration of hydrogeological, socio-economic, and stakeholder inputs from	**22,500**	-	-	-	-	-		**22,500**	**UNESCO**

both countries									
2.1.1 **Drilling engineer :** Supports procurement, supervision, and HSE oversight of exploratory drilling activities at the transboundary level	-	**40,000**	-	-	-	-		**40,000**	**UNESCO**
2.1.1: **Geologist** to supervise drilling of deep exploratory wells and support with the collection and consolidation of geological data	-	**10,000**	-	-	-	-		**10,000**	**UNESCO**
3.1.1 **Groundwater monitoring specialist:**	-	-	**15,000**	-	-	-		**15,000**	**UNESCO**

Designs and supports implementation of groundwater monitoring networks, including network layout, technical specifications, indicators, and standardized protocols for data collection and management									
3.1.4: **Observatory & Data Coordination Specialist:** Supports the setup and operation of the Hydro-environmental Observatory, including data flows, system coordinatio	-	-	**37,400**	-	-	-		**37,400**	**UNESCO**

n, and reporting									
4.1.4 **Policy Review Consultant (s)** - Conducts a comprehensive review of related policies and regulatory frameworks, identifying gaps, inconsistencies, and opportunities for strengthening governance	-	-	-	**20,400**	-	-		**20,400**	**UNESCO**
6.1.1. **M&E Specialist:** Supports the design and implementation of the Results Framework, including monitoring systems, data tracking tools, and consolidate	-					**32,500**		**32,500**	**UNESCO**

d reporting across project components, and contributes to adaptive management and evaluation processes (6.1.1).									
Subtotal Individual consultants (Contractual Services – Individual)	**226,486**	**50,000**	**137,400**	**107,900**	**77,200**	**66,100**	**0**	**665,086**	**UNESCO**
Contracts									
Subcontract to executing partner/entity									
Aquifer Assessment, Data Collection & Validation (National Execution) Supports conceptual modelling, data collection, isotope	**161,044**	**-**						**161,044** **0**	**UNESCO / MoW (Tanzania)**

surveys, and stakeholder validation processes (1.1.1–1.1.2)									
Aquifer Assessment, Data Collection & Validation (National Execution) Supports conceptual modelling, data collection, isotope surveys, and stakeholder validation processes (1.1.1–1.1.2)	**161,043**	**-**						**161,043** **0**	**UNESCO / MoSI (Kenya)**
Exploratory Drilling & Field Implementation (National Execution) Supports planning, procurement, and implementa	**-**	**700,000**	**-**	**-**	**-**	**-**		**700,000** **0**	**UNESCO**

tion of exploratory drilling campaigns, including equipment, permits, and contractor coordination (2.1.1)									
Establishing Kilimanjaro Hydro-Env. Observatory: Conduct a feasibility study to assess needs, goals and potential challenges and consolidation of national datasets (National Execution) (3.1.4)	-	-	**75,000**	-	-	-		**75,000**	**UNESCO**
Design and Drilling of Monitoring Networks (National Execution)	-	-	**98,530**	-	-	-		**98,530**	**UNESCO**

Supports the design, installation, and drilling of groundwater monitoring networks, including provision of tools, equipment, and technical workshops to enable effective data collection and system operation (3.1.2).								**0**	
Groundwater Development, MAR & Ecosystem Interventions **(JWF/TNC)** Supports MAR site investigations, pilot implementation, recharge protection, and water demand analysis to	**-**	**730, 267**			**-**			**730, 267** **0**	**UNESCO / JWF/TNC**

enhance groundwater availability and ecosystem resilience (2.1.2, 2.1.3, 2.1.4 and 2.1.5)									
1.1.1 Technical advisory on basin conceptualization & aquifer characterization (IGRAC)	**11,250**	-	-	-	-	-		**11,250**	**UNESCO**
Knowledge Dissemination & Outreach Events (1.1.2, 2.1.1)	**4,000**	**2,000**	-	-	-	-		**6,000**	**UNESCO**
1.1.2 IW: Learn knowledge sharing on aquifer assessment and characterization	**16,000**	-	-	-	-	-		**16,000**	**UNESCO**
1.1.2 Technical advisory on hydrogeological	**40,611**	-	-	-	-	-		**40,611**	**UNESCO / IGRAC**

numerical modelling (IGRAC)									
1.1.2: Aquifer delineation, stakeholder validation and reporting	**100,000**	-	-	-	-	-		**100,000**	**UNESCO**
1.1.2 Integration of gender roles, water uses, and livelihood patterns into the design of groundwater assessments, and implications of delineation of groundwater recharge zones (WWAP)	**15,000**	-	-	-	-	-		**15,000**	**UNESCO /WWAP**
2.1.1: Exploratory drilling (equipment, permits, contractors) (National Execution)	-	**400,000**	-	-	-	-		**400,000**	**UNESCO**

2.1.1: Plan, implement and supervise annual deep exploratory drilling campaigns, and consolidate results for integration into the project database	-	**31,446**	-	-	-	-		**31,446**	**UNESCO**
2.1.1 Incorporation of gender and socio-economic considerations into site selection, access arrangements and benefit sharing in activities to expand groundwater resources and underground storage (WWAP)	-	**4,000**	-	-	-	-		**4,000**	**UNESCO**
Contractual Services								-	

– Company									
Technical Advisory on Hydrogeology, Modelling & Monitoring Systems (IGRAC) Provides technical support on aquifer assessment, conceptual and numerical modelling, design of monitoring networks, and pilot monitoring demonstrations including real-time data systems (1.1.1, 1.1.2, 3.1.1, 3.1.2).	-	-	**69,000**	-	-			**69,000**	**UNESCO**
Technical and Policy Advisory for	-	-	-	**185,287**	-			**185,287**	**UNESCO**

Transboundary Aquifer Governance (IGRAC) Provides technical and institutional advisory support for transboundary aquifer (TBA) cooperation, including development of coordination mechanisms and strengthening of national policies and governance frameworks (4.1.2, 4.1.4)								**0**	
Gender & Socio-economic Integration in Monitoring & Data Systems (WWAP)			**60,000**	**-**	**-**			**60,000**	**UNESCO**

Supports integration of gender and socio-economic considerations into monitoring network design, groundwater information systems (GIMS), and the Hydro-environmental Observatory, including socio-economic assessments and inclusive data collection and analysis (3.1.1, 3.1.3, 3.1.4)								**0**	
Gender & Socio-economic Integration in Governance, SAP & Capacity			**160,000**	**55,000**	**17,000**			**232,000**	**UNESCO**

Building (WWAP) Supports integration of gender equality and socio-economic considerations into governance frameworks, SAP development, stakeholder engagement, and capacity-building activities, including surveys, training, and knowledge products (3.1.5, 4.1.1, 4.1.2, 5.1.2).								**0**	
Modern Well Monitoring Technologies for Real-Time Data Transmission (Both Countries)	**-**	**-**	**26,250**	**-**	**-**	**-**		**26,250**	**UNESCO**

Set up and deployment of monitoring technologies for groundwater wells, including sensors and real-time data transmission systems to improve data availability and decision-making (3.1.2)								**0**	
Hydro-Environmental Observatory for Integrated Monitoring and Decision-Making								**63,750**	
Establishment of Kilimanjaro Hydro-Env. Observatory to coordinate groundwater, surface water,	**-**	**-**	**63,750**	**-**	**-**	**-**		**0**	**UNESCO**

climate and ecosystem monitoring for joint analysis and decision-making (3.1.4)									
Stakeholder Engagement and Inclusive Consultation Mechanisms Provision of services to design and implement stakeholder consultation processes, ensuring inclusive engagement of public and private sector actors, women, youth, Indigenous Peoples, and local communities in project planning	-	-	-	-	**47,051**	-		**47,051** **0**	**UNESCO**

and implementation (5.1.1).									
Facilitation and operationalization of transboundary governance mechanisms Facilitate joint reviews and refinement of Terms of Reference, stakeholder consultations, and support to government processes for for the establishment and operationalization of a permanent transboundary consultation and information-exchange	-	-	-	**4,740**	-	-		**4,740** **0**	**UNESCO**

mechanism (4.1.1)									
5.1.4: IW Learn and Knowledge Management	-	-	-	-	83,844	-		83,844	UNESCO
6.1.1 M&E - Mid Term Review	-	-	-	-	-	60,000		60,000	FAO
6.1.1 M&E - Terminal Evaluation	-	-	-	-	-	75,000		75,000	FAO
6.1.1 M&E - Terminal Report	-	-	-	-	-	6,578		6,578	FAO
Subtotal Contracts (Contractual Services – Company)	**508,948**	**1,867,713**	**552,530**	**245,027**	**147,895**	**141,578**	**0**	**3,463,691**	
Training and Workshops								-	
Workshops and Stakeholder Engagements	-		-	-	-	-		-	
TDA and SAP Multi-Stakeholder Consultations and	**13,330**			**152,555**				**165,885**	UNESCO

Partnership Processes Supports stakeholder engagement, consultation workshops, and partnership conferences for TDA development and SAP formulation, including mobilization of international support (1.1.3, 4.1.2, 4.1.3).								0	
National and Regional Stakeholder Engagement and Coordination Supports consultations, coordination meetings, and engagemen					**85,575**			**85,575** **0**	**UNESCO**

t events with stakeholders, including communities and Indegenous Peoples, policymakers, and regional actors for information exchange and participation (5.1.1)									
Outreach and Knowledge Exchange Activities/ Events Supports training workshops, outreach events, and knowledge exchange activities to disseminate project results and lessons learned at national and regional levels					**87,396**			**87,396** **0**	**UNESCO**

(5.1.2, 5.1.3, 5.1.4).									
Project Inception and Closing Workshops (All Countries) Supports organization of project inception and closing workshops across participating countries to facilitate project launch, capacity-building, knowledge sharing, and dissemination of results (5.1.1).					**37,240**			**37,240** **0**	**UNESCO**
Gender Integration Workshops for Water Governance (WWAP)	**-**	**-**	**-**	**16,360**	**-**	**-**		**16,360**	**UNESCO**

Supports participatory workshops to apply gender-responsive approaches in practice, including stakeholder dialogue, validation of approaches, and integration of gender considerations into governance frameworks and policy processes (4.1.4)								**0**	
Trainings and Capacity building	**-**	**-**	**-**	**-**	**-**	**-**		**-**	
Technical Capacity Building on Hydrogeology, Monitoring and Water Resources Management	**49,670**		**37,140**					**86,810**	**UNESCO**

Supports training of technical teams on hydrogeological assessment, GIS and remote sensing, water quality monitoring, numerical modelling, managed aquifer recharge (MAR), and integrated surface–groundwater management (1.1.1, 3.1.1, 3.1.2)								**0**	
Training on Integrating Gender into Water Resource Management and Decision-Making	**-**	**-**	**-**	**11,213**	**-**	**-**		**11,213**	**UNESCO**

Supports structured training for government and institutional stakeholders to build capacity on integrating gender and socio-economic considerations into water resource management, policy, and decision-making processes (4.1.1)								**0**	
Project Governance	**-**	**-**	**-**	**-**	**-**	**-**		**-**	
5.1.2: Quartely meetings for project oversight, decision-making, and strategic guidance	**-**	**-**	**-**	**-**	**17,860**	**-**		**17,860**	**UNESCO**
5.1.2: Quarterly coordinatio	**-**	**-**	**-**	**-**	**12,260**	**-**		**12,260**	**UNESCO**

n meetings between WRA and PBWO for implementation alignment, 1 physical meeting/year									
4.1.2: Organize annual SAP consultation workshops and partnership conferences to review progress, validate priorities and agree on next steps for joint implementation	-	-	-	**122,569**	-	-		**122,569**	**UNESCO**
Other	-	-	-	-	-	-		-	
5.1.2: Participation in WWW for knowledge sharing and networking	-	-	-	-	**40,000**	-		**40,000**	**UNESCO**
Subtotal workshops	**63,000**	**0**	**37,140**	**302,697**	**280,331**	**0**	**0**	**683,168**	

and trainings and project goveranace									
Non-expendable procurement								-	
1.1.1: GPS & survey accessories (handheld GPS, safety gear, others)	**10,655**	-	-	-	-	-		**10,655**	**UNESCO**
1.1.2: Field testing kits & handheld meters (pH/EC/DO, portable flow meters)	**15,000**	-	-	-	-	-		**15,000**	**UNESCO**
2.1.1: Purchase of drilling/ and equipment for drilling of deep exploratory wells.		**50,000**	-	-	-	-		**50,000**	**UNESCO**
3.1.1: Monitoring & telemetry equipment (sensors,	-	-	**52,000**	-	-	-		**52,000**	**UNESCO**

loggers, gateways) & Specialized technical equipment (pumps, flow meters)									
3.1.3: IT peripherals & networking (routers, switches, UPS, external drives) Groundwater Information Management System	-	-	**30,000**	-	-	-		**30,000**	**UNESCO**
3.1.4:Software for data reception, transmission and dissemination (Hydro-environmental Observatory)	-	-	**25,000**	-	-	-		**25,000**	**UNESCO**
6.1.2.PMC Computers	-	-	-	-	-	-	8,260	**8,260**	**UNESCO**
Sub total Non-expendabl	**25,655**	**50,000**	**107,000**	**0**	**0**	**0**	**8,260**	**190,915**	

e procurement									
Travel									
Workshops and Stakeholder Engagements									
TDA and SAP Multi-Stakeholder Consultations and Partnership Processes								**51,220**	
Covers travel for participation in TDA multi-stakeholder engagement, SAP development workshops, consultations, and partnership conferences, including mobilization of international support (1.1.3, 4.1.2).	**14,820**	**-**	**-**	**36,400**	**-**			**0**	**UNESCO**

National and Regional Stakeholder Engagement and Coordination								**53,300**	
Covers travel for national and regional stakeholder consultations, community engagement (including Indigenous Peoples), coordination meetings, and engagement with policymakers and regional actors (5.1.1, 5.1.2).	-	-	-	-	**53,300**			**0**	**UNESCO**
Project Inception and Closing Workshops (All Countries)	-	-	-	-	**21,240**	**5,500**		**26,740**	**UNESCO**

Covers travel for participation in project inception and closing workshops across participating countries to support project launch, coordination, and dissemination of results (5.1.1)								0	
Outreach and Knowledge Exchange Activities/ Events								**43,430**	
Covers travel for outreach events, knowledge exchange workshops, and dissemination of project results and lessons learned at national	**3,750**	**2,000**	**9,420**		**28,260**			**0**	**UNESCO**

and regional levels (5.1.2, 3.1.2, 5.1.3, 5.1.4).									
Trainings and Capacity building	**-**	**-**	**-**	**-**	**-**	**-**		**-**	
Technical Trainings and Gender-Responsive Capacity Building for Water Resources Management Covers travel for training and capacity-building for technical teams and stakeholders on hydrogeological assessment, GIS and remote sensing, water quality monitoring, numerical	**52,680**		**15,420**	**19,592**				**87,692**	**UNESCO**

modelling, managed aquifer recharge (MAR), and integration of gender considerations into water resource management and decision-making (1.1.1, 3.1.2, 3.1.1, 4.1.1)									
Project Governanace	**-**	**-**	**-**	**-**	**-**	**-**		**-**	
5.1.2: Quartely meetings for project oversight, decision-making, and strategic guidance	**-**	**-**	**-**	**3,000**	**42,960**	**-**		**45,960**	**UNESCO**
5.1.2: Quarterly coordination meetings between WRMA and PBWO for implementation	**-**	**-**	**-**	**-**	**20,720**	**-**		**20,720**	**UNESCO**

alignment, with national and regional government agencies/institutuions									
6.1.2: Facilitation of project steering committee meetings throughtout the project implementation period	**21,626**	**28,374**	-	-	-	-		**50,000**	**UNESCO**
6.1.2: Other project support activities and coordination with regional TBA governance	**6,748**	-	**28,374**	-	**28,374**	-		**63,496**	**UNESCO**
Other	-	-	-	-	-	-		-	
5.1.2: Participation in WWW for knowledge sharing and networking	-	-	-	-	**34,000**	-		**34,000**	**UNESCO**
6.1.2 Other travel costs, in-	**28,374**	-	-	-	-	-		**28,374**	**UNESCO**

country missions, visa fees, travel insurance									
Sub Total Travel	**127,998**	**30,374**	**53,214**	**58,992**	**228,854**	**5,500**	**0**	**504,932**	
GOE budget			-	-	-	-		-	
6.1.2 Project office, utilities, supplies, bank fees	-	-	-	-	-	-	5,645	**5,645**	**UNESCO**
Subtotal misc.	**0**	**0**	**0**	**0**	**0**	**0**	**5645**	**5645**	**UNESCO**
TOTAL	**1,421,187**	**2,230,267**	**1,153,512**	**1,015,134**	**734,280**	**213,178**	**338,379**	**7,105,937**	

Please explain any aspects of the budget as needed here

ANNEX I: RESPONSES TO PROJECT REVIEWS

From GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF.

Comment by Lucretia Landmann, Senior Policy Adviser Environmental Finance, Federal Office for the Environment FOEN International Affairs Division, SWITZERLAND, Council, made on 12/23/2024

- Apart from facilitating dialogue between technical experts and inter-ministerial representatives of the two countries, is the scope/interest for specific peer-to-peer exchanges practical issues of mutual relevance for the respective counterparts, and even more promising for broader peer advice / twinning arrangements beyond the countries with counterparts on the continent having dealt (recently) with the same issues in similar contexts?
- How far will the Project seize the opportunity to support the development of state-of-the art technologies (e.g. on artificial recharging of groundwater, solarization of groundwater extraction and assessment of aquifer vulnerability/replenishment using isotopes), whilst building on the international community and networks to bring the applied research to mainstream?

- Do you see a potential to build upon insights and experiences form past or continued regional/continent-wide initiatives such as AMCOW's Pan-African Groundwater Program, UPGro, the SADC-GMI or even the IUCN-BRIDGE (not referenced to in the PIF) and if so, do you plan on exploiting it and how?

AGENCY RESPONSE:
Status: addressed and strengthened in the CEO Endorsement Request.

The comment is reflected through a more explicit learning, technology and replication architecture in the CEO Endorsement Request. The project now goes beyond dialogue between national technical experts and inter-ministerial representatives by including structured peer-to-peer exchange, knowledge exchange and twinning arrangements under Component 5.

The CEO Endorsement Request specifically includes a dedicated twinning and knowledge-exchange workshop with the GEF-FAO-SPC project on groundwater management in volcanic island systems of the Pacific. This responds directly to the suggestion to create practical peer advice and twinning opportunities beyond Kenya and Tanzania. The exchange is designed to cover volcanic hydrogeology, recharge protection, community-based groundwater resilience, and the establishment of a wider network of water towers across continents. Expected outputs include IW:LEARN Experience Notes, joint knowledge products, and a roadmap for continued exchange of lessons and good practices.

The comment on state-of-the-art technologies is also reflected. The CEO Endorsement Request includes: (i) preparation of a conceptual three-dimensional hydrogeological model of the KTAS; (ii) a stable isotope survey of major springs, production wells and lakes to characterize their relationship with the Kilimanjaro and Chyulu Hills aquifers; (iii) exploratory drilling and testing of deeper confined aquifers; (iv) identification and demonstration of Managed Aquifer Recharge and underground water storage/flood management solutions; (v) design of harmonized groundwater quality and quantity monitoring networks; (vi) real-time monitoring demonstrations; and (vii) establishment of a Groundwater Information Management System and Hydro-Environmental Observatory.
The opportunity to build on broader continental and regional initiatives is now reflected through the project knowledge-exchange mechanism and regional coordination arrangements. The CEO Endorsement Request refers to engagement with relevant ongoing initiatives and platforms, including the World Bank-supported Groundwater for Resilience programme, UNESCO-IHP, FAO, IGAD, EAC, LVBC, AMCOW, IW:LEARN and IHP-WINS. It also recognizes the value of lessons from other African regional cooperation experiences, including SADC-related experience. Where initiatives such as UPGro or IUCN-BRIDGE are not named explicitly in the CEO document, they can be captured during implementation through the activity dedicated to identifying relevant projects and initiatives for coordination and knowledge exchange.
Finally, the CEO Endorsement Request now positions KTAS as a flagship regional reference case and replication model for other transboundary aquifer systems and volcanic groundwater settings in Africa and beyond. This directly responds to the comment on applied research, mainstreaming and upscaling.

Comment by Annette Windmeisser, GEF Council Member, Head of Division on Climate Finance, BMZ (Federal Ministry for Economic Cooperation and Development), GERMANY, Council, made on 1/15/2025
Suggestions for improvements to be made during the drafting of the final project proposal:

- The proposal lists Managed Aquifer Recharge (MAR) and specifically the reforestation and protection of the cloud forest as a counterweight to the planned groundwater extraction to enable a sustainable use of the resource. Germany requests the quantification of the potential recharge rates and extraction numbers for a sustainable groundwater use.

- Germany asks to mention the key drivers behind the increase in water demand next to a growing population (potentially agriculture, tourism industry, etc.) and to to consider potential measures to reduce the water usage of the region.
- Germany recommends to include how a “heightened awareness of climate change impats on water resources” and thus, a priorization of aquifer protection but is achieved.
- Barrier IV lists the lack of modern groundwater monitoring networks and describes a fragmented outdated system not just on the basin level where the project takes place, but on a national level (Kenya and Tanzania respectively). Germany asks how the project will tie into already existing plans to modernize these networks.
- Germanys asks to stronger reflect Driver 2 (increasing demand) in the theory of change.

AGENCY RESPONSE:

Status: addressed, with additional clarification on quantification and demand management.

Germany requested stronger treatment of recharge/extraction quantification, water-demand drivers, climate-change awareness, monitoring networks and Driver 2 in the Theory of Change. These points are now reflected in the CEO Endorsement Request.

On recharge rates and sustainable extraction numbers, the CEO Endorsement Request clarifies that precise figures cannot be responsibly defined before the hydrogeological assessment is completed. The project is designed precisely to generate this evidence. Component 1 will establish the shared conceptual hydrogeological model, carry out isotope and hydrogeological surveys, and prepare the TDA. Component 2 will then use these findings to identify and test deeper groundwater resources, assess Managed Aquifer Recharge sites, and develop underground water storage and flood management plans. This sequencing ensures that future abstraction and recharge decisions are based on evidence rather than assumptions.

On water demand, the project rationale now explicitly identifies the drivers behind increased water demand, including population growth, urban expansion, agricultural intensification, livestock, industry and tourism. The CEO Endorsement Request also includes a dedicated water demand and supply analysis for major sectors, including WASH, agriculture, livestock, industry and urban centres. This analysis will be used to develop allocation scenarios balancing economic development needs with environmental sustainability, and to assess water-efficiency options and livelihood pathways that can reduce pressure on groundwater.

On water-use reduction, the project does not frame reduced water use as a stand-alone restriction on socio-economic development. Instead, it addresses demand management through improved allocation, water-efficiency measures, integrated modelling tools such as WEAP or AquaCrop where appropriate, water-efficient livelihood options, and improved governance of abstraction based on the aquifer assessment.

On climate-change awareness and prioritization of aquifer protection, the CEO Endorsement Request now links climate variability and drought risk to groundwater security and explicitly presents the cloud forests and recharge areas as critical climate-resilience infrastructure. Component 5, the stakeholder engagement process, the knowledge management system, training programmes and outreach activities are designed to translate this evidence into awareness, institutional uptake and prioritization of aquifer protection.

On monitoring systems, Component 3 now directly addresses the fragmented and outdated monitoring situation by designing harmonized groundwater quality and quantity monitoring networks, agreeing methodologies, indicators and protocols between the two countries, drilling and instrumenting pilot monitoring wells, establishing a Groundwater Information Management System, and creating the Hydro-Environmental Observatory of the Kilimanjaro Water Tower. The Observatory is expected to function as the

central repository for project-generated data and to interface with national information systems and relevant regional/global platforms.

On Driver 2, increasing water demand is now reflected in the project rationale, barriers, Theory of Change and results architecture. In particular, Output 2.1.5 and the related activities provide the operational response through demand and supply analysis, scenario modelling, allocation options and dissemination of the evidence base to national and local authorities.

Comment by Yibin Xiang, Convention Secretariat, Convention on Biological Diversity (CBD) made on 3/25/2024

- Regarding C. ALIGNMENT WITH GEF-8 PROGRAMMING STRATEGIES AND COUNTRY/REGIONAL PRIORITIES As the proposal marks significant relevance to biodiversity, please map the links with the 23 targets of the Kunming-Montreal Global Biodiversity Framework (KM-GBF), in terms of primary links and secondary links.

AGENCY RESPONSE:
Status: addressed through explicit KM-GBF mapping and strengthened biodiversity framing.

The CEO Endorsement Request now clarifies that, while the project is submitted under the International Waters focal area and does not primarily target biodiversity as a stand-alone focal area objective, it generates biodiversity co-benefits through the protection and restoration of groundwater recharge areas, especially the Kilimanjaro cloud forests and groundwater-dependent ecosystems. The CEO Endorsement Request explicitly links these benefits to the Kunming-Montreal Global Biodiversity Framework, particularly Target 3, through the improved management/restoration of approximately 71,000 ha of cloud forest/forest land and associated ecosystem services.
For completeness, the mapping requested by the CBD Secretariat is summarized as follows:

Primary link - Target 3: protection and improved management/restoration of cloud forests, recharge areas and groundwater-dependent ecosystems contributing to conservation of terrestrial and inland water ecosystems.

Primary link - Target 2: restoration and improved management of degraded recharge landscapes, including forest and forest land under Core Indicator 3.2.

Primary link - Target 11: maintenance and enhancement of ecosystem functions and services related to water regulation, recharge, drought buffering, erosion control and climate resilience.