AMCOW STRATEGIC PROGRAMME ON GROUNDWATER FOR WATER SECURITY AND RESILIENCE IN AFRICA (2026–2033)

August 2025

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List of Abbreviations

Abbreviation	Full Form
AfCFTA	African Continental Free Trade Area
AfDB	African Development Bank
AI	Artificial Intelligence
AMCOW	African Ministers' Council on Water
ARBE	Agriculture, Rural Development, Blue Economy, and Environment (AUC Dept.)
AU	African Union
AUC	African Union Commission
AWF	Africa Water Facility
Bos	Basin Organisations
CSOs	Civil Society Organisations
EbA	Ecosystem-based Adaptation
ICT	Information, Communication and Technology
IGAD	Intergovernmental Authority on Development
IHP	Intergovernment Hydrological Programme
IoT	Internet of Things
MAR	Managed Aquifer Recharge
NbS	Nature-based Solutions
PES	Payment for Ecosystem Services
PPP	Public-Private Partnership
R&D	Research and Development
RECs	Regional Economic Communities

Abbreviation	Full Form
SADC	Southern African Development Community
TBAs	Transboundary Aquifers
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WASH	Water, Sanitation and Hygiene
WASSMO	Africa Water and Sanitation Sector Monitoring and Reporting System
WEFE	Water-Energy-Food-Ecosystem (Nexus)

Executive Summary

Groundwater is a vital yet often overlooked resource, particularly in the context of Africa's growing water security challenges. It represents a critical source of freshwater for millions across the continent, supporting domestic needs, agriculture, and industry. However, the full potential of groundwater remains largely untapped, hampered by a complex interplay of factors, including inadequate policies, weak institutional capacity, and unsustainable practices.

The "Strategic Programme on Groundwater for Water Security and Resilience in Africa" aims to address this critical need by strengthening the foundation upon which sustainable groundwater management rests.

With 4 strategic objectives, namely (i) Strengthen the policy, legal and institutional environment and practice for groundwater development, utilisation and management towards resilient rural economies, sustainable urban centres, and overall quality livelihoods, social security and protection; (ii) Support multilevel human and institutional groundwater management capacity development for water security and climate resilience; (iii) Build a business case to demonstrate the economic value and cross-sectoral benefits of structured investment in groundwater development and management; and (iv) Develop and operationalise tools, to raise awareness, support evidence-based decision making and catalyse political and stakeholder buy-in and ownership, this initiative aims to create an enabling environment for responsible and effective groundwater governance. By improving policies, strengthening institutions, building the capacity, improving the knowledge base and promoting best practices, this programme will unlock the potential of groundwater to contribute significantly to water security, build resilience to climate change, and drive sustainable development across Africa.

AMCOW STRATEGIC PROGRAMME ON GROUNDWATER FOR WATER SECURITY AND RESILIENCE IN AFRICA 2026–2033

Summary

The Programme will be implemented through 4 Strategic objectives and a number of result areas as presented below.

SO1: Strengthen the policy, legal and institutional environment and practice for groundwater development, utilisation and management towards resilient rural economies, sustainable urban centres, and overall quality livelihoods, social security and protection

ER1.1 Profile of groundwater raised in Africa's water agenda, policy initiatives and programmes at all levels, including the post-2025 Africa Water Vision and Policy

ER1.2 Policy, legal and institutional frameworks strengthened for climate resilient groundwater development and management at various levels

ER1.3 A compendium of policies, laws, strategies and guidelines to promote best practices on groundwater management and regulation at all levels

SO2: Support multilevel human and institutional groundwater management capacity development for water security and climate resilience

ER2.1 Continental cooperation arrangements agreed and initiated for knowledge sharing and collective action between Member States and partners to establish an African community of practice on groundwater management

ER2.2 Support tools developed for standardised local-level approaches to sustainable groundwater use and management

ER2.3 A knowledge incubator initiative launched to support human and institutional capacity building to improve information and knowledge on Africa's groundwater resources

ER2.4 An inventory of courses established, including training and research institutions on groundwater management and development

SO3: Build a business case to demonstrate the economic value and cross-sectoral benefits of structured investment in groundwater development and management

ER3.1 Support provided to develop capacity for groundwater assessment, and management to leverage water resources management funding for groundwater management outcomes.

ER3.2 Best practices and studies that make a business case and demonstrate economic benefits of groundwater development and management upscaled and documented to improve understanding, cross-sectoral partnerships and collaboration and increase the groundwater investment outlook.

ER3.3 Studies initiated to improve understanding of the economic optimisation of groundwater and its contribution to climate resilience and facilitate integration of groundwater into National Development Plans.

ER3.4 Access to local development finance improved for water security and local transformation.

SO4: Develop and operationalise tools to raise awareness, support evidence-based decision making and catalyse political and stakeholder buy-in and ownership

ER4.1 An Inventory of existing guidelines/tools on groundwater development and management at all levels is established

ER4.2 A continental Groundwater Implementation Support Mechanism (GISM) established to promote the utilisation of groundwater tools by national and sub-national change agencies to strengthen local water security capacities, including business case development, attracting investment, and sustainable groundwater management best practices

ER4.3 Groundwater maps produced and periodically updated to identify water development hotspots

The formulation of the AMCOW Strategic Programme on Groundwater started in November 2024. A task team coordinated by the Africa Groundwater Network and composed of groundwater professionals within Africa was set up in January 2025 and started work fully in February 2025. The team was organized along 4 Strategic Objectives (SO) with each SO having a leader and task team members. Inputs into the programme document were received and discussed along the 4 SO and the overall task team. The Task team developed a draft Programme document in February 2025 that guided stakeholder consultations during the various consultative meetings. The

Programme document was updated and finalized based on suggestions and comments from the stakeholder consultations.

The Programme formulation took advantage of various consultation meetings namely (i) AMCOW sub-regional workshops held in 5 regions of the continent between March and April 2025 to formulate the Africa Water Vision 2063 and Policy, (ii) UNESCO webinar on groundwater held on 15 May 2025, (iii) IGAD 3rd Water Forum held in Ethiopia from 19 to 21 May 2025, (iv) Groundwater Access Facility meeting held in Ethiopia on 19 May 2025, (v) UNESCO Africa Regional IHP meeting held in Zambia from 25 to 26 May 2025, (vi) Pan-African Implementation and Partnership Conference on Water (PANAFCON) held in Zambia from 27 to 27 May 2025, and (vii) Specific Groundwater session held during the PANAFCON in Zambia on 28 May 2025.

The holistic, multi-disciplinary and high-level engagements resulted in a well formulated Strategic Programme on Groundwater and continued to groundwater being fully integrated in the Africa Water Vision 2063 and Policy.

A number of priority actions are needed to realise the objectives of the program namely:

2.6.1 Strategic Objective 1(SO1): Strengthen the policy, legal and institutional environment and practice for groundwater development, utilisation and management towards resilient rural economies, sustainable urban centers, and overall quality livelihoods, social security and protection

a) ER 1.1 Profile of groundwater raised in Africa's water agenda, policy initiatives and programmes at all levels, including the post-2025 Africa Water Vision and Policy

- Establish a common and coherent groundwater agenda that is clearly articulated within continental, regional and national policies and frameworks to enhance effective groundwater management.
- Link groundwater to and leverage existing continental and regional cooperation and development frameworks and programs such as the Blue Economy Strategy, Africa Climate Resilience Strategy, Africa Continental Free Trade Area, Comprehensive Africa Agricultural Development Programme, Groundwater Access Facility, African Water Investment Program etc.
- Improve advocacy and raise awareness of groundwater's crucial role in ensuring Africa's water security.

b) ER1.2 Policy, legal and institutional frameworks strengthened for climate resilient groundwater development and management at various levels

- Establish or strengthen existing legal, institutional and governance frameworks and mechanisms for groundwater management to promote coordinated, stakeholders driven and climate resilient and development.

- Integrate climate change aspects into groundwater-related policy and legal frameworks.
- Develop regulations and strategies for cross-sectoral coordination, conjunctive management of groundwater and surface, management of non-renewable groundwater etc to ensure sustainable groundwater use, prevent overexploitation and pollution and promote climate-resilient groundwater development and management.
- Establish a stakeholder coordination and participation framework for climate-resilient groundwater development and management including involvement of young people in decision-making processes, policy and investment regarding groundwater

c) ER1.3 A compendium of policies, laws, strategies, and guidelines to promote best practices on groundwater management and regulation at all levels

- Collect, review and compile groundwater management-related policies, laws, strategies, and guidelines into a compendium, including the use of digital platforms.
- Analyze and align existing groundwater laws, policies, strategies, and guidelines to different regions of the continent considering the groundwater context of each region.
- Disseminate existing laws, policies, strategies, and guidelines that promote best practices on groundwater management and regulation at all levels.
- Raise awareness and build capacity of various stakeholders to use the compendium of laws, policies, strategies, and guidelines.
- Undertake regular updates and revisions of groundwater management-related laws, policies, strategies, and guidelines to promote good practices in groundwater management and regulation.
- Integrate key aspect of groundwater in strategies for planning, development, and management of water and related natural resources at basin and sub-basin levels.

2.6.2 Strategic Objective 2 (SO2): Support human and institutional groundwater management capacity development for water security and climate resilience

ER2.1 Continental cooperation arrangements agreed and initiated for knowledge sharing and collective action between Member States and partners to establish an African community of practice on groundwater management

- Establish continental cooperation arrangements between Member States and partners for knowledge sharing and collective action.
- Establish/strengthen platforms for capacity building and training, knowledge exchange and sharing, among governments, partners, groundwater professionals, youth, community actors etc.
- Establish collaborative platforms for cross-border knowledge exchange, especially on shared aquifers and transboundary groundwater governance among Member States.
- Use existing platforms or promote establishment of community of practice to promote understanding of groundwater and its role in sustainable socio-economic development.
- Establish capacity-building programs and Joint Research Initiatives at continental, regional and national levels involving all key stakeholders such as governments, academic institutions, groundwater professionals, youth, community actors etc.
- Build capacity for integrated and cross sectoral planning taking surface water and groundwater together within the framework of integrated water resources management
- Increase groundwater expertise through scaling up professional training programs in hydrogeology and general groundwater education with special focus on young people.

ER2.2 Support tools developed for standardised local-level approaches to sustainable groundwater use and management

- Develop and utilize community-based groundwater training materials to build the necessary capacity
- Adopt community-based groundwater monitoring tools to integrate traditional and scientific knowledge
- Pilot and scaling up best practices and locally adapted groundwater management approaches
- Develop human capacity in various aspects of groundwater expert networking and field placements in various areas.
- Involve Civil Society Organizations to advocate for the inclusion of vulnerable groups in groundwater management to bridge the gap between citizens and authorities.
- Develop and disseminate information on groundwater management to support participatory governance and capacity development at the local level.

ER2.3 A knowledge incubator initiative launched to support human and institutional capacity building to improve information and knowledge on Africa's groundwater resources

- Establish a Continental Groundwater Knowledge Hub with harmonized databases and platform for long term storage and access of groundwater data
- Establish an Africa Groundwater Research, professional capacity-building and Innovation Grant Program in collaboration with relevant partners and organizations.
- Strengthen collaboration between academia and government in areas of research, capacity building and innovation.
- Strengthen capacity across government, communities, academia, and youth to participate in groundwater planning and decision-making.

ER2.4 An inventory of courses established, including training and research institutions on groundwater management and development.

- Map and catalogue groundwater training and research Institutions
- Develop an open-access database of existing groundwater training programs and courses
- Strengthen partnerships and knowledge exchange between and among institutions
- Utilize existing regional and national centres of excellence in different fields to promote sustainable management and development of groundwater resources
- Deploy real-time technologies such as remote sensing, Internet of Things (IoT), and digital twins for training and research.

2.6.3 Strategic Objective 3 (SO3): Building a business case to demonstrate the economic value and cross-sectoral benefits of structured investment in groundwater development and management

ER3.1: Support provided to develop capacity for groundwater assessment, and management to leverage water resources management funding for groundwater management outcomes

- Establish integrated groundwater information systems to support decision-making and data sharing at continental, regional and national levels
- Enhance decision-support tools for evidence-based groundwater development and management.

- Increase investment in groundwater research, monitoring and assessment to improve understanding of groundwater systems, particularly shared aquifers.
- Promote the conjunctive use and management of surface and groundwater

ER3.2: Best practices and studies that make a business case and demonstrate economic benefits of groundwater development and management upscaled and documented to improve understanding, cross-sectoral partnerships and collaboration and increase the groundwater investment outlook.

- Identify and document successful groundwater management and development models and their role in improving water security
- Showcase cost-effective groundwater development technologies such as solar-powered boreholes to support various uses such as domestic water supply, irrigation and their economic benefits
- Document good practices of cross sectoral partnerships and collaboration that increased the groundwater investment outlook
- Document good case studies of how groundwater has enhanced economic growth, food security, energy access, and climate adaptation through existing development frameworks
- Analyse lessons from transboundary aquifer management for regional cooperation

ER3.3: Studies initiated to improve understanding of the economic optimisation of groundwater and its contribution to climate resilience and facilitate integration of groundwater into National Development Plans

- Assess the potential of groundwater in terms of quantity and quality and how it is changing due to climate change and human impacts
- Assess the long-term cost-effectiveness of groundwater development and management and its integration in National Development Plans
- Assess the economic contribution of groundwater to socio-economic development, food security, improving rural incomes and climate resilience.
- Assess the role of managed aquifer recharge (MAR) and other nature-based solutions (NBS) in climate resilience.
- Analyse economic trade-offs between over-extraction risks and sustainable governance.
- Determine, communicate and pursue the benefits of transboundary groundwater cooperation as well as its implications.

ER3.4: Access to local development finance improved for water security and local transformation.

- Encourage integration of groundwater development into national economic planning

- Identify and develop innovative financing instruments and mechanisms, and models that diversify income streams and include strategic partnerships to support groundwater investments.
- Enhance institutional and human capacity to design appropriate financing vehicles for groundwater investment, leverage financing from different sources and prepare bankable groundwater projects.
- Develop a unifying framework Create a groundwater fund to pool resources from various funders and sources so as to create a strong voice for lobbying for additional funding (from private and public funds as matching grants) for groundwater projects and coordination of investment decisions, and for funding the whole groundwater value chain.
- Raise awareness about the value proposition for groundwater indicating what makes investing in groundwater unique and different
- Mobilize political will to support fiscal decentralization and funding allocations so that the local authorities can implement their groundwater functions.
- Encourage increased investments in groundwater development as a vital resource for domestic water supply in both rural and urban areas, small-scale agriculture, industrial development, and as a climate resilience measure.
- Integrate groundwater components into National Water Investment Programs to attract resources for investment, training and institutional strengthening.
- Utilise the Groundwater Access Facility (GAFA) as an AMCOW groundwater program implementation mechanism and framework, and use it to raise funds for groundwater development and management in Africa.

2.6.4 Strategic Objective 4 (SO4): Develop and operationalise tools to raise awareness, support evidence-based decision making and catalyse political and stakeholder buy-in and ownership

ER4.1 An inventory of existing guidelines / tools on groundwater development and management at all levels is established.

- Make an inventory of existing guidelines**,** information/knowledge resources and tools.
- Categorise and assess the useful of the existing guidelines**,** information/knowledge resources and tools
- Develop and operationalize an online platform on existing guidelines and tools for groundwater development and management.
- Establish a baseline on the current state of knowledge sharing and dissemination on both groundwater quantity and quality.
- Develop and operationalize guidelines and tools for integrated and cross sectoral planning taking surface water and groundwater together within the framework of integrated water resources management

ER4.2 A continental Groundwater Implementation Support Mechanism (GISM) established to promote the utilisation of groundwater tools by national and sub-national change agencies to strengthen local water security capacities, including business case development, attracting investment, and sustainable groundwater management best practices.

- Invest in hydrogeological mapping through the use of various techniques, including remote sensing technologies.
- Exploit evolving innovative technologies for groundwater management such as artificial intelligence, machine learning, remote sensing etc.
- Develop real-time monitoring networks and assessment programs to provide data and information on the state of groundwater resources.
- Develop groundwater management and investment tools
- Build capacity and provide technical support to relevant organisations at continental, regional, national and local and subnational levels to utilise groundwater management and investment tools
- Document and scale up best practices for groundwater management in urban areas with special focus on mega cities including the role of urban areas and cities in protecting recharge zones and catchments within and outside city boundaries, and securing investments
- Facilitate access to investment in sustainable groundwater management and development in urban areas, rural areas and border lines

ER4.3 Groundwater maps produced and periodically updated to identify water development hotspots.

- Develop and regularly update groundwater maps at various scales to meet different purposes namely planning, advocacy, analysis, monitoring, implementation etc
- Support development of Borehole Databases and web-based platforms where they don't exist to foster use of groundwater
- Support the development of targeted aquifer studies, sustainable monitoring and data management systems, groundwater regulation and licensing etc.
- Improve data collection, management, and sharing on critical areas such as groundwater quality, recharge, usage etc.
- Promote digitization and synthesis of historical groundwater data from various geological surveys, drilling operations etc.

- Integrate groundwater data in the existing dashboard under AMCOW **with** a simple leaflet-based map interface.

ER4.4 Ongoing development of the Africa Groundwater Atlas consolidated into an online open-access portal and knowledge incubator initiative for anchoring Africa's groundwater resources information, including an interactive tracker of Member States groundwater legal and regulatory frameworks.

- Develop an open access / open source portal to host the African Groundwater Atlas.
- Update and improve the resolution of the maps.

The "Strategic Programme on Groundwater for Water Security and Resilience in Africa" will be implemented at various levels namely continental, regional, national and subnational levels. The success of the program will depend on creation of strategic partnerships and collaboration among the various stakeholders. The partnerships and collaboration are key in leveraging existing resources, creation of synergies, avoid duplication, delivering a consolidated program that will sustainably manage and develop groundwater. Implementation will involve all relevant stakeholders depending on their interests and specific inputs. At each of the levels, the relevant government mandated instititions will coordinate the other stakeholders to ensure that there is synegy and avoid duplication for sustainable groundwater management and development.

Implementation shall be guided by the principles as adapted from the Africa Water Vision 2063 and Policy. Progress will be tracked through the Africa Water and Sanitation Sector Monitoring (WASSMO) system.

1. Introduction

1.1 Background

Groundwater plays a critical role in Africa's water security, supporting livelihoods, agriculture, industry, and ecosystems while contributing to several Sustainable Development Goals (SDGs), particularly SDG 6 (Clean Water and Sanitation), SDG 2 (Zero Hunger), and SDG 13 (Climate Action). As a reliable water source, especially in arid and semi-arid regions, groundwater enhances climate resilience by buffering against droughts and seasonal variability. It is essential for productive uses such as irrigation, livestock watering, and small-scale enterprises, driving economic development and poverty reduction (SDG 1). Expanding access to well-managed groundwater resources can improve health, food security, and sustainable livelihoods, making it a cornerstone for Africa's adaptation to climate change and rapid urbanisation. Groundwater's value is underscored by its extensive utilisation in the rural economy, which accounts for an average of 16% of GDP in sub-Saharan Africa. Moreover, groundwater utilisation has significant implications for eradicating poverty and ending hunger, given the proportion of rural livelihoods it supports. It is anticipated that groundwater use in commercial agriculture will rise to meet the dietary requirements associated with urbanisation and improved standards of living. Solar-powered irrigation is a key opportunity for expanding agricultural productivity, although unregulated expansion could lead to overexploitation. However, challenges such as inadequate data availability, limited institutional and human resources capacity, and insufficient investment hinder this vital resource's sustainable management and development. Therefore, threats of depletion, degradation, and competition for groundwater resources require high-level political action to align extraction benefits with social and environmental costs.

1.2 The role of groundwater across development imperatives

Africa has significant groundwater potential for socio-economic development and interest of African countries in exploiting groundwater is growing and the importance of groundwater as a climate resilient water resource is expected to increase. In line with *Agenda 2063: The Africa We Want*, groundwater is a strategic resource that underpins fundamental development goals across climate resilience, water and food security, human health, biodiversity and ecosystem services, and regional integration. These imperatives are summarised below.

Climate Resilience through Adaptive Groundwater Management

Groundwater will be increasingly relied on in a changing climate with more extreme weather, manifested in more frequent and severe floods and droughts. During droughts, groundwater provides a semi-resilient water source, and human dependency on it increases. The drought-proofing role of groundwater in Africa will intensify as climate change progresses, creating a risk of undercutting the very same resilience provided by groundwater. Minimising these risks requires better drought management, explicitly accounting for groundwater as part of long-term sustainable and adaptive planning.

Groundwater for Water Security, Health and Economic Growth

Groundwater provides a relatively inexpensive, off-grid, distributed, and readily available water source for dispersed rural communities throughout Africa. Several hundred million people living in rural sub-Saharan Africa depend on groundwater for drinking water. In urban settings, groundwater also plays a significant role through reticulated public utility supply, vendor supply, packaged water, or self-supply. Strategic investment and management support to public and private groundwater supply will be critical to increasing water security and climate resilience for rapidly increasing urban populations. Basic water supplies are essential to support sanitation, human health, and hygiene.

Groundwater remains central for economic activity and industrialisation expansion in African urban hubs, as knowledge and technological advances in groundwater exploration and development enhance the reach of public utilities and the private sector. Realising that groundwater is not a separate, isolated, or 'new' resource but rather connected to surface water systems with interlinked risks of over-exploitation and quality degradation, integrated sustainability considerations must be incorporated into groundwater development plans and activities.

Agricultural Transformation Based on Groundwater

Agriculture is still a primary sector of Africa's economy and accounts for the majority of livelihoods across the continent. The agricultural economy employs approximately 53% of Africa's labour force and typically accounts for 15% of GDP (2019-2020 data), and research shows that there is scope for expanding groundwater-irrigated land from renewable resources in Africa about 40-fold (Altchenko and Villholth, 2015). Hence, prudent investments in groundwater irrigation and the supporting value chain in an integrated water-energy-food nexus approach (Nhamo et al., 2018) are critical to the rollout of AMCOW-supported strategies for resilient and sustainable agricultural development in Africa.

Groundwater-sensitive Nature-based Solutions

Promoting investment and implementation that incorporates management, restoration and sustainability of 'natural infrastructure' – the ecosystem services provided by healthy watersheds and coastal zones – is pivotal to enhancing water security and resilience. Solutions inherently often hinge on groundwater as a critical component of the natural system, providing ecosystem services in the form of attenuating and absorbing floodwaters underground, retaining and degrading many pollutants, including disease-causing microorganisms, and supporting critical water storages and environmental flows in rivers, and by virtue, habitats and biodiversity, especially during dry periods and droughts.

Transboundary Aquifers for Regional Integration and Stability

International cooperation on shared water resources is increasingly acknowledged as a critical aspect of development goals, as exemplified by SDG 6.5.2. While Africa remains a continent with relatively good progress on transboundary aquifer cooperation, it is imperative that further work on these resources is promoted and supported and that efforts synergise and generate better national-level integrated (ground)water resources management as well as positive development outcomes locally, to achieve the development vision for Africa.

In view of the above, groundwater should be embebbed in Integrated Water Resources Management framework, climate change adaptation, and socio-economic transformation strategies. The importance of integrating the water-energy-food-ecosystem nexus into continental frameworks like Agenda 2063 needs also to be recognised.

Furthermore, coordination in planning, development, and management of water and related natural resources—including forests, wetlands, and land resources—at catchment, sub-basin, and basin levels, consistent with Integrated Water Resources Management (IWRM) principles needs to enhanced. Efforts to manage and protect watersheds to preserve their natural hydrological functions, reduce siltation risks to infrastructure, and enhance resilience of downstream ecosystems and communities against floods and droughts should be strengthened.

The Water-Energy-Food-Environment (WEFE) nexus approach should be enhanced by promoting integrated planning across water, energy, agriculture and environment sectors and encouraging the development of multipurpose water infrastructure that optimizes both financial and water resource use. Furthermore, there is need to deepen transboundary cooperation and advocate for the development of large-scale regional infrastructure projects that facilitate equitable benefit sharing, contribute to confidence

building, and promote regional integration, peace, and security. Economic valuation studies to quantify the contribution of groundwater resources to key water-dependent economic sectors is key as these studies will strengthen the case for increased budgetary allocations for groundwater from Ministries of Finance and other donors.

The critical linkage between investments in water and sanitation and the broader goals of industrialization, economic growth, employment creation, and societal well-being should be made more explicit. Institutional and human capacity development at local, basin, national, and regional levels should continue to be prioritized to ensure effective implementation of groundwater policies and programmes.The persistent challenges related to enforcement of water policies, laws, and regulations need to be addressed as they remain a critical barrier to achieving water security and sustainable ground water resource management.

1.3 Addressing challenges to groundwater development and management

While groundwater holds significant development potential for human needs, it is paramount to weigh and assess the benefits and risks of groundwater development. Protection of groundwater resources through targeted land use planning, regulation, and waste management is critical to ensuring long-term clean and sufficient groundwater replenishment.

Providing essential services and delivering groundwater as a means of socio-economic transformation requires a technical solution and a social dimension. This has been highlighted particularly around issues pertaining to gender, equity and social inclusion and WASH (AfDB, 2021b), the impacts of climate change on vulnerable communities, and the varying degrees of access to resources in rural settlements versus urban centers. Sustaining and expanding societal and economic benefits from groundwater requires effective, informed and inclusive groundwater governance, well-managed infrastructure within a resource-to-source paradigm, sustainable financing and partnerships, and enhanced knowledge and capacity at all levels.

Thus, well-functioning monitoring, assessment and management systems are required to ensure sustainable use of the resources. In particular, reliable information on resource potential, recharge rates, ecosystem and human dependence and utilisation is required to ensure sustainable groundwater availability to meet growing demands under a changing climate.

Available information indicates that concerted efforts by Member States are providing an enabling environment to regulate and manage groundwater resources. However,

institutional and technical capacity challenges constrain the functionality of those enabling arrangements and systems. These challenges include:

i. gaps in legal and regulatory frameworks;
ii. fragmented organisational responsibilities;
iii. ad-hoc resource development; and,
iv. inadequate funding to provide the equipment and skills required to assess, monitor and manage resource development and utilisation.

2. AMCOW Strategic Programme on Groundwater for Water Security and Resilience in Africa

2.1 Summary of the AMCOW Strategic programme on Groundwater for Water Security and Resilience in Africa 2026–2033

The Programme will be implemented through 4 Strategic objectives and a number of result areas as presented below.

SO1: Strengthen the policy, legal and institutional environment and practice for groundwater development, utilisation and management towards resilient rural economies, sustainable urban centres, and overall quality livelihoods, social security and protection

ER1.1 Profile of groundwater raised in Africa's water agenda, policy initiatives and programmes at all levels, including the post-2025 Africa Water Vision and Policy

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ER2.1 Continental cooperation arrangements agreed and initiated for knowledge sharing and collective action between Member States and partners to establish an African community of practice on groundwater management

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ER3.1 Support provided to develop capacity for groundwater assessment, and management to leverage water resources management funding for groundwater management outcomes.

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ER4.3 Groundwater maps produced and periodically updated to identify water development hotspots

By improving policies, strengthening institutions, building the capacity, improving the knowledge base and promoting best practices, this programme will unlock the potential of groundwater to contribute significantly to water security, build resilience to climate change, and drive sustainable development across Africa.

2.2 General Overview

The AMCOW Strategic Programme on Groundwater for Water Security and Resilience in Africa derives from AMCOW's pan-African Groundwater Programme (APAGroP), which aims to coordinate, strengthen and guide groundwater interventions to support Member States. Its formulation is driven by the overarching objective *"to improve policy and practice; and support capacity development, knowledge and information sharing in groundwater and transboundary water management in member states."* As such, the strategic programme is targeted at accelerating sustainable management and utilisation of groundwater for the socio-economic development of Member States in line with the Africa Water Vision 2025 and Agenda 2063. Interventions through this Strategic Programme will bring a coordinated approach to groundwater development across Africa.

The program contributes to Africa's efforts to ensure climate resilience and equitable water availability for sustainable socio-economic development. The impact will be monitored through a number of indicators, which stakeholders will define.

The formulation of the AMCOW Strategic Programme on Groundwater started in November 2024. A task team coordinated by the Africa Groundwater Network and composed of groundwater professionals within Africa was set up in January 2025 and started work fully in February 2025. The team was organized along 4 Strategic Objectives (SO) with each SO having a leader and task team members. Inputs into the programme document were received and discussed along the 4 SO and the overall task team. The Task team developed a draft Programme document in February 2025 that guided stakeholder consultations during the various consultative meetings. The Programme document was updated and finalized based on suggestions and comments from the stakeholder consultations.

The Programme formulation took advantage of various consultation meetings namely (i) AMCOW sub-regional workshops held in 5 regions of the continent between March and April 2025 to formulate the Africa Water Vision 2063 and Policy, (ii) UNESCO webinar on groundwater held on 15 May 2025, (iii) IGAD 3rd Water Forum held in Ethiopia from 19 to 21 May 2025, (iv) Groundwater Access Facility meeting held in Ethiopia on 19 May 2025, (v) UNESCO Africa Regional IHP meeting held in Zambia from 25 to 26 May 2025, (vi) Pan-African Implementation and Partnership Conference

on Water (PANAFCON) held in Zambia from 27 to 27 May 2025, and (vii) Specific Groundwater session held during the PANAFCON in Zambia on 28 May 2025.

The holistic, multi-disciplinary and high-level engagements resulted in a well formulated Strategic Programme on Groundwater and continued to groundwater being fully integrated in the Africa Water Vision 2063 and Policy.

2.3 Strategic objectives of the program

The proposed program has four strategic objectives, namely:

SO1: Strengthen the policy, legal and institutional environment and practice for groundwater development, utilisation and management towards resilient rural economies, sustainable urban centres, and overall quality livelihoods, social security and protection

SO2: Support the development of multilevel human and institutional groundwater management capacity for water security and climate resilience.

SO3: Build a business case to demonstrate the economic value and cross-sectoral benefits of structured investment in groundwater development and management

SO4: Develop and operationalise tools to raise awareness, support evidence-based decision making and catalyse political and stakeholder buy-in and ownership

Groundwater has been fully integrated in the Africa Water Vision 2063 and policy. The Africa Water Vision 2063 and policy have given attention to enhancing the reliability and predictability of Africa's water supplies across seasons and years and one of the focus areas is on prioritising groundwater as a strategic climate-resilient reserve. Strategic management will transform groundwater into a predictable buffer, directly contributing to rural resilience, social stability, maintaining livelihoods during dry spells, and enabling continuous economic activity.

The Africa Water Vision 2063 and policy has also prioritized enhancing sustainable resource development and increasing water supply in response to demands and has therefore given priority to ensure sustainable development of groundwater resources and conjunctive management of surface and groundwater.

The Vision and Policy note that sustainable development of groundwater resources is essential, particularly in regions with heavy reliance but limited data. They emphasize investment in comprehensive groundwater mapping, monitoring networks, and recharge studies to understand availability and ensure long-term sustainability, and improving knowledge of groundwater resources characteristics and use will prevent resource depletion that risks undermining rural economies and urban water security. Furthermore, the Vision and Policy also recognise that optimising the integrated management of surface water and groundwater systems will strengthen water security for both rural communities and growing urban centres and foster stable livelihoods and social protection.

Thus, the AMCOW Strategic Programme on Groundwater for Water Security and Resilience in Africa, through its four strategic objectives, will contribute to realization of the goal of Africa Water Vision 2063 and policy of Assuring Sustainable Water Availability and Safe Sanitation Systems to Achieve the Goals of Agenda 2063.

Groundwater will contribute to ensuring reliable availability of water of a safe quality for all household needs in line with Vision Statement 1, focusing on universal access to safely managed water, sanitation and hygiene services. In terms of Vision Statement 2, focusing sustainable water availability for transformed economies and growing, prosperous populations facing greater climate uncertainty, groundwater will contribute to increase the productivity of water use in all sectors. Groundwater will also contribute to ensuring equitable access to benefits of shared water resources, fostering regional integration and peace, and driving shared prosperity and ecological health across all riparian states in line with Vision Statement 5 focusing on Water basins being treated as natural assets for all and drive trade, regional integration, peace, social inclusion and political stability.

Groundwater as a strategic resource for ensuring water security and resilience in Africa will be given adequate attention in terms of human capacity building, research and innovation in line with Vision Statement 7 focusing on human capital development, technological empowerment and adaptive learning meet the requirements for effective management of Africa's natural resources base. Vision Statement 8 focusing on investment into legitimised and integrated water information systems supporting science-based decision making for climate resilience and raising the profile of water management and sanitation in national systems for economic planning, investment and financial allocation will deal also with groundwater. Institutionalisation of the application of the principles of valuing water and the circular economy to make the economic case, strengthening information systems and enhancing the enabling environment and provide assurances to boost investors' confidence; and overcome political and non-

commercial risks associated with investments in the water and sanitation sector are very much applicable to groundater.

2.4 Expected results of the program

The expected results of the of the program per strategic objective are:

SO1: Strengthen the policy, legal and institutional environment and practice for groundwater development, utilisation and management towards resilient rural economies, sustainable urban centres, and overall quality livelihoods, social security and protection

ER1.1 Profile of groundwater raised in Africa's water agenda, policy initiatives and programmes at all levels, including the post-2025 Africa Water Vision and Policy

ER1.2 Policy, legal and institutional frameworks strengthened for climate resilient groundwater development and management at various levels

ER1.3 A compendium of policies, laws, strategies and guidelines to promote best practices on groundwater management and regulation at all levels

SO2: Support multilevel human and institutional groundwater management capacity development for water security and climate resilience

ER2.1 Continental cooperation arrangements agreed and initiated for knowledge sharing and collective action between Member States and partners to establish an African community of practice on groundwater management

ER2.2 Support tools developed for standardised local-level approaches to sustainable groundwater use and management

ER2.3 A knowledge incubator initiative launched to support human and institutional capacity building to improve information and knowledge on Africa's groundwater resources

ER2.4 An inventory of courses established, including training and research institutions on groundwater management and development

SO3: Build a business case to demonstrate the economic value and cross-sectoral benefits of structured investment in groundwater development and management

ER3.1 Support provided to develop capacity for groundwater assessment, and management to leverage water resources management funding for groundwater management outcomes.

ER3.2 Best practices and studies that make a business case and demonstrate economic benefits of groundwater development and management upscaled and documented to improve understanding, cross-sectoral partnerships and collaboration and increase the groundwater investment outlook.

ER3.3 Studies initiated to improve understanding of the economic optimisation of groundwater and its contribution to climate resilience and facilitate integration of groundwater into National Development Plans.

ER3.4 Access to local development finance improved for water security and local transformation.

SO4: Develop and operationalise tools to raise awareness, support evidence-based decision making and catalyse political and stakeholder buy-in and ownership

ER4.1 An Inventory of existing guidelines/tools on groundwater development and management at all levels is established

ER4.2 A continental Groundwater Implementation Support Mechanism (GISM) established to promote the utilisation of groundwater tools by national and sub-national change agencies to strengthen local water security capacities, including business case development, attracting investment, and sustainable groundwater management best practices

ER4.3 Groundwater maps produced and periodically updated to identify water development hotspots

ER4.4 Ongoing development of the Africa Groundwater Atlas consolidated into an online open-access portal and knowledge incubator initiative for anchoring Africa's groundwater resources information, including an interactive tracker of Member States' groundwater policy and legal frameworks

2.5 Output indicators of the program

The output indicators of the program are:

a. Number of gaps in national-level WRM legal and regulatory frameworks vis-à-vis groundwater management addressed
b. Number of sub-national groundwater management instruments, institutions and participation established
c. Amount of financing for groundwater mobilized
d. Number of institutionalised groundwater management networks established
e. Number of functional i) linkages among; and ii) communities of practice of groundwater management actors (research, practitioners, policymakers, user groups) established
f. Number of support tools for standardised local-level approaches to sustainable groundwater use and management established
g. Number of groundwater assessment and monitoring tools integrated in WRM planning at the sub-national level

2.6 Priority actions for achieving the objectives of the program

The priority actions are presented per strategic objective and along the various Expected Result Areas (ER) as follows:

2.6.1 Strategic Objective 1(SO1): Strengthen the policy, legal and institutional environment and practice for groundwater development, utilisation and management towards resilient rural economies, sustainable urban centers, and overall quality livelihoods, social security and protection

a) ER 1.1 Profile of groundwater raised in Africa's water agenda, policy initiatives and programmes at all levels, including the post-2025 Africa Water Vision and Policy

Despite the growing recognition of groundwater's crucial role in Africa's water security, its integration into the continent's water agenda, policy initiatives, and programs, at international, regional and national levels to support the post-2025 Africa Water Vision and Policy framework, although existing, remains weak and inadequate. This inadequacy is evidenced by limited visibility, with groundwater often receiving less attention and investment than surface water, fragmented governance, where responsibilities are dispersed across institutions with unclear mandates and insufficient data and knowledge on the groundwater quantity and quality in various African countries. There is need to have a common groundwater agenda that is clearly articulated in continental, regional and national policies and frameworks in order to

enhance groundwater management. In addition, high level political support and commitment is needed to move the groundwater agenda forward and high on the agenda of the continent. Raising the profile of groundwater should involve practical demonstration of the benefits of groundwater through projects on the ground.

To address the above issues, the following priority actions are proposed:

- Establish a common and coherent groundwater agenda that is clearly articulated within continental, regional and national policies and frameworks to enhance effective groundwater management.

- Link groundwater to and leverage existing continental and regional cooperation and development frameworks and programs such as the Blue Economy Strategy, Africa Climate Resilience Strategy, Africa Continental Free Trade Area, Comprehensive Africa Agricultural Development Programme, Groundwater Access Facility, African Water Investment Program etc.
- Improve advocacy and raise awareness of groundwater's crucial role in ensuring Africa's water security.

b) ER1.2 Policy, legal and institutional frameworks strengthened for climate resilient groundwater development and management at various levels

Frameworks exist for groundwater cooperation at continental, regional and national levels but need to be strengthened. Legal and institutional frameworks for groundwater development and management at various levels remain inadequate to address the challenges of climate variability and change effectively. At the global level, the UN Water Convention provides a framework and tools for transboundary water cooperation, including specific provisions for groundwater. The importance of conjunctive management (linking surface and groundwater management) and improved data sharing is emphasised in the Water Convention. At the regional level in Africa, Southern African Development Community (SADC) has well developed legal and institutional frameworks for groundwater development and management. The Senegal-Mauritanian Aquifer Basin has demonstrated development of agreements and institutional arrangements for shared groundwater resources. Despite the progress made in some regions and aquifers basins in Africa, inadequacies in legal and institutional frameworks still exist in key areas such as climate-specific provisions, weak institutional coordination, fragmented responsibilities and unclear mandates, limited stakeholder participation, and insufficient capacity to integrate climate change considerations into groundwater management practices. The risks of unregulated groundwater use, the need for equitable access, and the importance of community participation in data collection and decision-making are priority issues that need attention. There is therefore a need for robust, equitable, and implementable policies, laws and governance frameworks for groundwater management. Opportunities for learning and exchange

from existing organisations and institutions as well as support from international organizations such as UNESCO, UNECE etc need to be exploited.

To address the above issues, the following priority actions are proposed for implementation at various levels (continental, regional and national levels):

- Establish or strengthen existing legal, institutional and governance frameworks and mechanisms for groundwater management to promote coordinated, stakeholders driven and climate resilient and development.
- Integrate climate change aspects into groundwater-related policy and legal frameworks.
- Develop regulations and strategies for cross-sectoral coordination, conjunctive management of groundwater and surface, management of non-renewable groundwater etc to ensure sustainable groundwater use, prevent overexploitation and pollution and promote climate-resilient groundwater development and management.
- Establish a stakeholder coordination and participation framework for climate-resilient groundwater development and management including involvement of young people in decision-making processes, policy and investment regarding groundwater

c) ER1.3 A compendium of policies, laws, strategies, and guidelines to promote best practices on groundwater management and regulation at all levels

While some laws, policies, strategies, and guidelines for groundwater development, management and regulation exist at different levels, they are often fragmented, difficult to access, and not consolidated. This absence of a comprehensive and readily available compendium of laws and policies, strategies, and guidelines to promote best practices on groundwater management and regulation hinders effective groundwater management and regulation, thus creating information gaps as practitioners and communities struggle to locate relevant documents. This therefore limits knowledge sharing, hinders policy analysis, impede capacity building, and limit public participation and informed decision-making. To address the above issues, the following priority actions are proposed:

- Collect, review and compile groundwater management-related policies, laws, strategies, and guidelines into a compendium, including the use of digital platforms.
- Analyze and align existing groundwater laws, policies, strategies, and guidelines to different regions of the continent considering the groundwater context of each region.
- Disseminate existing laws, policies, strategies, and guidelines that promote best practices on groundwater management and regulation at all levels.
- Raise awareness and build capacity of various stakeholders to use the compendium of laws, policies, strategies, and guidelines.

- Undertake regular updates and revisions of groundwater management-related laws, policies, strategies, and guidelines to promote good practices in groundwater management and regulation.
- Integrate key aspect of groundwater in strategies for planning, development, and management of water and related natural resources at basin and sub-basin levels.

2.6.2 Strategic Objective 2 (SO2): Support human and institutional groundwater management capacity development for water security and climate resilience

ER2.1 Continental cooperation arrangements agreed and initiated for knowledge sharing and collective action between Member States and partners to establish an African community of practice on groundwater management

Africa faces critical challenges in groundwater management due to fragmented knowledge, limited data availability, and inadequate institutional and technical capacity. Transboundary aquifers remain poorly coordinated, with insufficient cooperation among countries for data sharing and joint resource management. The lack of a unified knowledge sharing and capacity building platform hinders evidence-based decision-making, while hydrogeological expertise and research gaps limit adaptive responses to climate impacts. Without a coordinated continental approach, groundwater resources will remain underutilised or mismanaged, threatening water security and resilience across the region. To address the above issues, the following priority actions are proposed:

- Establish continental cooperation arrangements between Member States and partners for knowledge sharing and collective action.
- Establish/strengthen platforms for capacity building and training, knowledge exchange and sharing, among governments, partners, groundwater professionals, youth, community actors etc.
- Establish collaborative platforms for cross-border knowledge exchange, especially on shared aquifers and transboundary groundwater governance among Member States.
- Use existing platforms or promote establishment of community of practice to promote understanding of groundwater and its role in sustainable socio-economic development.
- Establish capacity-building programs and Joint Research Initiatives at continental, regional and national levels involving all key stakeholders such as governments, academic institutions, groundwater professionals, youth, community actors etc.
- Build capacity for integrated and cross sectoral planning taking surface water and groundwater together within the framework of integrated water resources management

- Increase groundwater expertise through scaling up professional training programs in hydrogeology and general groundwater education with special focus on young people.

ER2.2 Support tools developed for standardised local-level approaches to sustainable groundwater use and management

Groundwater management at the community level is hindered by a lack of accessible knowledge, limited local monitoring capacity, and weak integration of traditional and scientific practices. Many communities lack the training and tools to manage groundwater sustainably, leading to over-abstraction, contamination, and inefficient use. Existing monitoring systems often exclude local participation, resulting in data gaps that undermine decision-making. Civil Society Organizations play a vital role in bridging the gap between citizens and authorities, advocating for the inclusion of vulnerable groups in groundwater management. Furthermore, young people are disproportionately affected by water scarcity but are often excluded from decision-making processes. There's a need for greater youth inclusion in policy and implementation of groundwater programs. There is also a need for translating technical information into simple and understandable information for the local communities including the youth.

Without improved knowledge dissemination, community-based monitoring, and integration of best practices, groundwater resources will remain vulnerable to mismanagement, exacerbating water insecurity. To address the above issues, the following priority actions are proposed:

- Develop and utilize community-based groundwater training materials to build the necessary capacity
- Adopt community-based groundwater monitoring tools to integrate traditional and scientific knowledge
- Pilot and scaling up best practices and locally adapted groundwater management approaches
- Develop human capacity in various aspects of groundwater expert networking and field placements in various areas.
- Involve Civil Society Organizations to advocate for the inclusion of vulnerable groups in groundwater management to bridge the gap between citizens and authorities.
- Develop and disseminate information on groundwater management to support participatory governance and capacity development at the local level.

ER2.3 A knowledge incubator initiative launched to support human and institutional capacity building to improve information and knowledge on Africa's groundwater resources

Africa's groundwater research and innovation efforts are constrained by fragmented knowledge, limited research funding, and inadequate opportunities for professional development. There is a need for improved understanding of groundwater science, better data collection and sharing, and stronger collaboration between academia and government. Academia can play a very big role to advance research, training, and data generation to support groundwater policy and planning. However, there is no centralised platform for compiling, standardising, and disseminating groundwater data, leading to inconsistencies in assessment and management practices. Young researchers and institutions struggle to access funding and mentorship, slowing the advancement of locally driven groundwater solutions. Additionally, limited international mobility and scholarship opportunities hinder the development of a skilled workforce capable of addressing Africa's groundwater challenges. Without strengthened research coordination, investment in innovation, and professional capacity-building, Africa's groundwater resources will remain underutilised and poorly managed, threatening long-term water security. To address the above issues, the following priority actions are proposed:

- Establish a Continental Groundwater Knowledge Hub with harmonized databases and platform for long term storage and access of groundwater data
- Establish an Africa Groundwater Research, professional capacity-building and Innovation Grant Program in collaboration with relevant partners and organizations.
- Strengthen collaboration between academia and government in areas of research, capacity building and innovation.
- Strengthen capacity across government, communities, academia, and youth to participate in groundwater planning and decision-making.

ER2.4 An inventory of courses established, including training and research institutions on groundwater management and development.

Groundwater education and training in Africa are fragmented, with limited coordination among institutions, inconsistent curricula, and inadequate information on available programs. Many universities and technical institutes offer groundwater-related courses, but there is no comprehensive database to capture groundwater-related courses or platforms to connect students, professionals, and policymakers to relevant training opportunities. The lack of standardised curricula and weak institutional partnerships

hinder knowledge exchange and capacity building. Without a structured inventory, open-access training database, and stronger collaboration between institutions, gaps in groundwater expertise will persist, limiting Africa's ability to develop a skilled workforce for sustainable groundwater management. To address the above issues, the following priority actions are proposed:

- Map and catalogue groundwater training and research Institutions
- Develop an open-access database of existing groundwater training programs and courses
- Strengthen partnerships and knowledge exchange between and among institutions
- Utilize existing regional and national centres of excellence in different fields to promote sustainable management and development of groundwater resources
- Deploy real-time technologies such as remote sensing, Internet of Things (IoT), and digital twins for training and research.

2.6.3 Strategic Objective 3 (SO3): Building a business case to demonstrate the economic value and cross-sectoral benefits of structured investment in groundwater development and management

ER3.1: Support provided to develop capacity for groundwater assessment, and management to leverage water resources management funding for groundwater management outcomes

A major constraint to effective groundwater governance in Africa is the lack of reliable data and monitoring frameworks. Many governments struggle to make informed decisions due to fragmented, outdated, or non-existent groundwater data, leading to inefficient resource allocation and missed investment opportunities. Strengthening groundwater assessment and monitoring and management information systems will empower governments and other stakeholders to manage and develop groundwater resources more effectively. To address the above issues, the following priority actions are proposed:

- Establish integrated groundwater information systems to support decision-making and data sharing at continental, regional and national levels
- Enhance decision-support tools for evidence-based groundwater development and management.
- Increase investment in groundwater research, monitoring and assessment to improve understanding of groundwater systems, particularly shared aquifers.
- Promote the conjunctive use and management of surface and groundwater

ER3.2: Best practices and studies that make a business case and demonstrate economic benefits of groundwater development and management upscaled and documented to improve understanding, cross-sectoral partnerships and collaboration and increase the groundwater investment outlook.

Despite the immense value of groundwater, the development and management of this resource remains chronically underfunded, primarily due to limited understanding and recognition of groundwater's economic value and contribution and cross-sectoral benefits, as well as challenges in mobilising the required financial resources. Investing in groundwater development and management is essential for economic growth, climate resilience, and sustainable development across Africa. Demonstrating the economic viability of groundwater investments is essential to attracting financing and influencing policy decisions. There is a lack of comprehensive documentation and dissemination of best practices that showcase how groundwater can enhance economic growth, food security, energy access, and climate adaptation.

To address the above issues, the following priority action are proposed:

- Identify and document successful groundwater management and development models and their role in improving water security
- Showcase cost-effective groundwater development technologies such as solar-powered boreholes to support various uses such as domestic water supply, irrigation and their economic benefits
- Document good practices of cross sectoral partnerships and collaboration that increased the groundwater investment outlook
- Document good case studies of how groundwater has enhanced economic growth, food security, energy access, and climate adaptation through existing development frameworks
- Analyse lessons from transboundary aquifer management for regional cooperation

ER3.3: Studies initiated to improve understanding of the economic optimisation of groundwater and its contribution to climate resilience and facilitate integration of groundwater into National Development Plans

The economic value of groundwater as a climate-resilient asset remains understudied and poorly integrated into policy frameworks. Targeted studies will quantify groundwater's contribution to economic optimisation, climate resilience, and sustainable development. Unlocking the full potential of groundwater requires a structured investment approach that aligns with broader development goals. There is a need to enhance investments in groundwater, improve access to financial resources, and empower and strengthen the capacity of the private sector, local governments and communities to invest in groundwater projects.

Furthermore, benefits of transboundary groundwater cooperation as well as its implications need to be determined, communicated and pursued. Groundwater cooperation is emerging globally and there are not many examples of successful cooperation like for surface water. Without adequate data transboundary groundwater cooperation may not be easily realized. There is need to first invest in understanding the resource in terms of its quantity and quality and how it is changing due to climate change and human impacts so that it easier to manage and develop it. To address the above issues, the following priority actions are proposed:

- Assess the potential of groundwater in terms of quantity and quality and how it is changing due to climate change and human impacts
- Assess the long-term cost-effectiveness of groundwater development and management and its integration in National Development Plans
- Assess the economic contribution of groundwater to socio-economic development, food security, improving rural incomes and climate resilience.
- Assess the role of managed aquifer recharge (MAR) and other nature-based solutions (NBS) in climate resilience.
- Analyse economic trade-offs between over-extraction risks and sustainable governance.
- Determine, communicate and pursue the benefits of transboundary groundwater cooperation as well as its implications.

ER3.4: Access to local development finance improved for water security and local transformation.

One of the biggest barriers to sustainable groundwater development and management is the lack of accessible and structured financing mechanisms at the various levels, especially the local level.

Financing of groundwater development and management is key and requires stable and long term financing. National budgets and commitments are key for sustainability and these can be supplemented by other sources of funding. Financing for groundwater is too small and usually decentralized. The assessment of groundwater financing ecosystem in Africa reveals many gaps to close and opportunities for designing appropriate financing mechanisms for sustainable groundwater investment. The assessment normally focuses on four funding sources namely domestic public finance, domestic private finance, foreign public finance, and foreign private finance. These sources need to be fully exploited to improve investment in groundwater development and management.

Many countries already have various innovative financing tools for groundwater but these are implemented in isolation. Consequently, no single actor can solely provide sufficient funding for groundwater infrastructure investment and related value chain activities.

Various financing models have to be developed to address the particular needs of different users. Long-term financing such as equity and bond financing that states and

local governments frequently used to raise money, primarily for long-lived infrastructure investment, is not exploited to finance groundwater resources in many countries in Africa. Key agencies such as IFAD, UNICEF, UNCDF etc have financing mechanisms that support groundwater development and management in Africa.

The Groundwater Access Facility (GAFA) is a collaborative effort involving various partners, such as the United Nations Development Programme (UNDP), IGAD, UNICEF, UNESCO, and others that was launched in 2023 as a multi-partner financing mechanism to address two key pillars: data and evidence generation and the development of an investment pipeline for productive groundwater use. This initiative currently focuses on sustainable groundwater management in the Horn of Africa and the Sahel region, addressing water scarcity and promoting resilience to drought. It aims to unlock the potential of untapped groundwater resources to provide reliable water sources for communities and enhance their ability to cope with climate variability. It is seen as a crucial step towards achieving sustainable water management and building resilience in the face of climate change in the Horn of Africa and the Sahel. GAFA can therefore support implementation of the AMCOW groundwater program.

In order to address the above issues, the following priority actions are proposed:

- Encourage integration of groundwater development into national economic planning
- Identify and develop innovative financing instruments and mechanisms, and models that diversify income streams and include strategic partnerships to support groundwater investments.
- Enhance institutional and human capacity to design appropriate financing vehicles for groundwater investment, leverage financing from different sources and prepare bankable groundwater projects.
- Develop a unifying framework Create a groundwater fund to pool resources from various funders and sources so as to create a strong voice for lobbying for additional funding (from private and public funds as matching grants) for groundwater projects and coordination of investment decisions, and for funding the whole groundwater value chain.
- Raise awareness about the value proposition for groundwater indicating what makes investing in groundwater unique and different
- Mobilize political will to support fiscal decentralization and funding allocations so that the local authorities can implement their groundwater functions.
- Encourage increased investments in groundwater development as a vital resource for domestic water supply in both rural and urban areas, small-scale agriculture, industrial development, and as a climate resilience measure.
- Integrate groundwater components into National Water Investment Programs to attract resources for investment, training and institutional strengthening.
- Utilise the Groundwater Access Facility (GAFA) as an AMCOW groundwater program implementation mechanism and framework, and use it to raise funds for groundwater development and management in Africa.

2.6.4 Strategic Objective 4 (SO4): Develop and operationalise tools to raise awareness, support evidence-based decision making and catalyse political and stakeholder buy-in and ownership

ER4.1 An inventory of existing guidelines / tools on groundwater development and management at all levels is established.

An inventory is an extensive catalogue containing a comprehensive record of the current information/knowledge resources and tools for groundwater development and management. It helps to understand the data stored while also identifying gaps that need to be addressed. It further avoids duplication of efforts and inefficient use of resources, providing a point of reference for all its users. Therefore, establishing such an inventory that contains both aspects of quantity and quality, will be the prerequisite for developing and operationalising groundwater development and management tools and would be a foundation for immediate efforts in supporting evidence-based decision-making and awareness raising. Make a specific inventory should be made of tools for sustainable management of fossil aquifers, participatory governance and real-time monitoring technologies. To address the above issues, the following priority actions are proposed:

- Make an inventory of existing guidelines**,** information/knowledge resources and tools.
- Categorise and assess the useful of the existing guidelines**,** information/knowledge resources and tools
- Develop and operationalize an online platform on existing guidelines and tools for groundwater development and management.
- Establish a baseline on the current state of knowledge sharing and dissemination on both groundwater quantity and quality.
- Develop and operationalize guidelines and tools for integrated and cross sectoral planning taking surface water and groundwater together within the framework of integrated water resources management

ER4.2 A continental Groundwater Implementation Support Mechanism (GISM) established to promote the utilisation of groundwater tools by national and sub-national change agencies to strengthen local water security capacities, including business case development, attracting investment, and sustainable groundwater management best practices.

Many national and sub-national agencies lack the expertise, tools, and frameworks to manage groundwater effectively, leading to fragmented governance and weak institutional capacity. Particularly groundwater management in urban areas especially the mega cities needs more attention. Therefore, a dedicated Urban groundwater track

needs to be established that will create partnerships among urban authorities, municipalities, private sector, property developers and owners etc to address groundwater challenges in urban areas. This will be a good basis for attracting investment for groundwater in urban areas. There is also a need for recognizing the value of water and ecosystems, connecting cities to catchment areas and stakeholders, and attracting investments through a sound regulatory environment, using a scaled approach. Groundwater development has become attractive to cities because it can be scaled incrementally. Rural areas and borderlines are key for groundwater development to support productive sectors and therefore need more attention in terms of business models and sustainability. There is also need to document and scale up best practices for arid areas such as solar pumping and managed aquifer recharge (MAR) combination and design a revolving Water-Energy fund model for pilot projects

Additionally, groundwater resources often span multiple countries, requiring harmonised regulations and cross-border cooperation, which remain weak and poorly coordinated.

The lack of reliable data and monitoring systems makes evidence-based decision-making difficult and limits the ability to implement effective groundwater management strategies and invest in related infrastructure. The Groundwater Implementation Support Mechanism (GISM) will be established to strengthen institutional capacity, facilitate coordination, enhance data systems, mobilise investments, and promote political commitment to ensure the sustainable management of groundwater across the continent.

To address the above issues, the following priority actions are proposed:

- Invest in hydrogeological mapping through the use of various techniques, including remote sensing technologies.
- Exploit evolving innovative technologies for groundwater management such as artificial intelligence, machine learning, remote sensing etc.
- Develop real-time monitoring networks and assessment programs to provide data and information on the state of groundwater resources.
- Develop groundwater management and investment tools
- Build capacity and provide technical support to relevant organisations at continental, regional, national and local and subnational levels to utilise groundwater management and investment tools
- Document and scale up best practices for groundwater management in urban areas with special focus on mega cities including the role of urban areas and cities in protecting recharge zones and catchments within and outside city boundaries, and securing investments
- Facilitate access to investment in sustainable groundwater management and development in urban areas, rural areas and border lines

ER4.3 Groundwater maps produced and periodically updated to identify water development hotspots.

Given the uneven spatial and temporal distribution of water resources and uneven population distribution, water supply hotspot maps are crucial for identifying areas facing water scarcity or limited access. Groundwater maps are essential for prioritising resource allocation towards water supply infrastructure development, highlighting vulnerable populations with inadequate access, informing land use planning for sustainable water resource management, supporting drought preparedness and mitigation, and facilitating effective water resource management and monitoring.

Data availability and sharing is key for sustainable groundwater management. Translating data from grey literature within Africa and beyond into information should be a priority for the AMCOW GW program. Value of historical groundwater needs to be recognized and all efforts need to be made to digitize available data and reports. Efforts should be made to digitize and integrate historical groundwater data and reports to generate useful information. Most of this data is held by non-African Geological Surveys such as British Geological Survey, French Geological Survey, BGR etc. Formal request to access this data could be made by AMCOW through AU.

More emphasis should be put on groundwater data collection through ongoing drilling programs, targeted aquifer studies, sustainable groundwater monitoring systems, data management systems and groundwater regulation and licensing frameworks. The databases that hold the data should be harmonized so that the data does not get lost.

To address the above issues, the following priority actions are proposed:

- Develop and regularly update groundwater maps at various scales to meet different purposes namely planning, advocacy, analysis, monitoring, implementation etc
- Support development of Borehole Databases and web-based platforms where they don't exist to foster use of groundwater
- Support the development of targeted aquifer studies, sustainable monitoring and data management systems, groundwater regulation and licensing etc.
- Improve data collection, management, and sharing on critical areas such as groundwater quality, recharge, usage etc.
- Promote digitization and synthesis of historical groundwater data from various geological surveys, drilling operations etc.
- Integrate groundwater data in the existing dashboard under AMCOW **with** a simple leaflet-based map interface.

ER4.4 Ongoing development of the Africa Groundwater Atlas consolidated into an online open-access portal and knowledge incubator initiative for anchoring Africa's groundwater resources information, including an interactive tracker of Member States groundwater legal and regulatory frameworks.

An Africa Groundwater Atlas is crucial as it provides a centralised, accessible source of information about groundwater resources across the continent, which is vital for sustainable groundwater management, particularly in regions facing water scarcity, by allowing researchers, policymakers, and water professionals to easily access critical data on groundwater availability, quality, and potential development areas, which is often scattered and difficult to find in Africa. A platform that can provide open access to such information would support such efforts. Adding an interactive tracker of the progress in establishing and updating groundwater legal and regulatory frameworks in various Member States would support reporting and understanding the prioritisation of future efforts. To address the above issues, the following priority actions are proposed:

- Develop an open access / open source portal to host the African Groundwater Atlas.
- Update and improve the resolution of the maps.

Table 1: Strategic objectives, Result Areas and priority actions for the AMCOW Strategic Program on Groundwater

Strategic Objectives	Result Areas	Priority Actions
SO1: Strengthen the policy, legal and institutional environment and practice for groundwater development, utilisation and management towards resilient rural economies, sustainable urban centres, and overall quality livelihoods, social security and protection .	ER1.1 Profile of groundwater raised in Africa's water agenda, policy initiatives and programmes at all levels, including the post-2025 Africa Water Vision and Policy	• Establish a common and coherent groundwater agenda that is clearly articulated within continental, regional and national policies and frameworks to enhance effective groundwater management. • Link groundwater to and leverage existing continental and regional cooperation and development frameworks and programs such as the Blue Economy Strategy, Africa Climate Resilience Strategy, Africa Continental Free Trade Area, Comprehensive Africa Agricultural Development Programme, Groundwater Access Facility, African Water Investment Program etc. • Improve advocacy and raise

Strategic Objectives	Result Areas	Priority Actions
		awareness of groundwater's crucial role in ensuring Africa's water security.
	ER1.2 Policy, legal and institutional frameworks strengthened for climate resilient groundwater development and management at various levels	• Establish or strengthen existing legal, institutional and governance frameworks and mechanisms for groundwater management to promote coordinated, stakeholders driven and climate resilient and development. • Integrate climate change aspects into groundwater-related policy and legal frameworks. • Develop regulations and strategies for cross-sectoral coordination, conjunctive management of groundwater and surface, management of non-renewable groundwater etc to ensure sustainable groundwater use, prevent overexploitation and pollution and promote climate-resilient groundwater development and management. • Establish a stakeholder coordination and participation framework for climate-resilient groundwater development and management including involvement of young people in decision-making processes, policy and investment regarding groundwater •
	ER1.3 A compendium of policies, laws, strategies and guidelines to promote best practices on groundwater management and regulation at all levels	• Collect, review and compile groundwater management-related policies, laws, strategies, and guidelines into a compendium, including the use of digital platforms. • Analyze and align existing groundwater laws, policies, strategies, and guidelines to different regions of the continent considering the groundwater context of each region.

Strategic Objectives	Result Areas	Priority Actions
		• Disseminate existing laws, policies, strategies, and guidelines that promote best practices on groundwater management and regulation at all levels. • Raise awareness and build capacity of various stakeholders to use the compendium of laws, policies, strategies, and guidelines. • Undertake regular updates and revisions of groundwater management-related laws, policies, strategies, and guidelines to promote good practices in groundwater management and regulation. • Integrate key aspect of groundwater in strategies for planning, development, and management of water and related natural resources at basin and sub-basin levels.
SO2: Support the development of multilevel human and institutional groundwater management capacity for water security and climate resilience.	ER2.1 Continental cooperation arrangements agreed and initiated for knowledge sharing and collective action between Member States and partners to establish an African community of practice on groundwater management	• Establish continental cooperation arrangements between Member States and partners for knowledge sharing and collective action. • Establish/strengthen platforms for capacity building and training, knowledge exchange and sharing, among governments, partners, groundwater professionals, youth, community actors etc. • Establish collaborative platforms for cross-border knowledge exchange, especially on shared aquifers and transboundary groundwater governance among Member

Strategic Objectives	Result Areas	Priority Actions
		States. • Use existing platforms or promote establishment of community of practice to promote understanding of groundwater and its role in sustainable socio-economic development. • Establish capacity-building programs and Joint Research Initiatives at continental, regional and national levels involving all key stakeholders such as governments, academic institutions, groundwater professionals, youth, community actors etc. • Build capacity for integrated and cross sectoral planning taking surface water and groundwater together within the framework of integrated water resources management • Increase groundwater expertise through scaling up professional training programs in hydrogeology and general groundwater education with special focus on young people. •
	ER2.2 Support tools developed for standardised local-level approaches to sustainable groundwater use and management	• Develop and utilize community-based groundwater training materials to build the necessary capacity • Adopt community-based groundwater monitoring tools to integrate traditional and scientific knowledge • Pilot and scaling up best practices and locally adapted groundwater management approaches • Develop human capacity in various aspects of groundwater

Strategic Objectives	Result Areas	Priority Actions
		expert networking and field placements in various areas. • Involve Civil Society Organizations to advocate for the inclusion of vulnerable groups in groundwater management to bridge the gap between citizens and authorities. • Develop and disseminate information on groundwater management to support participatory governance and capacity development at the local level.
	ER2.3 A knowledge incubator initiative launched to support human and institutional capacity building to improve information and knowledge on Africa's groundwater resources	• Establish a Continental Groundwater Knowledge Hub with harmonized databases and platform for long term storage and access of groundwater data • Establish an Africa Groundwater Research, professional capacity-building and Innovation Grant Program in collaboration with relevant partners and organizations. • Strengthen collaboration between academia and government in areas of research, capacity building and innovation. • Strengthen capacity across government, communities, academia, and youth to participate in groundwater planning and decision-making.
	ER2.4 An inventory of courses established, including training and research institutions on groundwater management and development	• • Map and catalogue groundwater training and research Institutions • Develop an open-access

Strategic Objectives	Result Areas	Priority Actions
		database of existing groundwater training programs and courses • Strengthen partnerships and knowledge exchange between and among institutions • Utilize existing regional and national centres of excellence in different fields to promote sustainable management and development of groundwater resources • Deploy real-time technologies such as remote sensing, Internet of Things (IoT), and digital twins for training and research. •
SO3: Build a business case to demonstrate the economic value and cross-sectoral benefits of structured investment in groundwater development and management	ER3.1 Support provided to develop capacity for groundwater assessment, and management to leverage water resources management funding for groundwater management outcomes.	• Establish integrated groundwater information systems to support decision-making and data sharing at continental, regional and national levels • Enhance decision-support tools for evidence-based groundwater development and management. • Increase investment in groundwater research, monitoring and assessment to improve understanding of groundwater systems, particularly shared aquifers. • Promote the conjunctive use and management of surface and groundwater
	ER3.2 Best practices and studies that make a business case and demonstrate economic benefits of groundwater development and management upscaled and documented to improve understanding, cross-sectoral partnerships and collaboration and increase the groundwater investment outlook.	• Identify and document successful groundwater management and development models and their role in improving water security • Showcase cost-effective groundwater development technologies such as solar-powered boreholes to support various uses such as domestic water supply, irrigation and their economic benefits • Document good practices of cross sectoral partnerships and

Strategic Objectives	Result Areas	Priority Actions
		collaboration that increased the groundwater investment outlook • Document good case studies of how groundwater has enhanced economic growth, food security energy access, and climate adaptation through existing development frameworks • Analyse lessons from transboundary aquifer management for regional cooperation
	ER3.3 Studies initiated to improve understanding of the economic optimisation of groundwater and its contribution to climate resilience and facilitate integration of groundwater into National Development Plans.	• Assess the potential of groundwater in terms of quantity and quality and how it is changing due to climate change and human impacts • Assess the long-term cost-effectiveness of groundwater development and management and its integration in National Development Plans • Assess the economic contribution of groundwater to socio-economic development, food security improving rural incomes and climate resilience. • Assess the role of managed aquifer recharge (MAR) and other nature-based solutions (NBS) in climate resilience. • Analyse economic trade-offs between over-extraction risks and sustainable governance. • Determine, communicate and pursue the benefits of transboundary groundwater cooperation as well as its implications.
	ER3.4 Access to local development finance improved for water security and local transformation.	• Encourage integration of groundwater development into national economic planning • Identify and develop innovative financing instruments and mechanisms, and models that diversify income streams and include strategic partnerships to support groundwater investments. • Enhance institutional and human capacity to design appropriate financing vehicles for groundwater investment, leverage financing

Strategic Objectives	Result Areas	Priority Actions
		from different sources and prepare bankable groundwater projects. • Develop a unifying framework Create a groundwater fund to pool resources from various funders and sources so as to create a strong voice for lobbying for additional funding (from private and public funds as matching grants) for groundwater projects and coordination of investment decisions, and for funding the whole groundwater value chain. • Raise awareness about the value proposition for groundwater indicating what makes investing in groundwater unique and different • Mobilize political will to support fiscal decentralization and funding allocations so that the local authorities can implement their groundwater functions. • Encourage increased investments in groundwater development as a vital resource for domestic water supply in both rural and urban areas, small-scale agriculture industrial development, and as a climate resilience measure. • Integrate groundwater components into National Water Investment Programs to attract resources for investment, training and institutional strengthening. • Utilise the Groundwater Access Facility (GAFA) as an AMCOW groundwater program implementation mechanism and framework, and use it to raise funds for groundwater development and management in Africa.
SO4: Develop and operationalise tools to raise awareness, support evidence-based decision making and catalyse political and stakeholder buy-in and ownership	ER4.1 An Inventory of existing guidelines/tools on groundwater development and management at all levels is established	• Make an inventory of existing guidelines, information/knowledge resources and tools. • Categorise and assess the useful of the existing guidelines, information/knowledge resources and tools • Develop and operationalize an online platform on existing

Strategic Objectives	Result Areas	Priority Actions
		guidelines and tools for groundwater development and management. • Establish a baseline on the current state of knowledge sharing and dissemination on both groundwater quantity and quality. • Develop and operationalize guidelines and tools for integrated and cross sectoral planning taking surface water and groundwater together within the framework of integrated water resources management
	ER4.2 A continental Groundwater Implementation Support Mechanism (GISM) established to promote the utilisation of groundwater tools by national and sub-national change agencies to strengthen local water security capacities, including business case development, attracting investment, and sustainable groundwater management best practices	• Invest in hydrogeological mapping through the use of various techniques, including remote sensing technologies. • Exploit evolving innovative technologies for groundwater management such as artificial intelligence, machine learning, remote sensing etc. • Develop real-time monitoring networks and assessment programs to provide data and information on the state of groundwater resources. • Develop groundwater management and investment tools • Build capacity and provide technical support to relevant organisations at continental, regional, national and local and subnational levels to utilise groundwater management and investment tools • Document and scale up best practices for groundwater management in urban areas with special focus on mega cities including the role of urban areas and cities in protecting recharge zones and catchments within and outside city boundaries, and securing

Strategic Objectives	Result Areas	Priority Actions
		investments • Facilitate access to investment in sustainable groundwater management and development in urban areas, rural areas and borderlines
	ER4.3 Groundwater maps produced and periodically updated to identify water development hotspots	• Develop and regularly update groundwater maps at various scales to meet different purposes namely planning, advocacy, analysis, monitoring, implementation etc • Support development of Borehole Databases and web-based platforms where they don't exist to foster use of groundwater • Support the development of targeted aquifer studies, sustainable monitoring and data management systems, groundwater regulation and licensing etc. • Improve data collection, management, and sharing on critical areas such as groundwater quality, recharge, usage etc. • Promote digitization and synthesis of historical groundwater data from various geological surveys, drilling operations etc.
	ER4.4 Ongoing development of the Africa Groundwater Atlas consolidated into an online open-access portal and knowledge incubator initiative for anchoring Africa's groundwater resources information, including an interactive tracker of Member	• Integrate groundwater data in the existing dashboard under AMCOW with a simple leaflet-based map interface. • Develop an open access / open source portal to host the African Groundwater Atlas. • Update and improve the resolution of the maps. •

Strategic Objectives	Result Areas	Priority Actions
	States' groundwater policy and legal frameworks	

3. Implementation arrangements for the programme

3.1 Overall implementation mechanisms

The Strategic Programme on Groundwater for Water Security and Resilience in Africa will be implemented within the framework of the Africa Water Vision 2063 and Policy. The pathways and institutional roles to translate the proposed actions into tangible outcomes are presented in this section.

Success of the programme hinges on integrated, phased approaches, synchronised with Agenda 2063's decadal milestones. The first phase of the programme (2026 to 2033) will be hinged on the Investment-led regional integration phase of the Africa Water Vision 2063 and Policy that will run from 2026 to 2033. This phase that focuses on unlocking regional opportunities through strategic investments will (i) prioritise transboundary water infrastructure and economic corridors aligned with PIDA-PAP and AfCFTA; (ii) prioritise foundational investments and de-risking of public-private partnerships; (iii) fast-track 5 Economic Water Corridors (EWCs); and, (iv) operationalise open water related data platforms in 60% of shared basins to enable science-based decisions.

Follow up phases of the Strategic Programme on Groundwater for Water Security and Resilience in Africa will also follow the subsequent phases of th e Africa Water Vision 2063 and Policy. The second phase focused on systematic transformation (2033 to 2043) aims to accelerate the structural transformation of Africa's water economy. It will

(i) scale circular water economies and digital management systems continent-wide; (ii) integrate water valuation into national accounting frameworks; (iii) intensify pursuit of gender equality and social inclusion in water management and services delivery; and, (iv) mainstream climate resilience in all water investments, ensuring 80% of vulnerable communities access early-warning systems. The last phase focused on consolidated sustainability (2043 to 2063) aimed at locking in sustainability, equity, and innovation. It will (i) lock in intergenerational equity through legally binding ecosystem protections and youth-led water governance; (ii) mainstream innovation, achieve universal access, and lock in climate resilience; (iii) institutionalise youth-led and community-driven water governance mechanisms; (iv) achieve universal access to safe water and sanitation; and, (v) lock in climate resilience and mainstream innovation as systemic features of Africa's water and sanitation systems.

3.2 Institutional framework

The "Strategic Programme on Groundwater for Water Security and Resilience in Africa" will be implemented at various levels namely continental, regional, national and subnational levels. The success of the program will depend on creation of strategic partnerships and collaboration among the various stakeholders. The partnerships and collaboration are key in leveraging existing resources, creation of synergies, avoid duplication, delivering a consolidated program that will sustainably manage and develop groundwater. Implementation will involve all relevant stakeholders depending on their interests and specific inputs. At each of the levels, the relevant government mandated instititions will coordinate the other stakeholders to ensure that there is synegy and avoid duplication for sustainable groundwater management and development.

At continental level the African Ministers' Council on Water (AMCOW) will provide policy leadership and direction to the Strategic Programme on Groundwater for Water Security and Resilience in Africa. AMCOW will coordinate the partnerships and stakeholder engagement necessary to actualise the programme. It will lead policy coordination, as well as monitoring and providing accountability using the WASSMO system. AMCOW will work very closely with relevant stakeholders such as Africa Union Commission, African Development Bank, UN Agencies, relevant international organizations, groundwater networks and associations etc. The African Development Bank and related financial institutions at all levels will play a key role in operationalising mechanisms to improve the investment and funding outlook for the sector.

At regional level the implementation will be coordinated by the relevant Regional Economic Communities (REC) which will work very closely with other stakeholders such as River Basin Organisations, Development Banks, Development Partners, UN Agencies, relevant international organizations, groundwater networks and associations, academic institutions etc. The Regional Economic Communities, either directly or

working through Basin Organisations, are key actors in promoting regional cooperation and action on groundwater resources especially transboundary groundwater resources.

At national level the implementation will be coordinated by the Ministry responsible for water issues and these will work very closely with relevant government minisrries and agencies, UN Agencies, relevant international organizations, groundwater networks and associations, academic institutions, Non-governmental Organisations etc

At subnational level the implementation will be coordinated by the relevant local governments and these will work very closely with other government agencies, UN Agencies, relevant international organizations, groundwater networks and associations, academic institutions, Non-governmental Organisations, local community, cultural and regious institutions etc.

Civil Society and the Private Sector will co-design solutions and be actively eng aged in their delivery. They will support innovation, accountability, and service delivery, and ensure inclusion, entrepreneurship, and social mobilisation.

3.3 Implementation principles, monitoring and reporting

Implementation of the Strategic Programme on Groundwater for Water Security and Resilience in Africa shall be guided by the principles as adapted from the Africa Water Vision 2063 and Policy and summarised in Table 2 below. Progress will be tracked through the Africa Water and Sanitation Sector Monitoring (WASSMO) system.

Table 2: Implementation principles

Principle	Description
Programmatic approach	The strategic programme on groundwater for water security and resilience in Africa is aligned to the African Union's Agenda 2063. It will contribute to addressing the unfinished business of the Africa Water Vision 2025 and address new priorities arising from global, continental, regional and national priiorities related to groundwater.
Comparative advantage	Focus placed on areas where the AMCOW and its partners at the continental can drive action, the impacts of which will produce more results and add value to what the RECs, Basin Organisations, Member States, CSOs and private sector are doing.
Additionality	AMCOW, working in partnerships with the AfDB, UNECA, RECs, BOs, CSOs and the relevant institutions, organisations and stakeholders will motivate Member States interventions to actualise the strategic programme on groundwater.
Prioritisation	Based on the African Union's groundwater related development priorities and Agenda 2063: the Future we Want for Africa.
Flexibility	Implementation Plans for actualising the strategic programme on groundwater for water security and resilience in Africa shall be synchronised with Agenda 2063's decadal milestones. Regular periodic reviews are required to respond to the ever-

Principle	Description
	changing environment.
Variable geometry	A multi-pronged approach to implementation of key activities at Continental, RECs, BOs and Member States level, taking advantage of opportunities for immediate action.
Basin approach	RECs and BOs are critical institutions for management of transboundary groundwater resources within the frameowkr of integrated water management approaches; the principles of valuing water; and the water, energy, food and ecosystems nexus perspectives.
Best practices	Implementation of the planned activities to be informed and guided by best practices and lessons learnt in Africa and beyond.
Demonstration	Activities to pilot and/or demonstrate concepts and approaches to underlie processes for the proposed Strategic Programme on Groundwater, especially as it relates to establishing valuing water in national systems for economic planning.
Participation	Relevant partners and stakeholders shall be informed, consulted and involved as appropriate in the pursuit of the Strategic Programme on Groundwater.
Subsidiarity	Interventions will be undertaken at the most appropriate governance level.
Sustainability	Pursuit of the Strategic Programme on Groundwater shall promote local and national ownership; awareness; capacity development; gender equality and social inclusion; and institutional development.

Table 3: Strategic objectives, Result Areas and priority milestones during the Investment-led regional integration phase (2025 to 2033)

Strategic Objectives	Result Areas	2033 Milestones
SO1: Strengthen the policy, legal and institutional environment and practice for groundwater development, utilisation and management towards resilient rural economies, sustainable urban centres, and overall quality livelihoods, social security and protection .	ER1.1 Profile of groundwater raised in Africa's water agenda, policy initiatives and programmes at all levels, including the post-2025 Africa Water Vision and Policy	• A common and coherent groundwater agenda that is clearly articulated within continental, regional and national policies and frameworks to enhance effective groundwater management established. • Groundwater linked and leveraged in existing continental and regional cooperation and development frameworks and programs such as the Blue Economy Strategy, Africa Climate Resilience Strategy, Africa Continental Free Trade Area, Comprehensive Africa Agricultural Development Programme, Groundwater Access Facility, African Water Investment Program etc. • Advocacy improved and awareness raised on groundwater's crucial role in ensuring Africa's water security.
	ER1.2 Policy, legal and institutional frameworks strengthened for climate resilient groundwater development and management at various levels	• Legal, institutional and governance frameworks and mechanisms for groundwater management established or strengthened in 30% of African countries to promote coordinated, stakeholders driven and climate resilient and development. • Climate change aspects integrated into 30% of groundwater-related policy and legal frameworks. • 10 regulations and strategies for cross-sectoral coordination, conjunctive management of groundwater and surface, management of non-renewable groundwater etc developed to ensure sustainable groundwater use, prevent overexploitation and pollution and promote climate-resilient groundwater development and management. • Stakeholder coordination and participation framework for climate-resilient groundwater development and

Strategic Objectives	Result Areas	2033 Milestones
		management developed in 30% of the Afrcan countries that includes involvement of young people in decision-making processes, policy and investment regarding groundwater
	ER1.3 A compendium of policies, laws, strategies and guidelines to promote best practices on groundwater management and regulation at all levels	• 20% of the compendium of groundwater management-related policies, laws, strategies, and guidelines, including the use of digital platforms compilied. • Existing groundwater laws, policies, strategies, and guidelines analyzed and aligned to 2 out of 5 regions of the continent considering the groundwater context of each region. • Existing laws, policies, strategies, and guidelines that promote best practices on groundwater management and regulation disseminated in 2 out of 5 regions of Africa. • Awareness rasied and capacity of various stakeholders built to use the compendium of laws, policies, strategies, and guidelines in 2 out of 5 regions of Africa. • Regular updates and revisions of groundwater management-related laws, policies, strategies, and guidelines to promote good practices in groundwater management and regulation undertaken in 2 out of 5 regions of Africa.. • 30% of key aspect of groundwater integrated in strategies for planning, development, and management of water and related natural resources at basin and sub-basin levels.
SO2: Support the development of multilevel human and institutional groundwater management capacity for water security and climate	ER2.1 Continental cooperation arrangements agreed and initiated for knowledge sharing and collective action between Member States and partners to	• Continental cooperation arrangements between Member States and partners for knowledge sharing and collective action established. • Platforms for capacity building and

Strategic Objectives	Result Areas	2033 Milestones
resilience.	establish an African community of practice on groundwater management	training, knowledge exchange and sharing, among governments, partners, groundwater professionals, youth, community actors etc established/strengthened in 20% of the African countries. • Collaborative platforms for cross-border knowledge exchange, especially on shared aquifers and transboundary groundwater governance among Member States established in 20% of the African countries. • Establishment of community of practice to promote understanding of groundwater and its role in sustainable socio-economic promoted in 20% of the African countries. • Capacity-building programs and Joint Research Initiatives at continental, regional and national levels involving all key stakeholders such as governments, academic institutions, groundwater professionals, youth, community actors etc established in 20% of the African countries. • Capacity of key stakeholders in 20% of the African countries built for integrated and cross sectoral planning taking surface water and groundwater together within the framework of integrated water resources management • Groundwater expertise increased by 5% annually in Africa through scaling up professional training programs in hydrogeology and general groundwater education with special focus on young people.
	ER2.2 Support tools developed for standardised local-level approaches to sustainable groundwater use and management	• Community-based groundwater training materials developed and utilized to build the necessary capacity • Community-based groundwater monitoring tools adopted to integrate

Strategic Objectives	Result Areas	2033 Milestones
		traditional and scientific knowledge • Best practices and locally adapted groundwater management approaches piloted and scaled up in 30% of the African countries • Human capacity of key professionals developed in 30% of the African countries in various aspects of groundwater expert networking and field placements in various areas. • 10% of the Civil Society Organizations involved to advocate for the inclusion of vulnerable groups in groundwater management to bridge the gap between citizens and authorities. • Information on groundwater management developed and disseminated to support participatory governance and capacity development at the local level. • A Continental Groundwater Knowledge Hub with harmonized databases and platform for long term storage and access of groundwater data established
	ER2.3 A knowledge incubator initiative launched to support human and institutional capacity building to improve information and knowledge on Africa's groundwater resources	• An Africa Groundwater Research, professional capacity-building and Innovation Grant Program established in collaboration with relevant partners and organizations. • Collaboration between academia and government in areas of research, capacity building and innovation strengthened in 40% of the African countries. • Capacity across government, communities, academia, and youth to participate in groundwater planning and decision-making strengthened in 40% of the African countries.
	ER2.4 An inventory of courses	• Groundwater training and research

Strategic Objectives	Result Areas	2033 Milestones
	established, including training and research institutions on groundwater management and development	Institutions mapped and catalogued • An open-access database of existing groundwater training programs and courses developed • Partnerships and knowledge exchange between and among institutions strengthened in 30% of the African countries • 30% of existing regional and national centres of excellence in different fields utilized to promote sustainable management and development of groundwater resources • Real-time technologies such as remote sensing, Internet of Things (IoT), and digital twins deployed in 30% of training and research programs.
SO3: Build a business case to demonstrate the economic value and cross-sectoral benefits of structured investment in groundwater development and management	ER3.1 Support provided to develop capacity for groundwater assessment, and management to leverage water resources management funding for groundwater management outcomes.	• Integrated groundwater information systems established in 20% of the African countries to support decision-making and data sharing at continental regional and national levels • Decision-support tools enhanced in ir 20% of the African countries fo evidence-based groundwate development and management. • Investment in groundwater research monitoring and assessment increase by 3% annually to improve understanding o groundwater systems, particularly shared aquifers. • Conjunctive use and management of surface and groundwater promote in 20% of the African countries and basins
	ER3.2 Best practices and studies that make a business case and demonstrate economic benefits of groundwater development and management upscaled and documented to improve understanding, cross-sectoral partnerships and collaboration and increase the groundwater investment outlook.	• Successful groundwater managemen and development models and their role in improving water security identified and documented in 30% of African countries • Cost-effective groundwater developmen technologies such as solar-powered boreholes to support various uses such as domestic water supply, irrigation and their economic benefits showcased ir 30% of African countries • Good practices of cross sectora partnerships and collaboration tha

Strategic Objectives	Result Areas	2033 Milestones
		increased the groundwater investmen outlook document in 30% of Africar countries • Good case studies of how groundwate has enhanced economic growth, fooc security, energy access, and climate adaptation through existing developmen frameworks documented in 30% o African countries • Lessons from transboundary aquife management for regional cooperatior analysed for 40% of the aquifers • The potential of groundwater in terms o quantity and quality and how it is changing due to climate change anc human impacts assessed in 30% o African countries
	ER3.3 Studies initiated to improve understanding of the economic optimisation of groundwater and its contribution to climate resilience and facilitate integration of groundwater into National Development Plans.	• Long-term cost-effectiveness o groundwater development anc management and its integration ir National Development Plans assessed ir 30% of African countries • Economic contribution of groundwater tc socio-economic development, fooc security, improving rural incomes anc climate resilience assessed in 20% o African countries • The role of managed aquifer recharge (MAR) and other nature-based solutions (NBS) in climate resilience assessed ir 20% of African countries. • Economic trade-offs between over extraction risks and sustainable governance analysed in 20% of Africar countries. • The benefits of transboundary groundwater cooperation as well as its implications determined, communicatec and pursued analysed in 20% of aquifers • Integration of groundwater developmen into national economic planning encouraged in 20% of African countries
	ER3.4 Access to local development finance improved for water security and local transformation.	• Innovative financing instruments anc mechanisms, and models that diversify income streams and include strategic partnerships to support groundwate investments identified and developed. • Institutional and human capacity tc design appropriate financing vehicles fo groundwater investment, leverage

Strategic Objectives	Result Areas	2033 Milestones
		financing from different sources and prepare bankable groundwater projects enhanced in 20% of African countries. • A unifying framework to pool resources from various funders and sources developed so as to create a strong voice for lobbying for additional funding (from private and public funds as matching grants) for groundwater projects and coordination of investment decisions and for funding the whole groundwater value chain. • Awareness raised about the value proposition for groundwater indicating what makes investing in groundwater unique and different • Political will to support fiscal decentralization and funding allocations mobilized in 20% of African countries so that the local authorities can implement their groundwater functions. • 5% annual increase of investments in groundwater development as vital resource for domestic water supply in both rural and urban areas, small-scale agriculture, industrial development, and as a climate resilience measure encouraged in 20% of African countries. • Groundwater components integrated into National Water Investment Programs to attract resources for investment, training and institutional strengthening in 20% of African countries. • The Groundwater Access Facility (GAFA) utilized as an AMCOW groundwater program implementation mechanism and framework, and used to raise funds for groundwater development and management in Africa.
SO4: Develop and operationalise tools to raise awareness, support evidence-based decision making and catalyse political and stakeholder buy-in and ownership	ER4.1 An Inventory of existing guidelines/tools on groundwater development and management at all levels is established	• An inventory of existing guidelines, information/knowledge resources and tools made in 20% of African countries. • The useful of the existing guidelines, information/knowledge resources and tools categorised and assessed in 20% of African countries • An online platform on existing guidelines and tools for groundwater development and management developed and operationalized in 20% of African countries. • A baseline on the current state of

Strategic Objectives	Result Areas	2033 Milestones
		knowledge sharing and dissemination on both groundwater quantity and quality established in 20% of African countries. • Guidelines and tools for integrated and cross sectoral planning developed and operationalized in 20% of African countries taking surface water and groundwater together within the framework of integrated water resources management
	ER4.2 A continental Groundwater Implementation Support Mechanism (GISM) established to promote the utilisation of groundwater tools by national and sub-national change agencies to strengthen local water security capacities, including business case development, attracting investment, and sustainable groundwater management best practices	• Investment in hydrogeological mapping realized through the use of various techniques, including remote sensing technologies. • Evolving innovative technologies for groundwater management such as artificial intelligence, machine learning, remote sensing etc exploited in 20% of African countries. • Real-time monitoring networks and assessment programs developed to provide data and information on the state of groundwater resources in 20% of African countries. • Groundwater management and investment tools developed in 20% of African countries • Capacity built and technical support provided to relevant organisations at continental, regional, national and local and subnational levels to utilise groundwater management and investment tools in 20% of African countries • Best practices for groundwater management in urban areas documented and scaled up with special focus on mega cities including the role of urban areas and cities in protecting recharge zones and catchments within and outside city boundaries, and securing investments in 20% of African countries • Access to investment in sustainable groundwater management and development in urban areas, rural

Strategic Objectives	Result Areas	2033 Milestones
		areas and borderlines facilitated in 20% of African countries
	ER4.3 Groundwater maps produced and periodically updated to identify water development hotspots	• Groundwater maps developed and regularly updated at various scales to meet different purposes namely planning, advocacy, analysis, monitoring, implementation etc • Development of Borehole Databases and web-based platforms supported in 20% of African countries to foster use of groundwater • The development of targeted aquifer studies, sustainable monitoring and data management systems, groundwater regulation and licensing etc supported in 20% of African countries. • Data collection, management, and sharing on critical areas such as groundwater quality, recharge, usage etc improved in 20% of African countries.. • Digitization and synthesis of historical groundwater data from various geological surveys, drilling operations etc promoted in 20% of African countries. • Groundwater data integrated in the existing dashboard under AMCOW with a simple leaflet-based map interface in 20% of African countries.
	ER4.4 Ongoing development of the Africa Groundwater Atlas consolidated into an online open-access portal and knowledge incubator initiative for anchoring Africa's groundwater resources information, including an interactive tracker of Member States' groundwater policy and legal frameworks	• An open access / open source portal to host the African Groundwater Atlas developed. • The resolution of the maps updated and improved.

4.0 Financing mechanisms for the AMCOW Strategic Groundwater Programme

Financing for groundwater development and management can come from 4 sources namely domestic public finance, domestic private finance, foreign public finance, and foreign private finance. Funds from these sources can be mobilized to finance the AMCOW Strategic Groundwater Programme through a number of mechanisms as follows:

4.1 Mainstreaming groundwater into key development programs

Unlocking the full potential of groundwater requires a structured investment approach that aligns with broader development goals. There are opportunities for financing models that involve Government including public private parternships and blended finance to de-risk large investments. Funding for groundwater in governments is allocated indirectly as part of WASH and or as part of other programs budgets. In addition, community financing for operation and mentainence is growing, and access to domestic credit at the household level for water is triggered by incentives and subsidies from government or development partners for designing water loan products. Groundwater financing from private equity and municipal bonds although still low has potential to grow as well as the contribution of impact investors. The most significant share of private sector financing for subnational groundwater will be household financing. Groundwater should be mainstreamed into socio-economic and climate resilience agenda while unpacking the interconnectedness of groundwater with broader socio-economic developments. Through these linkages groundwater can be funded under the key development programs at continent, regional and national levels. These programs include the Blue Economy Strategy, Africa Climate Resilience Strategy, Africa Contnental Free Trade Area, Comprehensive Africa Agricultural Development Programme (CAADP).For example, UNCDF successfully tested capital markets for municipal water system in Tanzania and its was successful.

4.2 The Groundwater Access Facility (GAFA)

GAFA aims to unlock the potential of untapped groundwater resources to provide reliable water sources for communities and enhance their ability to cope with climate variability. GAFA is unique and focuses on groundwater. There are other funding facilities but they are not groundwater focused. Groundwater is primarily local and offers a way to not leave remote and borderland communities behind. It links to interests in fiscal decentralization and the ability of sub-sovereign institutions to borrow. It links to interests in last mile finance: remittances, micro-finance, and philanthropy. It links to other enabling opportunities such as subsidy, tax, growth corridors, humanitarian

finance (IDP camps etc). It also provises links to climate finance and links across-sectors to include productive (commercial; includes value chain approaches) and social benefits. GAFA should also have a window for strengthening enabling environment for groundwater finance, invest to move projects along the pipeline and promote understanding of important of groundwater within governments. GAFA is able to promote innovation on groundwater finance through e.g insurance, operation and maintenance models for water supply, results based financing etc) and benefits to stakeholders such as women, youth etc.

GAFA is therefore a key initiative that needs to be anchored into AMCOW groundwater program implementation and financing mechanism, using where possible structures under the AMCOW and acting collectively across countries to support de-risking of groundwater investments.

4.3 Africa Water Investment Program

The African Water Investment Program (AIP) has been developed to transform and improve the investment outlook for water security and sustainable sanitation for a prosperous, peaceful and equitable society. AIP will also contribute to acceleration of project preparation and financing of transboundary water projects and foster a water-food-energy nexus approach. Currently close to 20 African countries are being supported the African Union to develop National Water Investment Programs (WIP) to help them mobilize innovative financing to close the investment gap. During preparation of the WIP, actions to impement the WIP and their financing requirements will be proposed to ensure water security for all and for sue in mobilizing the required financing. AMCOW Groundwater Programme should position itself to benefit from this program through integrating groundwater issues in the National Water Investment Programs being developed by countries.