



# Co-Creating Data-Driven Climate Solutions for Africa



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Co-creating Data-Driven Climate Solutions for Africa

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# Africa's Climate Crisis: Context, Challenges, and Needs

## **Climate change affects Africa's environment, societies, and economies**

The African continent stands at the forefront of climate change impacts, experiencing a heightened vulnerability particularly in terms of droughts, floods, and heat waves. This causes severe disruptions to water availability, agriculture, and biodiversity, which impacts the economic livelihoods of millions. Recurrent droughts in the Horn of Africa have led to food insecurity and displacement of populations, while floods in cities of Western and Eastern African urban centers expose infrastructural vulnerabilities and health risks. Coastal zones face rising sea levels and erosion, threatening fisheries and urban human settlements, as seen in Senegal and Mozambique.

The impacts of climate change accelerate structural challenges in Africa, including the built environment, socio-economic inequalities, high population growth, and rapid urbanization. Many African nations face mounting adaptation and climate disaster response costs, diverting scarce resources from their developmental priorities. In the light of Africa's

minimal historical contribution to human-induced emissions of greenhouse gases (GHGs), this 'climate injustice' requires tailored strategies for mitigation and adaptation. In this context, an ethical imperative for the scientific support of climate action arises. A holistic understanding of climate-society-environment interactions is pivotal to sustain African development and build resilience. Scaling and further development of science-based responses to climate change will support Africa-led solutions.

KADI (*Knowledge and Climate Services from an African Observation and Data Infrastructure*) is an example of such a pan-African Research and Knowledge Infrastructure. It is a science and stakeholder-driven response to African climate service needs, at multiple scales and the result of a project funded to support the EU-AU strategic partnership on climate change.

## **Climate action in Africa needs to be coherent and inclusive**

Decision-making on climate issues in Africa faces systemic challenges, including fragmented data systems, institutional misalignment, limited engagement of local capacities in decision-making and diverse socio-ecological contexts across the continent. These barriers hinder the ability to implement coherent and inclusive climate action across scales, from the local to the continental level. The Research and Knowledge Infrastructure designed in KADI responds to these challenges in line with the African Union's Agenda 2063, particularly its aspirations for sustainable development, climate resilience, and regional integration.

To support more effective policy alignment and knowledge exchange across governance levels, it is necessary to foster a shared, interoperable system of climate science and underlying observations, and co-create services with local stakeholders like city councils and community leaders. By integrating Africa's sub-regional and local needs into climate ser-

Strengthening climate decision-making in Africa requires coordinated data systems, inclusive governance, and tailored climate services. KADI addresses these needs by building a shared knowledge infrastructure and co-developing climate tools with local actors to support informed, scalable climate solutions across the continent.

vices and tools, KADI advances practical solutions and reinforces the science-policy-practice interface. It is liable to empower African institutions and communities to lead with contextualized strategies based on scientifically robust evidence.

KADI takes a comprehensive approach to strengthen the societal role of research by co-creating climate observation capacities with societal needs at the core, paving the way for implementing climate services.

**Access to reliable data is a solution for adaptation and mitigation**

Unbiased adaptation and mitigation interventions, grounded in reliable data from all sectors of society, are essential to address the complex challenge of climate change. To achieve this, Africa also needs input from the natural sciences, arts, humanities and socio-economic sciences to develop an integrated Research and Knowledge Infrastructure. This will reinforce our understanding of GHG emission sources and sinks, extreme weather patterns, ecosystem responses, and health hazards. The integration of multiple interoperable data streams, ranging from ground-based measurements to model results and remote sensing data, will improve the detection of climate trends and related impacts that occur at varying spatial and temporal scales.

To fill the gaps in the integration and interoperability of data streams in Africa, it is important to focus on securing professional growth of young scientists. There is still a real need for improving the professional competences of personnel to source relevant

information, operate and maintain monitoring systems, and interpret the environmental parameters and information they produce. Institutional fragmentation, limited funding and coordination challenges can obstruct data acquisition and sharing and limit the integration of information necessary for the development of robust, data-driven climate services.

Addressing these gaps requires investments in infrastructure, human capacities, governance frameworks, and open data policies to unlock data potential and build long-term resilience. **Based on the climate service needs identified in KADI, we make the following recommendations:**

**i.)** Identify the most critical observational data gaps to reach sufficient geographical coverage of the required observations at multiple spatial scales. These can be prioritized based on the needs of different actors.

**ii.)** Invest in complementing and integrating in situ, satellite and modelled data. For example, design applications to combine high-precision measurements and observations (e.g. ecosystem towers) with the deployment of low-cost tools and other alternative data acquisition methods to address scalability and transfer of observations. A combination of low-cost sensors and human experiences has been tested in the city pilots in KADI.

**iii.)** Partner with global initiatives, international agencies, and funders to increase capacity within and across RI domains (e.g. data acquisition, analysis, use of new technologies, co-creation practices, and policy).

**iv.)** Engage young people/youths to collect climate related data, learn relevant skills, become employed and co-create data solutions tailored for local action and resilience-making. These can be facilitated by the development of Communities of Practice and/or Regional Hubs around the partnerships explored in KADI through the urban climate and ocean observation pilots.

**Addressing climate change in Africa requires integrated data systems, cross-disciplinary collaboration, and investment in human capacity. KADI supports this by strengthening research infrastructure, empowering young scientists, and promoting inclusive, locally informed climate services for long-term adaptation and mitigation.**

*Dar es salaam Metropolitan Development Project (DMDP) Weather station being installed, tested and validated under Tanzania Urban Resilience Program (TURP), 2018. Credit: Chris Morgan, World Bank*

**Climate services must integrate local and cross-sectoral knowledge**

Climate services produced out of a wealth of information are essential tools to enable societies to respond effectively to the impacts of climate change. Their importance is rising globally, particularly for climate risk reduction, adaptation, and mitigation across key sectors.

Specifically in Africa, climate services need to address the continent's diverse social, cultural, and vulnerability contexts. To increase their effectiveness, climate services must be tailored to the specific needs of African communities through co-creation processes that bring together multiple disciplines and sectors. For policymakers, this means fostering integrated, participatory approaches that engage scientists, local communities, and civil society at every stage – from setting research priorities and collecting data to delivering knowledge that underpins the climate service need. Such inclusive collaboration ensures that climate services are relevant, credible, and trusted by their users.

Demand-driven and iterative co-creation processes build on local knowledge, respect cultural diversity, and consider socio-economic realities, encouraging local ownership and improving service uptake. Embedding these participatory frameworks in national and regional strategies is crucial for establishing sustainable, resilient climate research infrastructures tailored to Africa's unique challenges. By prioritizing collaborative governance and investment in climate services that reflect local contexts, policymakers can strengthen Africa's capacity to adapt to climate change effectively. This is the approach that has been followed in KADI. This means open communication channels that encourage an iterative process of continued participation for the flow of knowledge, competence building, and continuous identification of data, and climate service needs. This would create opportunities to work with and learn from local actors, e.g., when establishing new physical observation stations, planning modes of delivery for climate services, and designing other RI operations to minimize disruption and maximize mutual benefit.



Effective climate services in Africa must reflect local contexts and be co-created with communities, scientists, and civil society. KADI promotes inclusive, participatory approaches that strengthen trust, relevance, and uptake—supporting sustainable climate strategies across governance levels.

# KADI: An Integrated African Research and Knowledge Infrastructure for Climate Services

KADI lays the groundwork for Africa's climate resilience by strengthening observation networks, improving data access, and fostering knowledge exchange. Through collaboration across disciplines and country borders, it supports African-led climate action rooted in robust science and aligned with the continent's policy goals.

## Why KADI matters for Africa's climate resilience and development

KADI is the result of a pan-African Research and Knowledge Infrastructure design. Its aim is to strengthen climate observation networks, to improve data quality and accessibility, to encourage technological innovation, and based on this, to foster the co-creation of climate services tailored to Africa's diverse environmental and societal contexts. By uniting multiple stakeholders, institutions and countries, KADI addresses critical gaps in climate

knowledge and supports African-led adaptation and mitigation efforts aligned with development priorities. KADI's transdisciplinary approach, drawing on knowledge from academic and wider societal stakeholders, ensures that climate information drives actionable interventions and policies that enhance resilience at local, national, and continental levels. As Africa experiences rising climate risks, KADI will be able to directly deliver scientifically sound and socially relevant climate knowledge that supports resilient economies and societies. KADI lays the foundations of Africa's climate research infrastructure – ensuring that data, observations, and services are generated, maintained, and owned on the continent.

## Climate services must be co-created and based on observations

The observational networks and data systems operating at local, regional and continental scales will provide the diverse data sources required for the nested analysis of climate phenomena to support context-dependent decision making. This ensures

climate services are locally relevant, socio-culturally grounded, and informed by clear risks and opportunities. The continued refinement of the co-creation process will provide iterative feedback which can be embedded within and used by communities of practice. The iterative feedback will support the sustainability of climate service provision while engaging in innovative approaches to support future developments in relevant fields.

The success, sustainability, and impact of the Research and Knowledge Infrastructure designed in KADI are rooted in its commitment to inclusivity and the engagement of diverse actors and knowledge systems across disciplines, sectors, and societal groups. By fostering an open research culture and embracing Open Science practices, KADI ensures that knowledge is accessible to all, shared, reused, and continually regenerated for the benefit of both science and society. The adoption of open data policies and adherence to internationally recognized standards guarantee interoperability and transparency. These are critical elements for long-term

pan-African data sharing and trust. In KADI, this meant finding concrete ways to engage researchers and institutional actors (like ministries, national meteorological departments and universities) to share responsibilities to establish, maintain, sustainably use and benefit from the infrastructure and its observational capacity. Existing relationships and well-functioning engagement practices between science and public domains for knowledge exchange, dialogue and mutual benefit need to be maintained and leveraged.

Climate services must be grounded on reliable observations and shaped through inclusive co-creation. KADI's approach of open, collaborative approach ensures data systems are transparent, interoperable, and locally relevant, building trust and long-term capacity for climate action across Africa.

**KADI Communities of Practice for impact, ownership and sustainability**

Communities of Practice (CoPs) play a vital role in facilitating the exchange of knowledge, experiences, and best practices. It supports local ownership, builds trust, promotes adaptation to the KADI framework, and fosters long-term sustainability and continuous learning. A CoP can operate virtually, spanning multiple disciplines, institutions, and countries. Training programs, workshops, and embedded partnerships strengthen the scientific autonomy of African institutions and their innovation potential, reducing dependence on external support and fostering context-appropriate solutions.

The adoption of innovative digital tools, emerging technologies, and methods holds significant potential to transform the operations and impact of research infrastructures. These emerging technologies are not only upgrading existing systems but are fundamentally reshaping how research is conducted, shared, and applied across disciplines. Moreover, KADI promotes innovation through the

development and deployment of low-cost sensors, enabling novel data analytics, and digital platforms which democratize access to high-quality climate data.

Together, these features have the potential to propel Africa's climate research beyond fragmented efforts toward a sustainable, state-of-the-art system that aligns with continental priorities. To address this challenge, KADI recommends establishing and sustaining Communities of Practice, i.e. networks of scientists, practitioners, residents, volunteers and local decision-makers. The objective is to exchange knowledge, refine solutions, provide mutual learning and support, as well as to co-create the climate services with common goals and a regular agenda for community activities. Some of these CoPs are already established, based on the stakeholders identified during the project. This is the case for activities related to urban climate and ocean observations.



**KADI's Communities of Practice foster local ownership, shared learning, and long-term sustainability. By combining inclusive networks with innovative technologies, KADI strengthens Africa's climate research capacity and supports the development of context-driven, collaborative climate solutions.**



# Unlocking KADI's Potential: Overcoming Barriers and Driving Impact

## KADI's path towards strategic and sustainable climate services

The implementation of the KADI project confirms that Africa's climate research wants to overcome fragmented funding, limited policy integration, skill gaps, and weak data interoperability. Sustaining KADI's Research and Knowledge Infrastructure requires long-term financing beyond project cycles, covering networks, data systems, and capacity programs. Innovative multi-stakeholder funding –

**Sustaining Africa's climate research requires long-term, inclusive funding and strong institutions. Public-private collaboration and strategic partnerships are vital to scaling innovation, ensuring local ownership, and delivering impactful climate services.**

combining government, donors, philanthropy, and private sector – can drive scalability of solutions, technology transfer, and knowledge exchange. Inclusive partnerships aligned with African priorities will foster co-financing and adaptability. A strategic, sustained approach is essential to secure ownership, resilience, and impact. Public-private partnership is crucial to ensure that services are tailored to the needs of the communities and actors. The involvement of the private sector in the creation and dissemination of services is underway and needs to be supported by an organized institutional environment that guarantees clear national policies, strong legal frameworks and access to reliable climate data. This desired commitment from the private sector should be built within a solid institutional framework that includes national institutions and the academic sector. The participation of the latter and the provision of knowledge exchange opportunities for the next generation of critical thinkers remain essential to enable future developments and maintain these services at the highest level of scientific relevance.

As identified by the policy cooperation component in KADI, examples of hybrid solutions are emerging in the meteorological landscape that can provide inspiration for other RIs, with the emergence of new private players. For example, the Trans-African Hydro-Meteorological Observatory (TAHMO) initiative, a joint venture between the Technical University of Delft (Netherlands) and the Oregon State University (USA), attempts to address this barrier by developing a complementary observation network based on a hybrid business model as follows: i.) Stations are financed and deployed by research programs and development initiatives, which retain ownership of the data; ii.) Station data is fed back into the network and provided free of charge to national meteorological services and researchers on request; iii.) Network data is sold to private initiatives. For the future implementation / advancement of KADI, one low hanging fruit is increasing collaboration and cross-funding between projects with similar focus. However, even in these new hybrid scenarios, the support of national political bodies and the institutionalization of climate observation remain a necessary condition.

## The key is to empower African scientists and practitioners

Competence development focused on technical skills, data literacy, and research management is vital to enable African scientists and institutions to lead climate data collection, analysis, and service provision. KADI promotes knowledge networks and communities of practice that foster collaboration

**KADI strengthens climate competence in Africa by combining practical training, inclusive partnerships, and real-world learning. Through initiatives like the Resilience Academy, it equipped young professionals and institutions with the skills and tools needed to co-create locally relevant climate solutions.**

among researchers, policymakers, and local actors to co-create climate services tuned to the societal needs in Africa. By embedding training programs, mentorship, and exchange platforms, KADI builds a self-sustaining ecosystem of expertise and innovation across the continent. Empowerment also involves fostering gender equity and inclusivity to ensure diverse voices contribute to and benefit from climate knowledge.

The Resilience Academy approach, piloted in one of the cities in KADI, demonstrates how identifying and co-creating solutions to climate service needs can be effectively achieved through collaboration between universities, practitioners, and communities. It equips young professionals with practical skills by integrating academic learning with real-world challenges, using open data, digital tools, and field-based engagement. By fostering partnerships across sectors and emphasizing co-production, the approach not only strengthens local capacity but also generates context-specific, actionable knowledge that supports climate resilience and sustainable development in African contexts.

*Resilience Academy students during their participation in the Industrial Training program, learning about positioning systems and how to use RTK-GNSS GPS. The photo was taken by Ramani Huria in 2019.*

**Governance, coordination and collaboration are needed at all levels**

Effective governance frameworks are essential for harmonizing climate observation efforts, facilitating data sharing, and aligning with national development and continental climate agendas. Coordinated mechanisms involving African Union bodies, regional economic communities, and national governments can reduce redundancies and foster a coherent continental climate knowledge ecosystem. Furthermore, governance models must ensure equitable access to data and knowledge products, reflecting principles of open science, inclusivity and African ownership at local, national, regional and continental scales.

An example that is already in use in many African countries is the WMO National Framework for Climate Services (NFCS), a governance and coordination model that helps countries identify climate service needs, co-create tailored solutions, and implement them effectively. It promotes collaboration among government agencies, researchers, the private sector, and communities, ensuring that services are user-driven and aligned with national priorities. By integrating science, policy, and practice,

the NFCS strengthens institutional capacity, fosters resource mobilization, and supports sustainable delivery of climate services in African countries. For instance, Kenya's NFCS strengthens climate resilience by making science-based information accessible and integrating it into planning, prioritizing five key sectors: agriculture, water, health, disaster risk reduction, and energy. It is also important to establish equal partnerships between research organizations in Africa and their global counterparts, moving away from "donor mindset" arrangements, while recognizing that international cooperation remains essential for ensuring high-quality science and practice for African organizations.

**Effective governance frameworks are vital to harmonize climate data, foster collaboration across African institutions, and ensure equitable access to knowledge, building a coherent, inclusive, and locally owned climate information ecosystem.**



# Time to move to action



Moving from knowledge to action means

1

Changing the research and knowledge mindset

2

Collaboration

3

Long term sustainable investments

4

Anticipation of the future

## Recommendations for Enhancing Climate Services in Africa - Actions, Assumptions, and Risks

Recommendation	Target groups	Concrete Actions	Key Assumptions & Risks
<p><b>Multiple knowledge systems and transformation mindset</b></p> <ul style="list-style-type: none"> <li>• Foster participatory approaches and integrate local knowledge, cultural diversity, and socio-economic realities into climate related data collection, climate service co-creation and delivery.</li> </ul>	<ul style="list-style-type: none"> <li>• Scientists, local communities, civil society, and the private sector (with the support of policymakers: national and local government, ministries of environment, agriculture, and climate change agencies, in collaboration with regional bodies like the AU, and Regional Economic Communities).</li> </ul>	<ul style="list-style-type: none"> <li>• Establish multi-stakeholder platforms at local, national, and regional levels.</li> <li>• Conduct regular stakeholder consultations.</li> <li>• Develop communication strategies promoting transparency and inclusion, e.g. through Communities of Practice.</li> <li>• Support the mapping, documenting and updating of indigenous and local climate knowledge.</li> <li>• Include local representatives in data collection and validation.</li> <li>• Adapt data collection methods to local contexts and languages.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Assumptions:</b> Strong political will and openness to inclusive governance; effective communication channels exist.</li> <li>• Respect for indigenous knowledge by scientific and policy communities; willingness to adapt standard methods.</li> <li>• <b>Risks:</b> Resistance from entrenched interests; limited capacity for sustained engagement; potential tokenism reducing trust.</li> <li>• Marginalization of local voices; cultural misunderstandings; data quality concerns.</li> </ul>

Recommendation	Target groups	Concrete Actions	Key Assumptions & Risks
<p><b>Collaboration across different knowledge systems</b></p> <ul style="list-style-type: none"> <li>• Promote multidisciplinary and cross-sector collaborations between government agencies.</li> <li>• Align national and regional climate strategies to embed co-creation and participatory frameworks (E.g. the WMO NFCS framework).</li> <li>• Secure adequate policy incentives.</li> </ul>	<ul style="list-style-type: none"> <li>• National and local government.</li> <li>• Ministries of environment, agriculture, and climate change agencies, in collaboration with regional bodies like the AU, and Regional Economic Communities (with the support of scientists).</li> </ul>	<ul style="list-style-type: none"> <li>• Create formal inter-agency working groups and joint taskforces.</li> <li>• Facilitate data-sharing agreements and integrated platforms.</li> <li>• Review and revise existing climate policies to include co-creation mandates.</li> <li>• Facilitate policy harmonization workshops between ministries.</li> <li>• Develop guidelines and accountability mechanisms.</li> <li>• Encourage collaborative research projects across disciplines to bridge the science-policy gap.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Assumptions:</b> Established communication platforms and incentives for collaboration exist.</li> <li>• Policy coherence at various government levels; alignment of stakeholder interests.</li> <li>• <b>Risks:</b> Institutional silos; competition for resources; coordination challenges.</li> <li>• Policy fragmentation; shifting political priorities; lack of enforcement mechanisms.</li> </ul>

Recommendation	Target groups	Concrete Actions	Key Assumptions & Risks
<p><b>Invest in Sustainability</b></p> <ul style="list-style-type: none"> <li>• Develop sustainable climate research infrastructures tailored to Africa's unique challenges with adequate and secure funding.</li> <li>• Support knowledge exchange and training programs for climate service providers and users.</li> <li>• Promote public-private partnerships for climate services which are tailored to the needs of the African socio-economic sector.</li> </ul>	<ul style="list-style-type: none"> <li>• Scientific and Technical Institutions.</li> <li>• Data and Observation Providers.</li> <li>• Policy and Governance Bodies.</li> <li>• Communities and Civil Society.</li> <li>• Development and Finance Partners.</li> <li>• Private Sector and User Sectors.</li> </ul>	<ul style="list-style-type: none"> <li>• Invest in up-to-date climate observation networks and data management systems.</li> <li>• Support national centers of excellence with regional links.</li> <li>• Secure long-term funding and maintenance plans.</li> <li>• Advocate for dedicated budget lines within national climate finance.</li> <li>• Engage donors with evidence-based proposals.</li> <li>• Establish transparent financial management systems.</li> <li>• Incorporate knowledge exchange into the curricula of universities, technical colleges, and research institutions, leveraging the RI-affiliated researchers to provide practical learning and training opportunities.</li> <li>• Establish mentorship and exchange programs.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Assumptions:</b> Long-term funding commitments; technical expertise retention; policy support for infrastructure.</li> <li>• Funder and government commitment; transparent governance of funds.</li> <li>• Availability of training resources and qualified trainers; willingness to learn among participants.</li> <li>• <b>Risks:</b> Funding volatility; brain drain of skilled personnel; infrastructure underutilization.</li> <li>• Funding shortfalls; corruption or mismanagement; competing budget priorities.</li> <li>• Participant turnover; gaps in curriculum relevance.</li> </ul>

Recommendation	Target groups	Concrete Actions	Key Assumptions & Risks
<p><b>Anticipate and adapt to the future</b></p> <ul style="list-style-type: none"> <li>• Ramping up the capacity to predict/forecast what will happen in 10, 20, 50, 100 years mainly based on modelling capacities, powered by scientific knowledge and observational data.</li> </ul>	<ul style="list-style-type: none"> <li>• Scientific and Technical Institutions.</li> <li>• Data and Observation Providers.</li> <li>• Policy and Governance Bodies.</li> <li>• Communities and Civil Society.</li> <li>• Development and Finance Partners.</li> <li>• Application and User Sectors.</li> </ul>	<ul style="list-style-type: none"> <li>• Design and implement standardized M&amp;E frameworks aligned with user needs.</li> <li>• Collect and analyze user feedback regularly.</li> <li>• Integration into policy and implementation frameworks.</li> <li>• Integrate learning loops to adjust service delivery dynamically.</li> <li>• Invest in digital infrastructure such as broadband and mobile networks.</li> <li>• Deploy IoT and remote sensing technologies for real-time climate data.</li> <li>• Develop and scale mobile applications and SMS platforms for climate information.</li> <li>• Foster partnerships with tech companies, start-ups, and digital social innovators.</li> <li>• Partner with global initiatives and funders to enhance capacity in data, technology, co-creation, and policy across RI domains.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Assumptions:</b> Reliable data collection mechanisms; feedback culture among stakeholders.</li> <li>• Availability of technological infrastructure and digital skills; political and regulatory support for digital innovation.</li> <li>• <b>Risks:</b> Poor data quality; resistance to evaluation findings; slow adjustment to feedback.</li> <li>• Digital divide excluding vulnerable groups; cybersecurity and data privacy concerns; technology obsolescence; high initial costs and maintenance challenges.</li> </ul>



## Glossary of Terms and Abbreviations

<b>AU – African Union:</b> Continental union of 55 African member states.	<b>NFCS – National Framework for Climate Services:</b> WMO model for tailored national climate services.
<b>Agenda 2063:</b> AU’s strategic plan for inclusive, sustainable development.	<b>Open Science:</b> Practices ensuring research is open and reusable.
<b>Climate Services:</b> Science-based tools and information to manage climate risks.	<b>RECs – Regional Economic Communities:</b> Regional blocs fostering integration in Africa.
<b>CoP – Community of Practice:</b> Network for knowledge exchange and co-creation.	<b>RI – Research Infrastructure:</b> Facilities, networks and systems supporting research.
<b>GHG – Greenhouse Gas:</b> Heat-trapping gases driving climate change.	<b>Resilience Academy</b> – A collaborative initiative that builds youth capacity and co-creates practical, data-driven solutions for climate resilience in Africa.
<b>KADI – Knowledge and Climate Services from an African Observation and Data Infrastructure:</b> A Pan-African project building the foundations for a research and knowledge infrastructure.	<b>TAHMO – Trans-African Hydro-Meteorological Observatory:</b> Weather station network initiative in Africa.
<b>M&amp;E – Monitoring and Evaluation:</b> Process to assess and improve performance.	<b>WMO – World Meteorological Organization:</b> UN agency for climate and weather cooperation.

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