



ADAPTATION FUND

PRE-CONCEPT FOR A REGIONAL INNOVATION PROJECT/PROGRAMME

PART I: PROJECT/PROGRAMME INFORMATION

Title of Project/Programme:	Enhancing Hydromet Services through Regional Monitoring Innovation Hubs in Africa
Countries:	Tanzania, The Gambia
Thematic Focal Area:	Disaster risk reduction and early warning systems
Type of Implementing Entity:	Multilateral Implementing Entities
Implementing Entity:	World Meteorological Organization
Executing Entities:	National Meteorological and Hydrological Services (NMHSs) of Tanzania and The Gambia; UK Centre for Ecology & Hydrology
Amount of Financing Requested:	5,000,000 USD

Project / Programme Background and Context:

Recognizing the cross-sectoral nature of water and aware of the increasing water-related challenges around the world, many countries are now taking steps to address water security through, for example, sustainable water management, enhancing flood and drought resilience and improving water quality. These steps require reliable hydrological data and early warning information in order to support decision-making through the provision of hydromet services and to help build trust amongst stakeholders. However, the availability of hydrological data of adequate quantity and quality often remains a challenge, which constrains provision of effective hydromet services.

The African continent has made significant achievements in development over the last few decades, but climate-related and disaster risks threaten present and future development gains. These risks affect 10 million people annually, yet hydromet services are presently not equipped to meet the needs of society. Weather and climate related disasters are reversing development gains, setting countries 10 to 20 years back.

In The Gambia, the variability in the amount and distribution of rainfall is projected to increase, resulting in more frequent extreme events, namely droughts and floods. The flooding events include flash and riverine floods thus affecting peoples' and lowland agricultural fields. Further decline in the amount and distribution of rainfall, together with increased temperatures, is expected to constrain productivity of in the agricultural and forestry sectors. Groundwater in western Gambia is at risk of increased salinization, while coastal aquifers may become reduced, which would affect fresh water supplies and peri-urban agriculture. The impact of sea level rise and coastal erosion on tourism and the artisanal fisheries sector is likely to be significant. Ecosystems will be impacted through the combination of rising temperatures and changing rainfall, largely in negative ways.

For Tanzania, a study on economics of climate change has revealed that current climate change variability already costs around 1% of GDP annually and it could go up to 2% of GDP by 2030. The agriculture sector in Tanzania is particularly vulnerable to climate change because it is customarily dependent on rainfall, its adaptation needs to be enhanced through data-driven decisions. The sectors that will benefit from hydromet data and early warning information include disaster management, irrigation, hydropower, and water resources management and allocation.

As climate change exacerbates current weather conditions, sea levels will rise and flood into cities and salt water will contaminate aquifers and other fresh water sources, cyclones and storm surges will hit the coasts, and heat waves and droughts will hamper farming and agriculture, leaving millions food and water insecure and crippling economies. African countries face a combination of risks and effective data-driven hydromet services can offer adaptation solutions to these challenges.¹ To achieve this however, many hydromet monitoring systems need optimization of their efficiency and Operation & Maintenance (O&M) cost. Here, existing and emerging innovative technologies and approaches offer new opportunities. Their operational uptake by NMHSs is currently low due to (1) insufficient collaboration between academia, private sector and hydromet services, (2) insufficient translation of research into operational tools and/or (3) high costs of technologies and their ownership/operational costs. Moreover, in order to sustainably operate hydromet monitoring systems, political commitment, viable financial models, qualified human resources as well as effective engagements with the user community are a prerequisite.

The proposed project will execute a portfolio of activities through the WMO HydroHub Phase II – *that started in September 2021* – to advance innovation in the hydrometry agenda. The project will deliver activities that accelerate the pull-through of new cost-effective approaches and technologies into operational use by monitoring agencies within the target countries and develop new sustainable partnerships, through providing actors across the public and private sectors at local, regional and national levels with capacity, innovation and engagement opportunities. Together, these actions will lead to an increase in availability of reliable hydrological data and information needed for the provision of hydromet services in the region. These improved hydromet services will support data-driven decisions in agriculture, disaster risk reduction, water resources management and environmental protection among others.

The Regional Innovation Hubs will be established in Tanzania and The Gambia that support improved monitoring and early warning in their own and surrounding countries, with a particular focus on the use of innovative monitoring approaches to support flood forecasting and drought risk management. Both Hubs will be established as regional partnerships through collaborations between NMHSs, relevant national and regional entities active in the field of hydrological monitoring, academia and private sector entities that could support the manufacturing and maintenance of new technological solutions (including Small and Medium Enterprises (SME) and start-ups). In Tanzania, synergies with the recently established Water Resources Centre of Excellency will be sought, in view of increasing the sustainability of project outcomes. In The Gambia, the ECOWAS Hydromet Initiative – that seeks to promote the modernization of Hydromet Services in ECOWAS member states – will be leveraged as well as the Gambia River Development Organization (OMVG).

Project / Programme Objectives: The overall aim of the project is to improve the delivery of hydromet services through two “Regional Innovation Hubs” in Africa by advancing the uptake of innovative hydrometric approaches by the NMHSs in Tanzania, The Gambia and surrounding countries. The objectives of the project are:

- Increase operational capacity of the NMHSs to deploy and maintain innovative hydrometeorological observation, data and metadata exchange, calibration and data processing technologies (e.g. Artificial Intelligence, innovative water level sensors, locally manufactured data loggers, locally innovated hydrometeorological infrastructure) through collaborative Innovation Call projects, training interventions (both train-the-trainer and short/long course trainings) and support for Regional Technical Champions;
- Develop two Regional Innovation Hubs in hydrological monitoring and data processing, which use novel mechanisms (such as Innovation Camps and International Twinning) to bring together public and private entities to support the development, manufacturing and maintenance of digital and physical monitoring technologies;

¹ <https://www.worldbank.org/en/region/afr/brief/hydromet-in-africa>

- Enhance regional cooperation for mutual technical assistance among NMHSs and other monitoring organizations within the region where the Innovation Hubs are established;
- Increase political and institutional commitment for operational hydrology through improved stakeholder collaboration and engagement, including co-production of hydromet services.

Project / Programme Components and Financing:

The proposed project will implement a portfolio of activities to address identified needs. The table below provides an overview of the proposed activities.

Project/Programme Components	Expected Outcomes	Expected Outputs	Countries	Amount (USD)
1. Increased operational capacity of the NMHSs to provide fit for purpose hydrological data through the use of innovative monitoring approaches	Improved and sustained technical expertise of NMHSs staff and uptake of innovative technologies	1.1 Enhanced local trainings capacity, research and tailored technical guidance material to addressing specific technical expertise deficits related to hydrometric monitoring within the Regional Innovation Hub (e.g. linked to the use of new instrumentation) 1.2 Innovation Calls projects (involving collaborations between in-region and international operational and research partners) implemented to find and operationalize innovative water monitoring solutions to NMHSs hydrometric challenges within the Regional Innovation Hub	Tanzania, The Gambia	2,000,000
2. Two developed Regional Innovation Hubs in hydrological monitoring, which bring together public and private entities to support research, the development, manufacturing and maintenance of digital and physical monitoring technologies	Locally designed, manufactured and maintained capabilities exist in both countries to service water monitoring needs across their regions	2.1. International twinning/mentoring, events bring together hydro monitoring institutions and startups that innovate from across the world to assess their suitability to address identified hydrometric challenges in The Gambia and Tanzania. Selected startups will benefit from pump priming grants to grow both public and private sector capability and linkages with the research sector, with the potential to lead to job creation. 2.2 Innovation Camps and other activities established to bring together public and private entities to support the development, manufacturing and maintenance of digital and physical monitoring technologies	Tanzania, The Gambia	600,000
3. Enhanced regional cooperation for mutual technical assistance	Improved dialogues and exchanges within	3.1 Organization of Learning Staff Exchanges to facilitate and guide learning exchanges among	Tanzania, The Gambia	900,000

among NMHSs and other monitoring organizations within the region where the Innovation Hubs are established	Regional Innovation Hubs and beyond	NMHSs within a Regional Innovation Hub in view of addressing specific common hydrometric challenges 3.2. Organization of Innovation Workshops to bring together NMHSs, academia, private sector (solution providers) and others, and facilitate targeted interactions among them in a way that allows NMHSs to express their operational challenges and needs, and the private sector to tailor their solutions to operational realities of NMHSs		
4. Increased political and institutional commitment for operational hydrology through improved stakeholder collaboration and engagement, including co-production of hydromet services.	Increased support to NMHSs through budget and Water Legislations, and fit-for-purpose innovative hydrometric technologies and user-oriented hydromet services	4.1 Organization of Ministerial Roundtables in each country of the Regional Innovation Hubs that will showcase the comprehensive results and recommendations of national cost-benefit analysis of hydrological data investments 4.2 Organization of User-provider Workshops and Webinars, to bring together NMHSs, public and private sectors (users of hydromet services) and facilitate targeted interactions among them, including for identifying and developing new markets for NMHSs services	Tanzania, The Gambia,	678,082
5. Total Project Activity				4,178,082
6. Project/Programme Execution cost				388,128
7. Total Project/Programme Cost				4,566,210
8. Project/Programme Cycle Management Fee charged by the Implementing Entity (if applicable)				433,790
Amount of Financing Requested				5,000,000

Project Duration: 5 years (2023 – 2027)

PART II: PROJECT / PROGRAMME JUSTIFICATION

Regional Programme

The project will advance the provision of hydromet services in Africa through the establishment of “Regional Innovation Hubs” in Tanzania and The Gambia. Throughout the Phase I of the WMO HydroHub (February 2017 – August 2021) active engagement with the NMHSs of The Gambia and Tanzania took place with both countries proactively expressing interests in scaling up their involvement in future WMO HydroHub activities.

In Tanzania, a successful innovation project was implemented by the Trans-African Hydro-Meteorological Observatory (TAHMO) in the framework of the 2nd WMO HydroHub Innovation Call, specifically looking at open-source non-contact river flow observations with cameras. In The Gambia, the participation of an NMHS representative in WMO HydroHub Innovation Workshops highlighted the need for innovation to address some of the country's most pressing hydrometric challenges, and helped the design of solutions in a way that integrated some of the realities on the ground e.g. short battery lifespan in data loggers.

Building on this previous engagement with the WMO HydroHub, the project will develop Regional Innovation Hubs in Tanzania and The Gambia that will play the role of incubators for innovation both locally and in neighboring countries. The Regional Innovation Hubs will change the way hydromet data is collected, managed and disseminated through (1) progressive operationalization of emerging cost-effective technologies, (2) integration of non-traditional data sources such as citizen science, (3) improved sustainability of hydromet monitoring through, for example, mentoring and learning exchanges activities, and (4) enhancing engagement with stakeholders in the hydromet data user community. The enhanced hydrological data collection and management capacity acquired during the project will help improve the delivery of hydromet services in the regions (e.g. enhancing the collection and management of observation of floods to underpin improvements in flood forecasting), hence improve decision-making in water management. Based on preliminary consultations, the following gaps and needs to improve hydrological monitoring systems were identified:

- Lack of real time data for disaster risk reduction and flood early warning systems;
- Lack of capacity in operational hydrology;
- Lack of capacity in instrumentation (fabrication, maintenance);
- Lack of connection with end-users; and
- Inadequate government support

To address the identified needs, the proposed project will implement a set of activities through four project components:

1. Increased operational capacity of the NMHSs to provide fit for purpose hydrological data through the use of innovative monitoring approaches;
2. Two developed Regional Innovation Hubs in hydrological monitoring to support the development, manufacturing and maintenance of digital and physical monitoring technologies;
3. Enhanced regional cooperation for mutual technical assistance among NMHSs;
4. Increased political and institutional commitment for operational hydrology through improved stakeholder collaboration and engagement.

The two first components will ensure that the NMHSs within the Regional Innovation Hub will improve and sustain their provision of hydrological data, whereas the two last will ensure that the regions are strengthened through mutual technical assistance and increased political commitment.

With regard to the vulnerable communities, groups, end-users that will be the beneficiaries of the project through improved hydromet services, five main groups have been identified: 1) Local communities affected by hydrological disasters including those living in flood prone areas in Tanzania and along the lower reaches of the river Gambia basin; 2) Agriculture sector, including farmers working in irrigation schemes/field such as paddy farms, small holder tidal irrigation farmers, women oyster farmers in the Tanbi Wetland Complex; 3) Students and researchers, through the provision of data for climate change and sea level rise modeling and the potential for employment of graduates

in the area of innovation for hydromet; 4) Women, as a vulnerable group, yet being the pillars of in family economy through subsistence farming, and 5) Regional data collection and research initiatives, international partners and initiatives.

Promotion of new and innovative solutions

Innovative solutions will be promoted through the project, notably through Innovation Calls that will address regional hydrometric challenges common to all countries within a Regional Innovation Hub and enhanced linkages with research sector to support co-design of new innovative solutions. The innovative solutions that will be leveraged in the project would have already been through proof-of-concept testing but need further assistance to, for example: (1) tailor them to the needs of hydromet services in West and East Africa, (2) build the support infrastructure (e.g., local manufacturers and maintenance providers), and/or (3) help operational services transition to the new technology.

The Innovation Calls will be implemented in both Hubs through provision of financial and technical support to project proposed via open calls. Innovation Call applications will be technically evaluated based on a set of criteria including: a low total cost of ownership; cost effectiveness of the solution; innovativeness; open source; scalability to other countries and regions; possibility for local manufacturing; involvement of youth, women and vulnerable communities in the project scoping and design. An established mechanism for this exists and has been demonstration in WMO HydroHub Innovation Calls in its Phase I.

The Gambia and Tanzania were thought to be suitable locations in which to support the growth of innovation ecosystems around water monitoring. In The Gambia, the government has made strong commitments to entrepreneurship and a number of technological incubators/accelerators have been established in recent years, that could provide useful synergies with the proposed Regional Innovation Hub. An active innovation ecosystem also exists in Tanzania, with a number of other incubators and accelerators established across different sectors that could provide useful linkages with the hydrometry Innovation Hubs. In developing the Concept Note, other initiatives such as UNDP Innovation Labs will be considered in shaping the proposal.

In addition to the current technical and innovation positioning of the two countries, the project aims to establish the two Regional Innovation Hubs in two different regions in Africa i.e., East and West Africa, as these could then support hydrometric monitoring innovation across other countries in the region. For example, in West Africa, the Gambia's membership of ECOWAS should simplify regional trade for any start-ups that might stem from the Hub. Looking further ahead, it is envisaged that the Regional Innovation Hub model of supporting improvements in water monitoring could be replicated in other regions e.g., North and Southern Africa should the project be successful.

Scaling up of innovative solutions

The innovative hydrometric solutions implemented in Tanzania and The Gambia will be designed in a way that makes the innovations applicable to other countries or regions facing the same or similar hydrometric challenges. They will then be scaled up to the other countries within the Regional Innovation Hub.

Expected partnerships that will emerge from the Regional Innovation Hubs and help bring about transformative change include 1) NMHSs and private sector technology providers (for the development and uptake of innovative solutions that meet NMHSs' needs); 2) NMHSs and hydromet data users, both private and public sectors such as agriculture, civil defense (for the improvement of user-oriented data provision); 3) NMHSs and citizen science groups, including youth, women and vulnerable communities (for the integration of non-traditional data sources into NMHSs operations); 4) private sector technology providers and academia (for collaborative research and development of technologies); 5) among NMHSs of various countries (for continuous learning, mentoring and collaboration); and 6) among existing innovators from various sectors (for improved business incubation and acceleration).

Cost Effectiveness

The project is designed in a cost-effective way with a high return on investments. Implemented activities are such that they will have a long-term impact and will build on existing WMO entities present in the region. The project being developed in the broader framework of the WMO HydroHub Phase II will leverage investments by other donors in developing tools and networks e.g. Innovation Calls. A full logframe, including indicators, will be developed if this pre-concept is approved.

Consistency with national or sub-national sustainable development strategies

The project will be consistent with national sustainable development strategies, including:

- Gambian National Adaptation Plan of Action (NAPA) on Climate Change (November, 2007)
- [National Development Plan in The Gambia \(NDP 2018 – 2021\)](#)
- Tanzania's National Adaptation Plan (NAPA)
- [National Five-Year Development Plan in Tanzania 2021/22–2025/26](#)
- [Tanzania's National Climate Change Response Strategy 2021-2026](#)

The Gambian National Adaptation Plan of Action (NAPA) on Climate Change recognizes the inadequate knowledge between the climate and biophysical process within the Gambia. It stresses the risk of the disappearance of freshwater swamps and salinization resulting from the effect of sea-level rise. Furthermore, it emphasizes that the combination of sea-level rise, global warming and changes in rainfall patterns, could impact freshwater resources qualitatively and quantitatively. Surface evaporation is expected to increase, whilst groundwater recharge is expected to take the reverse trend. Thus, the NAPA recommended the preparation and implementation of strategic and effective water resources management tools such as policies, legislations and action plans. The supplementary Agriculture and Natural Resources (ANR) Policy (2017 - 2026) calls for regional cooperation in the sustainable management of shared water resources. It also emphasizes the need to expedite the water sector reform with a draft Gambia Water bill, that would enhance effective water policy implementation to minimize water conflict and promote cooperation among the various users and uses.

The project responds to the Tanzania's National Adaptation Plan (NAPA), the National Five-Year Development Plan 2021/22-2025/26; and the National Climate Change Response Strategy 2021-2026 through aims to address issues of increase in frequency and intensity of extreme events such as strong wind, heavy rainfall, hailstorm and higher temperatures that are devastating socio-economic impacts including loss of life and properties, and destruction of infrastructure.

Learning and knowledge management

The project includes learning and knowledge management aspects such as the trainings on technical deficits in component one, the learning exchanges in component three and the results of cost-benefit analysis presented in the context of Ministerial Roundtables in component four.

Consultation process

This pre-concept was developed by the NMHSs in Tanzania and The Gambia together with WMO. It also went through an internal WMO peer-review. More consultations will be carried out with all relevant stakeholders in the preparation of the Project Concept Note. Mechanisms that would be used have been developed by WMO through experience and wide consultation with Members. Two consultation workshops will be organized during the Concept preparation phase to help identify what the gaps and needs are in terms of hydrological monitoring in Tanzania, The Gambia and neighboring countries.

Sustainability

The sustainability of the project will be ensured by the Regional Innovation Hubs and the full range of stakeholders who encompasses them. All activities have long-term impact potential and are designed in a sustainable way. Innovation Calls for example are expected to be locally self-manufactured and with a low total cost of ownership. A specific focus will be placed on enhancing peer-to-peer support across water monitoring organizations in each supported region as well as growing a network of research collaborations, private sector SMEs and start-ups with the capabilities to support monitoring operations.

Economic, social and environmental benefits

The project will bring economic, social and environmental benefits to the regions through improved hydromet services that will allow for improved decision-making, save lives and protect the environment.

Compliance with the Environmental and Social Policy of the Adaptation Fund

The project is compliant with the Environmental and Social Policy of the Adaptation Fund and does not have the potential to cause environmental or social harm throughout its implementation.

Duplication of project / programme with other funding sources

The project will not duplicate activities being carried out in the framework of other projects. A mapping of ongoing and planned activities will be made, in view of identifying synergies and ensuring coherence with regional programmes and seeking collaboration with regional and national institutions in the region.

PART III: IMPLEMENTATION ARRANGEMENTS

WMO will be the implementing entity for this project. The NMHSs of Tanzania and The Gambia, and the UK Centre for Ecology & Hydrology (UKCEH) will act as executing entities. While the NMHSs of Tanzania and The Gambia will play a key role in developing partnerships – with the other NMHSs and relevant organizations – within the Regional Innovation Hubs by taking the lead on consultations and hosting activities such as Learning Exchanges, the UKCEH will support the project coordination. International experts from across the WMO Membership will be deployed where appropriate (for example, as innovation mentors or deliver of train-the-trainer interventions). Also, synergies with universities and regional training centers (potentially the National Water Research Center (NWRC) in Cairo, AGRHYMET Center in Niamey) will be sought to ensure innovations can get supported both at the demonstration, instrument maintenance and operational levels.

Compliance and quality control will be ensured through appropriate WMO Bodies e.g. Infrastructure Commission.


Other partners will be identified during the Concept Note development. The Associated Programme on Flood Management (APFM) Support Based Partners represents a pool of possible partners that could be leveraged.

PART IV: ENDORSEMENT BY GOVERNMENTS AND CERTIFICATION BY THE IMPLEMENTING ENTITY

A. Record of endorsement on behalf of the government² *Provide the name and position of the government official and indicate date of endorsement for each country participating in the proposed project/programme. Add more lines as necessary. The endorsement letters should be attached as annexes to the project/programme proposal.*

<p>GAMBIA (The Republic of) Mr. Bubacar Zaidi Jallow Director Central Project Coordinating Unit Ministry of Environment, Climate Change and Natural Resources (MECCNAR)</p>	<p>Date: 1/12/2021</p>
<p>TANZANIA Mr. Mohammed Khamis Abdulla Deputy Permanent Secretary Vice President's Office</p>	<p>Date: 22/12/2021</p>

B. Implementing Entity certification *Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address*

<p>I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans (National Five-Year Development Plan in Tanzania 2021/22–2025/26 and National Development Plan in The Gambia (NDP 2018 – 2021)) and subject to the approval by the Adaptation Fund Board, <u>commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund</u> and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.</p>	
<p> Jean-Paul Gaudechoux Implementing Entity Coordinator</p>	
<p>Date: (Month, Day, Year)</p>	<p>Tel. and email: +41 79 514 4261 jpgaudechoux@wmo.int</p>

Each Party shall designate and communicate to the secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.

Project Contact Person: Sophia Sandström

Tel. And Email: ssandstrom@wmo.int