STAKEHOLDER CONSULTATION WORKSHOP

for the preparation of the Project Concept Proposal to be submitted to the Adaptation Fund (AF) for a large innovation project

"Enhancing Hydromet Services through Regional Monitoring Innovation Hubs in Africa (Tanzania, The Gambia)"

DATE:

20 June 2022

VENUE:

Tanzania Meteorological Agency (TMA)

Ubungo Plaza – Dar es Salaam, Tanzania

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List of stakeholders consulted

The consultations were carried out between 9 and 20 June 2022, and covered the following stakeholder categories:

a) Hydro-related institutions

- Nine River Basin Water Boards (BWBs) in Tanzania (Wami-Ruvu BWB, Rufiji BWB, Pangani River BWB, Lake Rukwa BWB, Lake Tanganyika BWB, Ruvuma and Southern Coast BWB, Lake Victoria BWB, Internal Drainage BWB and Lake Nyasa BWB);
- Ministry of Water (MoW) of Tanzania;
- Water Resources Centre of Excellence (WRCoE) under the Ministry of Water of Tanzania.

b) Meteorological Service

- Tanzania Meteorological Authority (TMA).

c) Public institutions and Non-Government Organizations (NGOs) dealing with communities (gender, children and disabled persons)

- Prime Minister's Office – Labour, youth empowerment and disabled persons;
- Vice President's Office (National Designated Authority);
- Maasai Women Development Organization (MWEDO), which is a non-governmental women-led organization. MWEDO empowers women to enhance sustainable equitable and human development for grassroots Maasai women;
- Ministry of Community Development, Gender, Women and Special Groups.

d) Other NGOs

- Tanzania Water Partnership (TWP);
- Nile Basin Discourse (NBD).

e) Relevant UN agencies working in the country on relevant subjects

- UNESCO – Natural Science Programme;
- UNESCO – Intergovernmental Hydrological Programme (IHP) Committee.

f) Development partners/donors that are implementing related projects in the country/region:

- German Development Agency (GIZ)

- African Development Bank (AfDB)
- World Wildlife Fund (WWF)
- KfW Development Bank
- African Wildlife Foundation (AWF)

g) Innovators/Manufacturers (public and private organisations/startups)

- Ennovate Ventures and Sahara Ventures – private organisations dealing with innovation/software development;
- Public institutions represented by Dar es Salaam Institute of Technology (DIT) and Arusha Technical College (ATC).

h) Academia

- University of Dar es Salaam (UDSM);
- Sokoine University of Agriculture (SUA);
- Water Institute (WI);
- Nelson Mandela African Institution of Science and Technology (NM-AIST).

i) Neighbouring countries – Regional Hubs

- Nile Equatorial Lakes Subsidiary Action Programme (NELSAP) – Kigali, Rwanda;
- Joint Songwe River Basin Commission (Tanzania and Malawi);
- Nile Basin Secretariat (Nile-SEC) – Entebbe, Uganda;
- Zambezi Water Course Commission (ZAMCOM) – covering Angola, Botswana, Malawi, Mozambique, Namibia, Tanzania, Zambia and Zimbabwe;
- Mozambique;
- Malawi;
- Lake Victoria Basin Commission (LVBC), Kisumu-Kenya (Kenya, Tanzania, Uganda, Rwanda, Burundi).

Description of the consultation techniques

The consultation techniques used are as follows:

(i) Introduction of the project via email communication and phone calls, and invitation to the workshop (held in hybrid mode – physical/virtual). The communication

started on 9th June 2022 via telephone calls. Official invitation letters drafted by the Ministry of Water in collaboration with TMA were sent out on 13th & 14th June 2022.

(ii) Sending questionnaires to all stakeholders and receiving written responses before and after the workshop.

(iii) Physical/Virtual Consultation Workshop at TMA on 20th June 2022.

The consultation workshop was guided by the following agenda:

- **Opening remarks** by Dr. Ladislaus Chang'a (Acting Director General TMA), Mr. Robert Sunday (Ministry of Water, Tanzania) and Mr. Igor Chernov (WMO Secretariat).
- **Presentation on the Pre-concept Proposal** by Mr. Harry Dixon (UK Centre for Ecology & Hydrology). The main aim being to understand the objectives of the project and guide the discussion of the stakeholders.
- **Presentation on the Review of the existing legislation** by the Ministry of Water and discussion on how the innovation project can contribute to strengthen it.
- **User requirements and project impact at the last mile** (national to local perspective in Tanzania).
- **User requirements – Regional aspects**; **Feedback from neighbouring countries**.
- **Innovative monitoring approaches – capacities in Tanzania; Role of Public, Private and Academia**.
- **Capacity building** – skills needed in relation to Hydromet innovation and transition from research to sustainable innovations.
- **Synergies with other projects in the country and the region**.
- **Identification of focal points and their roles** in project development and implementation.

The key consultation feedback and findings

Opening session

During the opening remarks the following points were highlighted:

- Sustainability of the project should be considered critically;

- The issue of loss and damage is critical, and we should consider capacitating the services that reduce loss and damage caused by hydro-meteorological disasters;
- Ensuring that capacity building for experts is done during implementation;
- The gap on research, data and systematic observations should be taken into consideration.

Review of the existing legislation and how the innovation can contribute to strengthen it

Key challenges highlighted during the discussion

- Challenges of hydrological equipment on Hydromet Operationalization:
    - Technological Challenges. The main technological challenges include:
        - shortcomings in high-tech technologies;
        - unavailability of spares in local market, short life batteries, very delicate, often malfunctioning;
        - frequent miss communication between station loggers and the server;
        - limited cellular network in some stations posed transmission challenges, frequent troubleshooting problems and delicate glass measuring cylinder.
    - Financial challenges and others.

The following are the suggested ways to address the challenges:

- Invest in technology that is suitable in respective areas (especially remote areas);
- There is a need to have a dedicated IT capacity to deal with the modernized network;
- Data processing software is required to manage huge amount of data;
- Explore options of getting batteries with longer life span;
- Think of plastic made measuring cylinders;
- Retrofit automatic stations with inbuilt Solar Power system as an additional power sources and way managing vandalism;
- Calibration of hydromet facilities is recommended for quality control of the data.

It was further highlighted that there is no hydromet calibration facilities in East Africa Region and hence investment in current meter, water quality and groundwater facilities should be done. This can be achieved through collaboration with local institutions such as

Ministry of Water, Water Institute and University of Dar es Salaam, Dar es Salaam Institute of Technology and Arusha Technical College.

Recommendations

- Technology should be smart, stable, simple and feasible to suite local environment;
- Private sector and technical institutions/universities should work together and come up with best solutions;
- Involvement of community and informal sectors;
- There should be a link on the data (collected, kept, retrieved) and person taking the data should also be part of data users to end up with a database that is useful;
- We should collaborate with private sector on the development of sensors since they are using high tech;
- Learning institutions should improve their curriculum to involve hydromet studies (planning to data analysis);
- To have a centralized data management system with information that cover every part of the country;
- The system should be of reasonable operation costs;
- Resolutions of the data should be built, and the database infrastructure should be well established.

User requirements and project impact at the last mile

The written feedback from the Ministry of Community Development, Gender, Women and Special Groups highlighted the following as part of the user requirements:

- Weather/climate change may lead to poor business performance and/or reduced productivity, and sales of production also vary with weather condition. For example, during the rainy season for 'machingas' it becomes difficult to be on the streets selling their products. Another group is fishermen – during the rainy season it is difficult for them to go to the sea/lake for fishing, and their livelihood depends on this activity. Even in dry season, it becomes difficult for farmers to carry out agricultural activities as a large percentage of smallholder farmers rely on rainfall and tap water.
- These changes in climate can cause difficulties in maintaining business activities as well as production of some of the products that depend on weather conditions and/or availability of water from time to time. For example, the farmers group is very dependent on the availability of water. Also, the number of customers may

increase or decrease depending on the weather season, which affects the revenue collected at a given time.

- It was recommended to come up with an easy method to access information. For example, Weather App can be developed with an easy access to data, or telephone message alerts. The same recommendation was echoed by MWEDO through their written response – a mobile app for weather updates can be very useful for community activities at the grassroots level.

Recommendations during the workshop:

- The Project should have kind of a business model;
- Establish calibration center for hydromet equipment;
- Plan should be made to add more information on water quality and sedimentation;
- Train staff and establish a delivery system to support stations that are automated;
- Integrate the sediments of operationalization of Hydromet;
- Internal capacity to be explored and coordinated.

Innovative monitoring approaches

This session involved a panel discussion on existing capacities in Tanzania for manufacturing the instruments and developing data acquisition and management systems. Highlights were made on the national and regional demand of equipment, software and models.

The written feedback on the submitted questionnaires were also reviewed. For example, the feedback from one private NGO dealing with innovation – *Ennovate Ventures* – highlighted the following capacities:

- We have a good background of system development, our in-house team of system designers, system developers, copywriters, graphic designers work in synergy to uphold the highest standards for project planning and execution, and we're dedicated when it comes to building perfect systems for clients and beneficiaries (organizations, startups and companies) on-time and on-budget.
- We have built different systems (management, Internet of Things (IoT), websites, software etc.) for several brands in country with great success.

On job opportunities, the innovation NGO has highlighted the following:

- This area has a huge potential of creating job opportunities as it falls on sensitive sectors and strategic areas i.e. water, manufacturing, agriculture and so on whereas these sectors and strategic areas are among leading in creating job opportunities based on most recent statistics.

- By adding innovative intervention will have a tremendous plus and even more supporting factor on this area specifically on job opportunities creation and that is when high emphasis is made on creating and launching most innovative startups in this area.

The panel discussion recommended the following:

- There should be a link between innovation and end users;
- Increase political advocacy on hydromet services;
- Connect Hydromet to end users;
- Focus should be made on the local community solutions and find a way to commercialize the service;
- Learning Institutions to review the curriculum to include the modules on hydrometric studies (innovation, instrumentation);
- Develop portals which can facilitate hydrometric system to acquire, install and analyze data;
- Students to come up with smart innovations and be part of the project;
- We should have a local capacity to ensure sustainability (development of hydrometric capacity);
- Capacitate in terms of analysis of data;
- Accreditation to the work so that we can be recognized outside the country;
- Focus on the provision of necessary infrastructure for the experts to use;
- Improve the technical expertise of working staffs;
- Advocacy should also be done on water monitoring and Hydromet;
- Coordination of the whole process should be done properly e.g. UDSM have an innovation center that works closely with the community;
- Local innovators should be branded;
- End users should not be left behind, they should be mentored for the project to be sustainable.

Additionally, learning institutions were asked whether they see Innovation Hub as an opportunity and their comments were as follows:

- Arusha Technical College (ATC): They currently run Vocation Programs, Diploma and have modules/programs which directly work in this line of Hydromet and most of the aspects are directed. They encouraged the Project committee to use some of the ATC facilities on executing the project.

- Dar es Salaam Institute of Technology: Component of capacity building training on ICT is on progress including new technology, artificial intelligence, curriculum improvement, students to do innovations in relation to Hydromet and check on the gap.

- Water Institute: Indicated that by the end of this year the review of curriculum for next five years will be completed and includes modules on innovation on the side of hydrometric instruments.

Capacity building to uptake and operationalize the innovative approaches

The panel discussion session covered the different skills needed in relation to hydrometric innovation and the transition from research to sustainable operations. The gaps were discussed, and the following were suggested:

- Data to be translated immediately to information (coding) as the easiest way to get income and proceed with another session of data collection;
- Universities should link directly to the government as a custodian of technology;
- Recognize Indigenous Knowledge (IK)/capacity and working with the community to harness key information and data;
- Develop research themes which can be easily commercialized;
- We should encourage automation, reliable data which is easy to share.

From the written feedback, different skills were highlighted by different institutions. Also, the contribution of the public, private and academic sectors in carrying out research in hydrometric monitoring was highlighted in the following areas:

- Remote sensing applications;
- Flood detection and forecasting;
- Weather parameters monitoring;
- Hydrology monitoring;
- Hydromet sensors research;
- Weather and climate extremes research;
- Climate and global change research;
- Weather analysis and predictability of large-scale systems.

For the aspects to be considered to ensure long term sustainability of the investments, the feedback was as follows:

- Development of the locally available technology;
- Use locally available materials;
- Ensuring availability of the locally skilled personnel.

Synergies with other projects

Stakeholders responses on synergies with other projects in the country/region are summarized in the following table:

	Project	Organization	Description	Relevance	Website
NATIONAL PROJECTS/INITIATIVES					
1	Development of an Operational Decision Support System (ODSS) through Enhanced Hydro-Meteorological Service	Ministry of Water	The ODSS comprises the following key components to support water resources decision making across Tanzania: (i) A Water Resources Information System (WRIS) for exchanging water datasets and knowledge products with linkage to a hydro-met monitoring system for all nine basins in Tanzania; (ii) Flood Forecasting Early Warning System (FFEWS) in the Wami/Ruvu Basin; (iii) Water Use Permitting Analysis tool (WUPA) for water allocation in the Pangani and Rufiji basins; and (iv) Dam Operation Support tool (DOS) for the Nyumba ya Mungu Dam in the Pangani Basin, and Mtera Dam and Kidatu Dam in the Rufiji Basin. These components support the Ministry of Water, Basin Water Boards and other stakeholders in making decisions related to data, flood emergency response, water use permits and dam operation.	The HydroHub Project will enhance operationalization of ODSS through producing hydrometeorological data. The innovation aspect is key to sustainability of ODSS.	No link
2	Modernization of Hydro-Meteorological Network	Ministry of Water	The objectives of the Project are modernization and improvement of the water resources monitoring networks (surface hydrology, weather, precipitation and groundwater) in Tanzania and favour for a sustainable and long-term operation. It will also upgrade and rehabilitate the faulty of existing monitoring stations including the use of automated telemetry system.	The aspect of hydromet modernization is relevant with the innovation ambition of HydroHub Project.	No link
3	The Water Resources Center of Excellence Strategic Plan for 2019/2020 to 2024/2035	Ministry of Water	The Center will conduct multi-sector analysis that: (i) will support decisions on allocation of water, water use and demand management, water security infrastructure development; (ii) provide strategic policy support for Integrated Water Resources Management and Development, investment planning and prioritization on water, energy and food security; (iii) collaborate with the multi-sectoral forum to bring professionals to address complex multi-sectoral problems in water resources management and development; and (iv) provide technical expertise to support calibration services of hydrogeological and hydro-meteorological equipment.	The Center will strengthen technical expertise to support calibration services of hydrogeological and hydro-meteorological equipment. This will complement HydroHub Project through innovation of hydromet	No link

Project		Organization	Description	Relevance	Website
				equipment and setting calibration facilities/center.	
4	Higher Education for Economic Transformation (HEET) Project	Ministry of Education, Science and Technology	The US$ 425 million World Bank supported 2021-2026 HEET Project supports the higher education sector as part of the country's bid to allow the sector to be an enabler for economic transformation. This is in keeping with the national aspiration for achieving industrial revolution, consolidating the national grip on being a middle-income country and in unleashing employment opportunities for youth, who constitute the biggest segment of the national population. The HEET Project seeks to enable Universities and colleges/schools to be in the driving seat for the envisaged economic transformation, whereas three Ministry agencies, namely Tanzania Commission for Universities (TCU), the Commission for Science and Technology (COSTECH) and the Higher Education Students Loan Board (HESLB) are expected to create the needed enabling environment. As a means of creating innovation in the higher education supply chain, the implementation of the HEET Project is premised on the principle of the "Theory of Change", for which the medium-term outcome, hereby referred to as Project Development Objective (PDO), is "to strengthen the learning environment and labor market alignment of priority programs at beneficiary higher education institutions and improve the management of the higher education system". The focus areas funded under the project relate to: (i) construction or rehabilitation of infrastructure; (ii) building capacity of academic staff and university leadership; (iii) updating and developing new curriculum; (iv) promoting applied research and innovation capacity; (v) building functional linkages with private sector/industry; (vi) strengthening use of digital technology; and (vii) developing options for self-generated income.	The following areas – (a) updating and developing new curriculum; (b) promoting applied research and innovation capacity; (c) building functional linkages with private sector/industry; (d) strengthening use of digital technology; among others – appear to complement the HydroHub Project.	No link

	Project	Organization	Description	Relevance	Website
5	WISE Futures – Water Infrastructure and Sustainable Energy	The Nelson Mandela African Institution of Science and Technology (NM-AIST)	The center has conducted research in remote monitoring of drinking water supply system, river level and weather station. Specifically, the innovation centered on how to remotely collect and transmit real time data for further analysis. In drinking water supply monitoring, the project is developing water level loggers in tanks. For now, a proprietary version has been installed which uses GSM module. WISE Futures is testing other module of data acquisition, e.g., a technical team downloading every month. This system uses non-contact technique to monitor water level in river or canal and then transmit to server. As proof concept it was found to be effective, however, it faced vandalism. The local community destroyed deployed version, trying to get the solar battery used Low-cost rainfall and temperature data collection: This version is testing the concept of collecting data for agricultural use. It particularly focuses on collecting rainfall and temperature data only. Although it can be integrated with soil moisture. As a proof concept, it is working well. It will need further improvement in the communication system, energy etc.	WISE Futures would be interested in working with youth group to develop this technology under the project. The project would develop for full deployment under a business model.	Link
6	Tanzania Water Partnership Strategic Plan 2022-2027	GWP Tanzania	The Strategic Plan with seven Strategic Objectives include Strategic Partnership; strengthening resource mobilization; establish Water Knowledge and Exchange Hub; and Enhancing Mentorship Programme.	This will complement HydroHub initiatives through engaging in innovation calls for proposals; develop project ideas and engage potential partners to fund them; and carry out youth mentorship programmes.	No link

	Project	Organization	Description	Relevance	Website
7	National Intergovernmental Hydrology Programme (IHP) Committee Five Years Strategic Plan 2021-2025	IHP National Committee	The strategy is structured along five objectives including: (i) Enhanced sustainable management of wetlands and groundwater to improve water security and build resilient communities; (ii) Support cutting-edge research and technological innovations in the water sector; (iii) Improved hydro-meteorological, and water quality data (acquisition, storage and analysis) to support water resource management; (iv) Enhanced management of water related disasters (floods and drought) as an adaptation to climate change; and (v) Enhanced water governance, education and professional capability in water sector.	The Strategy complements the HydroHub goals through responding to main questions of technological innovations in hydrology. The questions include (i) How to use innovative technologies to measure surface and subsurface properties, states and fluxes, at a range of spatial and temporal scales? (ii) What is the relative value of traditional hydrological observations vs soft data (qualitative observations from lay-persons, from data mining etc.), and under what conditions can we substitute space for time?	No link
REGIONAL AND NEIGHBOURING COUNTRIES PROJECTS/INITIATIVES					
8	Zambezi Water Information System (ZAMWIS)	Zambezi Watercourse Commission (ZAMCOM)	The Zambezi Water Information System (ZAMWIS) is the center-point of data and information sharing and exchange between eight Member States in the Zambezi Basin. The ZAMWIS is the software tool used for the actual exchange and sharing of the data and information. ZAMWIS is a Water Resources Information System (WRIS), which later will be extended to include a Decision Support System (DSS) that will facilitate	Making use of the ZAMWIS which is used in Tanzania Lake Nyasa Basin requires data input from the monitoring networks. Secondly, the	Link

Project		Organization	Description	Relevance	Website
			the use of the shared data and information for strategic planning and utilization of the water resources in the basin.	area of software management can benefit from outputs of HydroHub Project.	
9	Strengthening Transboundary Cooperation and Integrated Natural Resources Management in the Songwe River Basin (STCINRMSRB) Project	Joint Songwe River Basin Commission for Tanzania and Malawi	The four years (2019–2023) project has a component of Improving Early Warning and Disaster Risk Management. The outcomes of the project include percentage of the population in the flood plain benefitting from the Flood Early Warning System (FEWS). The flood emergency and evacuation plan for Lower Songwe Flood plains (Karonga and Kyela) developed, Flood early warning system (FEWS) developed and operational, and number of hydrological & meteorological stations installed. In order for these outcomes to be achieved, hydrometric monitoring is an integral part of the project. The project will upgrade hydrometric monitoring stations so that they are able to transmit automated data to server that will be housed at SONGWECOM.	Innovation in hydromet will enhance sustainability of this initiative.	No link
10	The Nile Basin Data and Analytics Services	Nile Basin Initiative for 10 Member States	The project enhances data and analytic services through expanding its data and analytics services for climate-resilient water resources management in the Nile Basin's 10 Member States through innovative information services for climate-resilient investment planning.	This requires data input from operational hydrology and in turn improves hydromet services.	No link
11	Drought Monitoring and Forecasting System	Nile Basin Initiative	This component contains drought indices suitable for hydrological and meteorological drought that are based on climate information.	From both ends, the project depends on data availability from monitoring network and innovations as visioned in the HydroHub Project.	Link
12	The Nile Basin River Flow Forecasting	Nile Basin Initiative	System is an integrated real-time multi-functional forecasting system that supports the Nile Basin Initiative and its stakeholders in river flow forecasting providing short-term to seasonal river flow forecasts for the	This initiative, especially in Tanzania, is suffering from malfunctioning of	Link

Project		Organization	Description	Relevance	Website
			entire Nile basin. Furthermore, it supports investigating the consequences of alternative infrastructure operation rules for dams and key water users using the flow forecasts generated.	hydromet network and services in specific catchments. The HydroHub Project will complement this initiative to enable it to take place and endure.	
13	Water Security and Climate Resilience in Urban Areas in Tanzania 2019 to 2022 and the Next Phase: once commissioned (2022 to 2025)	GIZ Water Programme	- Providing technical support to Basin officers in carrying out hydrometric measurement and data processing in areas they feel they require to improve partly due to new technology including how to access remote sensing data on vegetation, land use and land cover. - Support the implementation of Quality Management System in the hydrological services in all basins (national level) with attention in the basins that receive GIZ support. Data collection is one of the key processes.	i) Putting into use knowledge management process and citizen science developed by the Innovation Hub in selected water catchments in Lake Rukwa basin and from other Water Basins that will be supported by GIZ; ii) GIZ to support effective use of existing frameworks (catchment meeting, basin forum, National Forums, Maji week, etc.) to provide opportunities to share/exchange good practices lessons with basin experts;	No link

Project		Organization	Description	Relevance	Website
				iii) Possibility of using GIZ programmes within EAC and SADC to spread the products of Innovation Hub through workshops provided contributing to the goals of the partners especially in transboundary water resources management	
14	Simiyu Climate Resilience Project	KfW Tanzania	- Addresses climate change and its impact through the Steering Committee where several ministries participate. Also, there will be an ICT-Climate Change Information Platform for farmers to receive information on weather.	Participation in the Steering Committee or taking up the lessons learned from the Steering Committee. Link HydroHub measures to the planned ICT-Climate Change Information Platform.	No link

Innovation and Responsibility

Recommendations based on stakeholders' consultations on roles and responsibilities in Project Development and Implementation are as tabulated below:

Project/Programme Components	Expected Outcomes	Expected Outputs	Organizations	Responsibility/Activities
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)	BWBs, WRCoE, WI, WISE Futures, UDSM	- Basin Water Boards are responsible for water resources monitoring; - WRCoE and research institutions will be responsible for capacity building addressing specific training needs in relation to hydrometric monitoring; - WISE Futures working with youth and students in designing instruments.
		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	WRCoE, WISE Futures	- Research and Innovation – linkage and collaboration with the regional and international partners to find innovative water monitoring solutions; - Support start-up groups in innovating and manufacturing Hydromet equipment.
			UDSM, SUA, ATC, DIT	- Research and Innovation – for UDSM and SUA – it is in line with the World Bank HEET Project, which aims at Problem Based Learning (PBL); - IHP Committee to develop strategic plan, solicit fund and support innovation projects for the research and technical institutions.

Project/Programme Components	Expected Outcomes	Expected Outputs	Organizations	Responsibility/Activities
			IHP, COSTECH	- IHP Committee/COSTECH to develop strategic plan, solicit fund and support innovation projects for the research and technical institutions as well as private innovators.
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.	MoW, BWBs, TMA	- Key players in establishing regional and international operational and research partners; - International conferences/symposia – hosted by NMHSs.
			DIT, ATC, WISE Futures	- Private and public sectors: research and development of digital and physical monitoring technologies.
			COSTECH, BWBs, WI	- Call for application for innovation grants related to hydrometric monitoring; - Technologies.
			WI, WISE Futures, Ennovate Ventures, UDSM, SUA, DIT, ATC	- Private and public sectors: research and development of digital and physical monitoring systems. Soliciting grants to support innovation.
		2.2 Innovation Camps and other activities established to bring together public and private entities to support the development,	DIT, ATC, Ennovate Ventures, COSTECH, BWBs,	- Innovation Camps to be organized by COSTECH/WRCoE to bring together public and private sectors.

Project/Programme Components	Expected Outcomes	Expected Outputs	Organizations	Responsibility/Activities
		manufacturing and maintenance of digital and physical monitoring technologies	WI, WISE Futures, UDSM, SUA	
3. Enhanced regional cooperation for mutual technical assistance among NMHSs and other monitoring organizations within the region where the Innovation Hubs are established	Improved dialogues and exchanges within Regional Innovation Hubs and beyond	3.1 Organization of Learning Staff Exchanges to facilitate and guide learning exchanges among NMHSs within a Regional Innovation Hub in view of addressing specific common hydrometric challenges	MoW, TMA, SONGWECOM	- Organization of learning exchanges
		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	MoW, WRCoE, WISE Futures, WI, DIT, ATC, UDSM, SUA	- Organization of Innovation Workshops by the MoW/WRCoE to involve public and private sectors in the country.
4. Increased political and institutional commitment for operational hydrology through improved stakeholder	Increased support to NMHSs through budget and Water Legislations, and fit-for-purpose innovative hydrometric	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	MoW, National Multi-Sectoral Forum (NMSF), TWP	- Organization of Ministerial Roundtables – MoW in collaboration with TWP to coordinate organization.

Project/Programme Components	Expected Outcomes	Expected Outputs	Organizations	Responsibility/Activities
collaboration and engagement, including co-production of hydromet services.	technologies and user-oriented hydromet services	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	MoW, NMSF, TWP, IHP	- Organization of User-provider Workshops.

Annex 1: Participants

ENHANCING HYDROMET SERVICES THROUGH REGIONAL MONITORING INNOVATION HUBS IN AFRICA (TANZANIA, THE GAMBIA)

STAKEHORDERS'CONSULTATION WORKSHOP FOR THE PREPARATION OF THE PROJECT CONCEPT NOTE

DATE: 20TH JUNE 2022,

VENUE: TMA HEADQURTERS, UBUNGO PLAZA - DAR-ES-SALAAM, TANZANIA

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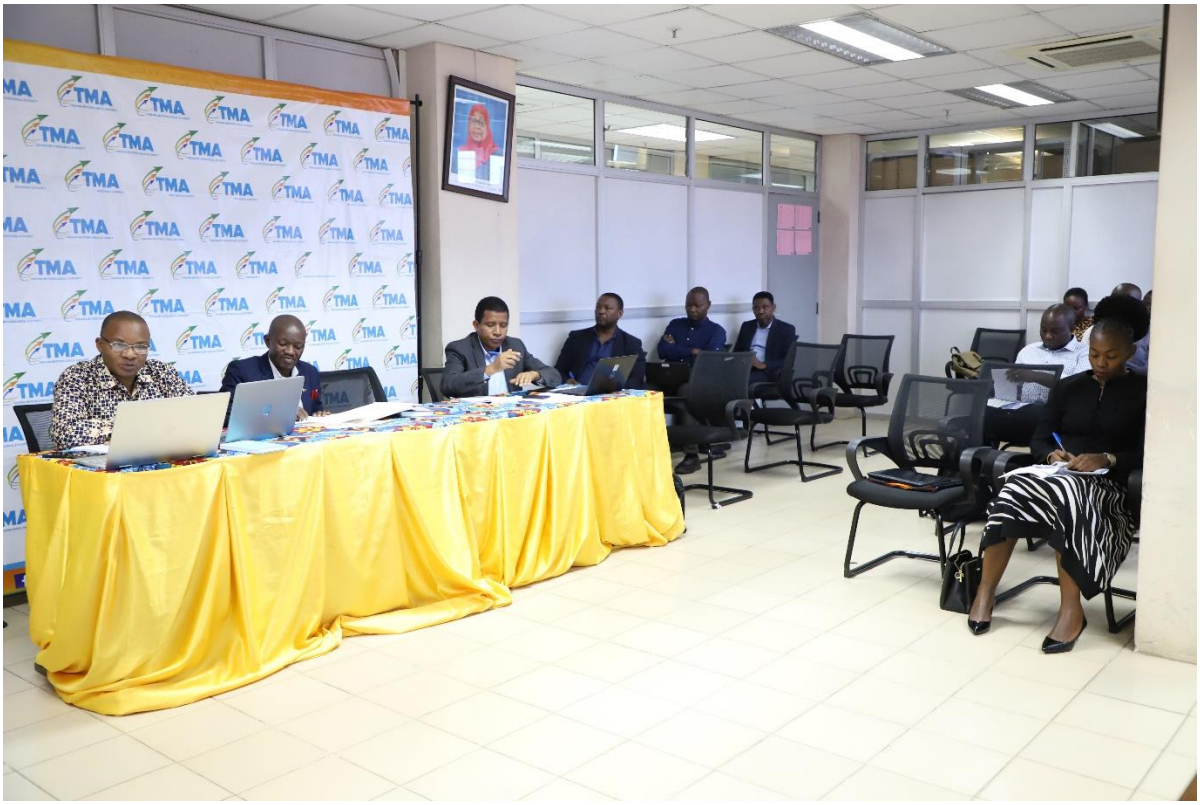
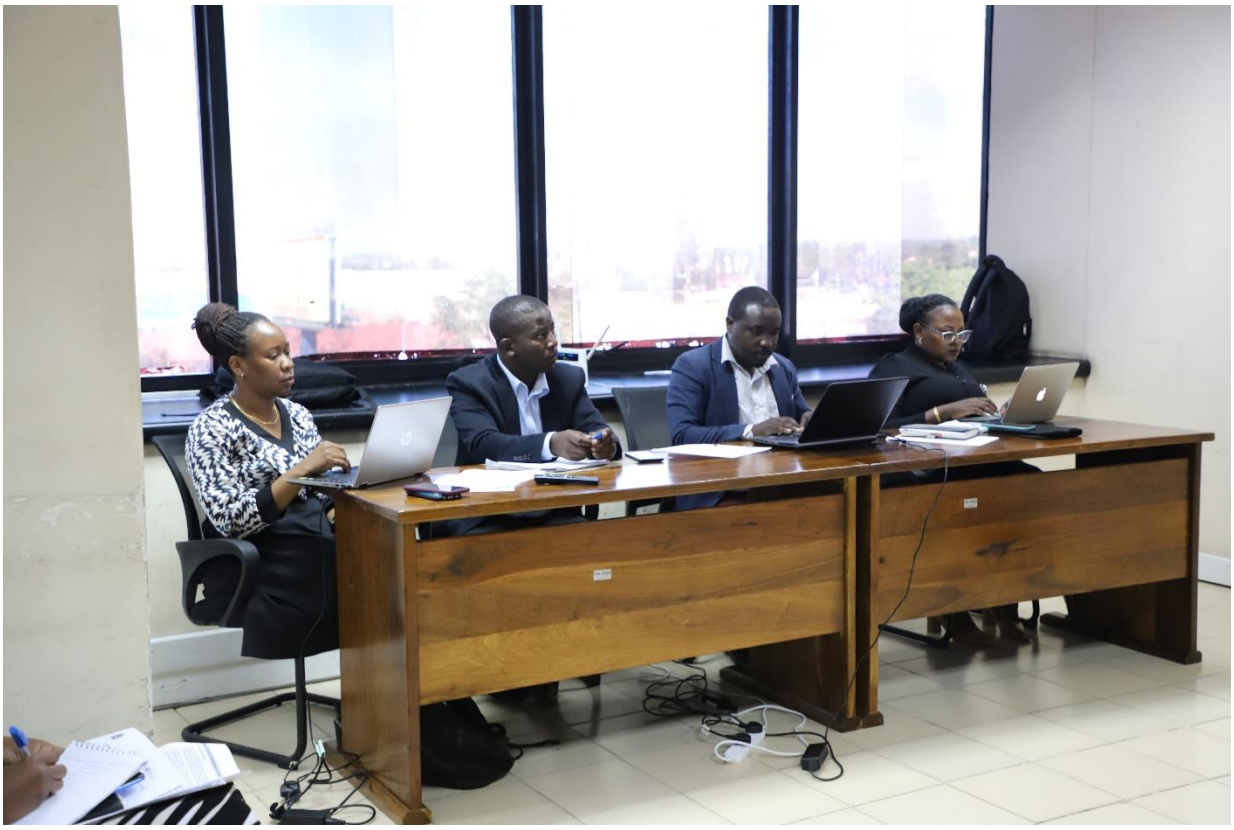
VIRTUAL PARTICIPANTS AND OTHER STAKEHOLDERS WHO SUBMITTED COMMENTS VIA E-MAIL

SN	Name	Position	Organization	Location	Mode of participation
1	Conrad Thombansen	Programme Manager	GIZ	Dar es Salaam	Submitted responses to questions
2	Andrea Hoeltke	Portfolio Manager	KfW	Dar es Salaam	Submitted responses to questions
3	Felix Ngamlagosi	Executive Secretary	ZAMCOM	Harare-Zimbabwe	Submitted responses to questions and participated virtually
4	Hastings Chibuye	Programme Manager – Water Resources Information Systems	ZAMCOM	Harare-Zimbabwe	Submitted responses to questions and participated virtually
5	Dr. Hans Komakech	Lecturer and Centre Leader	WISE Futures	Arusha	Oral contributions and participated virtually
6	Dr. John Mthandi	Expert on Flood and Early Warning System Project	SONGWECOM	Kyela	Oral contributions and participated virtually
7	Dr. Modathir Abdalla Hassan Zaroug	Regional Water Resources Modeller	Nile Basin Initiative Secretariat	Entebbe	Oral contributions and participated virtually
8	Eng. Hilda Luoga	Engineer	LVBC	Kisumu	Submitted responses to questions and participated virtually

Annex 2: Photos from the workshop





Annex 3: List of Abbreviations

AF	Adaptation Fund
AfDB	African Development Bank
ATC	Arusha Technical College
AWF	African Wildlife Foundation
BWB	Basin Water Boards
COSTECH	Commission for Science and Technology
DIT	Dar es Salaam Institute of Technology
DOS	Dam Operation Support tool
DSS	Decision Support System
FFEWS	Flood Forecasting Early Warning System
GIZ	German Development Agency
GWP	Global Water Partnership
HEET	Higher Education for Economic Transformation
HESLB	Higher Education Students Loan Board
IHP	Intergovernmental Hydrological Programme
IK	Indigenous Knowledge
IoT	Internet of Things
LVBC	Lake Victoria Basin Commission
MoW	Ministry of Water
MWEDO	Maasai Women Development Organization
NBD	Nile Basin Discourse
NELSAP	Nile Equatorial Lakes Subsidiary Action Programme
NGO	Non-Government Organization
NM-AIST	Nelson Mandela African Institution of Science and Technology
NMHS	National Meteorological and Hydrological Services
NMSF	National Multi-Sectoral Forum
ODSS	Operational Decision Support System
PBL	Problem Based Learning
PDO	Project Development Objective
SONGWECOM	Joint Songwe River Basin Commission
SUA	Sokoine University of Agriculture
TCU	Tanzania Commission for Universities
TMA	Tanzania Meteorological Agency
TWP	Tanzania Water Partnership
UDSM	University of Dar es Salaam
WI	Water Institute
WRCoE	Water Resources Centre of Excellence
WRIS	Water Resources Information System
WUPA	Water Use Permitting Analysis tool
WWF	World Wildlife Fund
ZAMCOM	Zambezi Water Course Commission
ZAMWIS	Zambezi Water Information System