MINUTES

Event: Workshop No. 1 – Working Group

Assessment of needs and requirements of future users and administrators of the system

Date: April 29, 2024

Location: Dedza pottery- Dedza District

Project: UNEP CTCN - Using simple mobile technologies to scale up digital collection & processing of climate observations for adaptation actions in Malawi

Participants

Name	Title	Organisation
Fatsanawo Dzingomvera	Sr Assistant Meteorologist - ICT & Stations Management, WG member	Department of Climate Change & Meteorological Services (DCCMS)
Lisa Dengue	Meteorologist, WG member	
Lemani Ngwena	Senior Assistant Hydrological Officer, WG replacement	Department of water Resources (DWR)
Louis Thanki	Hydrological Officer, WG replacement	
Lyson Kampira	Research Services Officer, WG member	National Commission of Science and Technology UNFCCC NDE
Louise Croneborg-Jones	Team Lead	Water in Sight (WiS) Ltd
Daniel Husam	Data Scientist & Full-Stack Developer	
Dr Vincent Msadala	National Coordinator	T-Notch Consulting Ltd
Wezzie Kamphale	Gender Expert	
Thokozani Mtewa	Project Officer	

Total participants: 10 (female participants: 4; male participants: 6)

Item	Reflection/Action
Dr Msadala welcomed the workshop participants, introductions were made, and all were briefed on the meeting objective. Fatsanawo was selected as Chaired of the Workshop.	n/a
Individual expectations on the workshop and the project were shared by each workshop participant. Overall expectations were to learn about technology and approach, on how to integrate observation into mainstream management of data within departments, and how to make the technology a sustainable service.	n/a
The past technologies and prototypes in the Water in Sight Projects with DCCMS and DWR were presented to bring everyone up to speed with the draft solution available for advancing in the UNEP project.	n/a
Data collection - Needs	

River level observation collection (DWR) - current status • Raw river level measurement data is collected by Gauge Readers (GR) who record the data in books and submit their log books after a month or two to the regional office which then sends the book to the Headquarters. • DWR lacks funds to cover the cost to purchase log books and to send by post. Institutional reform means lack of staff at regional offices.	A diminishing system of logbooks translates into an opportunity for mobile technologies.
Rainfall observation collection (DCCMS) • DCCMS Observers send their log books to Blantyre office via post office courier. A manual check is to be performed of records before they are ready for manual entry into Climsoft. Full process can take at a minimum two to three months. • Out of the 800 stations in the country, about 150 stations send log books to DCCMS. Funding for log books has diminished as has the budget for sending books by post. • DCCMS is embracing mobile technology and WhatsApp. But individual messages and calls require airtime to be administered and individual recording of measurements. • Raw observation data sent via whatsapp or phone are not considered official/verified, but can be used in analysis.	Prototype must facilitate bulk management of whatsapp messages. Technologies to be built need to build trust, potentially through verification methods, so that data can qualify as official. Site selection criteria should include vicinity to automated sensors to explore verification between manual and sensor observations.
Challenges with measurement equipment • Gauge plates and angle irons are affected by vandalism. • Vandalism rates are high in southern Malawi compared to northern. • Replacing old or broken measuring cylinders in rainfall gauges is a challenge for DCCMS due to costs. • Rainfall cylinders made of fibre are not as durable as the traditional copper rainfall gauge cylinders previously used. It's an issue of quality over function. Copper gauges are durable but the standard size is small. During extreme events, they overflow. The modern fibre-made cylinders can hold as much as 400 ml water but do not function well or last in Malawi's climate. • Where river gauges are inadequate, the plate can be missing due floods. • When DWR or DCCMS staff go to repair a station, they often find that the piece of equipment needed is different than originally planned. • Maintenance budgets are small and do not cover the full expenses to visit and repair station equipment (daily allowance, fuel, replacement equipment).	It was agreed that once the site selection is complete, and the testing stations identified, the team shall do a preliminary assessment of equipment status. For select stations, the project can finance minor replacement and repair work, if within budget. Cost estimates of repair and replacement needs will be documented to provide insights on financing needs for scaling the prototype nationally.

Compensations/incentives
• Previous prototyping in Water in Sight found a strong link between monthly compensations (mobile payments based on performance) and level of data submissions by gauge readers and observers.
• Participants shared alternative incentives used.
  ○ MClimes project, personal protective equipment (PPE) and training was provided. Financial honorarias were not.
  ○ The company Baseflow trained gauge readers who travelled from across the country.
• DCCMS shared that internet bundles/airtime could provide incentives instead of honorarias. At manual synoptic stations, prepaid local routers could be bought to enable Observers to use whatsapp on their phones for free.
	For the project's testing, it is clear that **compensation is important for river Gauge Readers** who are entitled to a government honorarium.
	For DCCMS **observers, the incentive is more connected to airtime/data bundle** to cover both the cost of sending observations and as a reward.
	Working Group will continue deliberating how to find an **operational and financial model to make submissions sustainable** .

Gender • Access to financial compensation and potentially a high-valued phone assumes partner support in the household. However, tension can be a source of Gender Based Violence (GBV). • One women in the previous Water in Sight project sent their daughter to record the measurement, resulting in potential insecurity. • The project and departments need to consider access to information by persons with disability. • If opportunities exist, an increased number of female gauge readers can be considered.	When training female gauge readers, information on NGOs or support mechanisms on GBV can be shared. But needs to be done in a culturally sensitive manner so as not to make presumptions. In the TOR agreed with gauge readers, copies of their IDs are recorded when training occurs at station or central location, and gauge readers should be instructed not to ask children under 18 to perform the monitoring.
Data Processing & Use - Needs	
DWR • In the past, data was sent from GR to the Hydrological officer (HO) (in the hydrological district) to verify the data, then to the regional office then later submitted to the headquarters (HQ) for analyses. Currently, because there are no officers at the district level, raw data is sent to the regional office then to HQ or GRs sends directly to HQ. • Data clerks enter the raw data on excel files which is checked by the hydrological officers. The officers check for errors, i.e they conduct the data cleaning manually from their experience and knowledge. The officers sometimes	DWR and DCCMS need to convey: • **Parameters** to be incorporated in the platform. • What **type of visualisations** are useful for verification or simple analysis (in

plot graphs to check for any anomalies on the graphs and if found, they clean the data. • The length to process and analyse data depends on the time log books take to get to the HQ - two to three months- so sometimes the HQ just focuses on the critical stations. • Data from automated and connected stations are quicker, where data can be downloaded and cleaned within one week. However, DWR has not paid its licence fee to SEBA Hydrometrie, and can thus only access data from 10 stations in their HydroCenter platform. • DWR said discussions on the API with the supplier of automated sensors, SEBA Hydrometrie, are in the pipeline where it will be better to have all the data in one place and the data would be extracted into Hydstra. • Satellite observations from Geogloss are used where data can be downloaded, used to fill manual or sensor data gaps, and trends can be developed or checked. • The WiS platform should also incorporate visualisations such as graphs which will be showing yearly river discharges and seasonal variations. DCCMS • Raw data in log books are checked manually and sent to Climsoft and Climsoft has simple tools for identifying outliers to be cleaned. When the system identifies an anomaly, the department calls the responsible Observer for corrections. • They are developing an API which is focussing on forecasts and will be ready in June. They would want a parallel server for WiS data where the API can be generated to extract the data into their system. • WiS platform should consider including simple analyses where issues of climate variations are incorporated e.g. the onset of rainfall in different years. • It should also be recording outliers, e.g.highest recorded or lowest recorded rainfall values	recognition that forecasting or modelling requires more sophisticated software - e.g., HECRAS for rainfall-runoff etc.) • The intention, if budget allows, is to explore how to merge and harmonise data from multiple sources. • THe project will also explore ways to use sensor, data science and satellite observations to strengthen verification of observations. • Any API design will be adapted to DCCMS needs.
Pro:s and Con:s of using mobile technology - Debate	

Pro:s • Easy storage of the data in databases and other platforms. Data is also easily retrievable from the database. • Analysis done timely • Timely submission of observations - no delays. • Two-way communication between GRs to HQ and HQ to GRs. • Easy data sharing to as many recipients as possible. • Room for upgrading and building up of the system. • Data consistencies. • Makes data processing easier e.g. in case of having rating curves in the platform. Con:s • Technology could be too expensive for the Malawi Government. • Although not a manifested problem, people face challenges at times to access consistent power supply to charge phones. Solar batteries commonly used. • Network coverage can be an issue. • Data manipulation and security risks. • Takes away job opportunities of people who transcribe data. • Hard copies are good for record keeping as copies are stored in different offices.	The debate role play was appreciated and brought out additional dimensions on needs and requirements.
Where should we test?	
Project allows for testing at approximately 20-30 stations, starting in late July and running until March 2025. Criteria for site selection will be drafted and shared at the Workshop for ranking of site selections	Working group to consider their criteria to support the selection of testing stations.
Closing remarks	
The Chair thanked everyone for a fruitful workshop and closed the meeting.	n/a
The Workshop participants proceeded to visit the Observer Harold Nkhoma at Dedza Meteorological Station and the Gauge Reader Sabina Kasiya at Linthipe Roadbridge river gauging station. Feedback on the previous prototype was overall positive. Observer Harold recommended the project finance a new phone, and that he would prefer to use WhatsApp instead of free SMS.	n/a

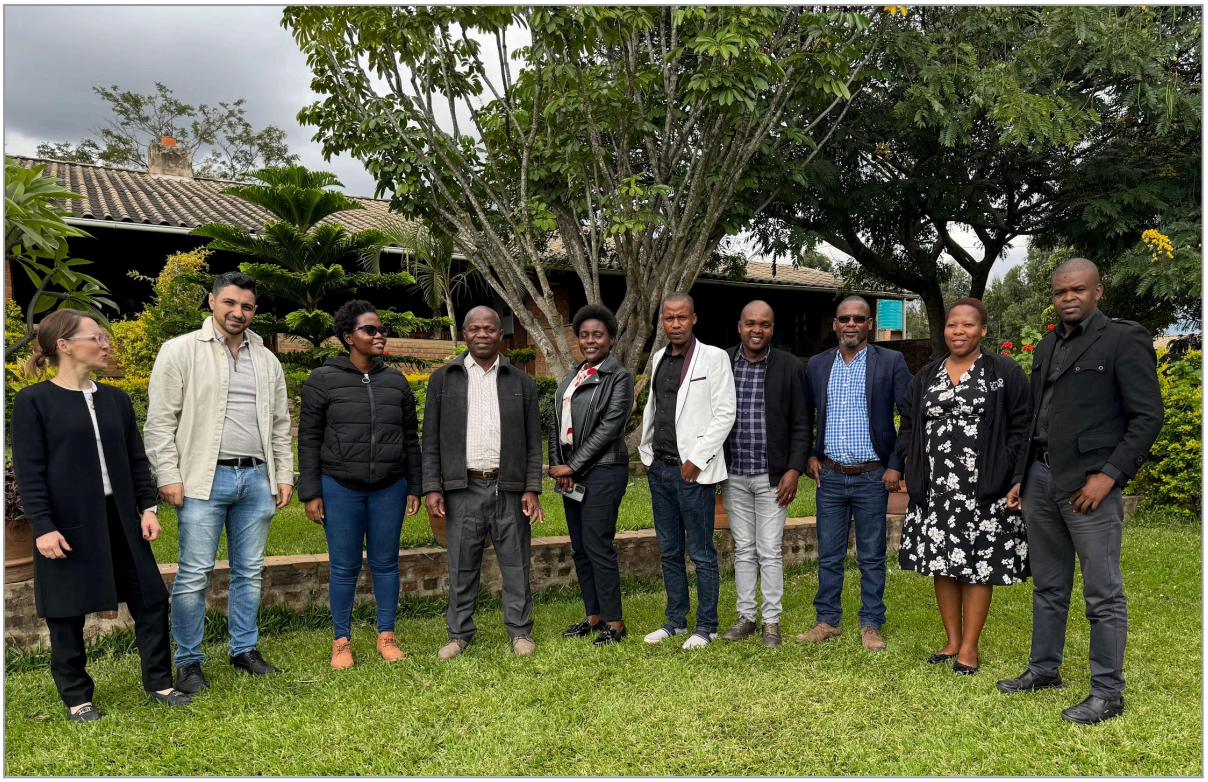

Figure 1. Workshop No 1 Participants (April 29, 2024 - Dedza, Malawi). Participants (L-R): Louise Croneborg-Jones, Daniel Hussam, Thokozani Mtewa, Lyson Kampira, Wezzie Kamphale, Louis Thake, Leman Ngwena, Vincent Msadala, Lisa Dengue, Fatsanawo Dzigomvera.

Figure 2. Workshop visits to interview Gauge Reader Sabina Kasiya at Linthipe River Bridge station (4B3) and Meteorological Observer Harold Nkhoma at Dedza Meteorological Station (April 29, 2024) © Water in Sight.

Agenda

Time	Topic	Goal
	Welcome remarks	
08h00 - 08.30	• Workshop & Project expectations • Snapshot of WiS technology (current)	• Shared vision • Understanding current prototype in action

08.35 - 09.30	• Data Collection - summary of needs
	  ○ Equipment
	  ○ Site management
	  ○ Mobile data transfer methods (e.g., SMS)
	  ○ Observer/Gauge Reader skills
	  ○ O/GR phone, mobile coverage etc.
	  ○ Compensation/Incentives
	  ○ Gender dimensions
	  ○ Other…
		• Mapping major needs for collection of manual meteorological and hydrological observations

09.30 - 09.50	Coffees & refreshments	

09.50 - 10.40 (mini-break afterwards)	• Data Processing & Use - summary of needs
	  ○ Data format
	  ○ Data quality requirements
	  ○ Data transfer methods
	  ○ Data delivery (Dashboard, Analysis)
	  ○ Data storage requirements
	  ○ Application into analysis/forecast/modeling
	  ○ Other…
		• Mapping major needs for processing and use of manual meteorological and hydrological observations

10.40 - 10.50	Mini Break	
10.50 - 12.00	• Pro:s & Con:s of using mobiles - Debate (breakout sessions)	• Identify & prioritise the major pain points & unique opportunities
12.00 - 13.00	Refreshments	
13.00 - 16.00	Field visits to: • Dedza Met Station map & meet Observer Harold Nkhoma • Linthipe @ Linthipe roadbridge map & meet Gauge Reader Sabina Kasiya	• In-field understanding of needs at station and from data collector
16.00	Departure for Lilogwe & Blantyre	Get home safely