

Technical Assistance Closure Report Template

Objective of the technical assistance (TA) Closure Report:

- To communicate publicly in one document a summary of progress made and lessons learned during the TA towards the anticipated impact (sections 1-4).
- To document qualitative and quantitative data collected during TA, for use in donor and UN reporting (Annex 1).

Steps for completing the TA closure report:

1. The lead TA implementer submits the closure report at the end of the technical assistance as a final deliverable. The TA closure report will capture outputs, outcomes and impacts of all activities conducted under the TA. Please copy and summarise relevant material from previous TA outputs/deliverables and the Response Plan, as relevant.
2. A CTCN Manager will review and revise the closure report before final approval by the CTCN Deputy Director.

Important note on public and internal use of the closure report:

Once approved by the CTCN Deputy Director, the TA closure report will be a public document available on the CTCN website www.ctc-n.org. Selected content will be used for targeted communication activities. Annex 2 is for internal use only and will not be publicly available.

Closure Report for CTCN Technical Assistance

1. Basic information

Title of response plan	Using simple mobile technologies to scale up digital collection & processing of climate observations for adaptation actions in Malawi
Technical assistance reference number	AF-20220000072 (CTCN 2022000048)
Country / countries	Malawi
NDE organisation	National Commission for Science and Technology Private Bag B 303, Lilongwe 3, Malawi www.ncst.mw
NDE focal point	Mr. Lyson Kampira Chief Research Services Officer
NDE contact information	lkampira@ncst.mw , lkampira@yahoo.com
Proponent focal point and organisation	Malawi University for Science and Technology (MUST) Dr. Vincent Msadala vmsdala@must.ac.mw
Designer of the response plan	CTCN

<p>Implementer(s) of technical assistance</p>	<p>Implementers:</p> <p>Government of Malawi Department of Water Resources Ministry of Water and Sanitation <i>Eng. James Chitete, Director</i> jmschitete@gmail.com</p> <p>Department of Climate Change and Meteorological Services Ministry of Natural Resources and Climate Change <i>Dr. Lucy Mtilatila, Director</i> lmtilatila@metmalawi.gov.mw</p> <p>TA Consultant Water in Sight Ltd (Sweden) <i>Louise Croneborg-Jones, CEO</i> Louise@waterinsight.se</p> <p>T-Notch Consulting Ltd (Malawi) <i>Dr. Vincent Msadala</i> vmsadala@gmail.com</p>
<p>Beneficiaries</p>	<p>Direct beneficiaries:</p> <ul style="list-style-type: none"> ● Department of Climate Change & Meteorological Services (DCCMS) ● Department of Water Resources (DWR) ● National Water Resources Authority (NWRA) ● Department of Disaster Management Affairs (DoDMA) ● Staff and local community members collecting manual river, lake, rainfall and temperature observation data using the new technology, predominantly southern Malawi as well as in the central and northern regions: <ul style="list-style-type: none"> ○ Gauge Readers, GRs (DWR) ○ Rainfall Observers, Os (DCCMS) ○ Synoptic Meteorologists (DCCMS) <p><i>92% of surveyed government staff say the project improved their individual capacity to respond to and mitigate impacts of climate related events, and 85% said it improved the said capacity of their institutions.</i></p> <p>Indirect beneficiaries:</p> <ul style="list-style-type: none"> ● Community members and household members of the GRs, Os, and Synoptic Meteorologists using the technology.

	<ul style="list-style-type: none"> Recipients of government weather forecasts and hydrological updates (incl. flood warnings) strengthened by the technology.
Sector(s) addressed	<ul style="list-style-type: none"> Water management Early Warning and Environmental Assessment Cross-sectoral
Technologies supported	<ul style="list-style-type: none"> Water resources assessment Hydrological modelling Climate change monitoring Hazard mapping solutions Flood forecasting systems Seasonal to interannual weather forecast
Implementation start date	01/02/2024
Implementation end date	30/04/2025
Total budget for implementation	<p>UNEP CTCN : USD 193,056</p> <p>Water in Sight Ltd, in-Kind: USD 51,500</p>
Description of delivered outputs and products as well as the activities undertaken to achieve them. In doing so, review the log frame of the original response plan and refer to it as appropriate	<p>Overall, the UNEP CTCN project delivered two impactful and integrated technologies:</p> <p>1) iteratively proven, scalable and robust approach to digitization of observations using free SMS at manual river, lake, rainfall and weather monitoring stations; and</p> <p>2) tailored development of a unique and resilient software solution, called BlueIQ, that manages swathes of manual data and large systems of observers and monitoring stations - alongside the additional water and climate data sources from sensors at country scale.</p> <p>This was made possible through the TA's six outputs as follows:</p> <p>Output 1 – Development of Communication Documents</p> <p>Under Activity 1.1, developed and delivered the project's detailed Work Plan, the project Monitoring & Evaluation Plan (including a list of indicators) to guide implementation, as well as the CTCN Description Document Statement, outlining the expected impact of the TA.</p> <p>These documents and deliverables were validated with national stakeholders in the inception phase.</p>

	<p>In addition, the project involved 12 monthly Working Group meetings and six bimonthly progress reports to department directors and staff.</p> <p>Output 2 – Creation of a Steering Committee, mapping of stakeholders and Inception Meeting</p> <p>Three activities encompassed establishing a multi-stakeholder Working Group and conducted a kick-off meeting (February 07, 2024 - online) and the Inception Workshop (March 01, 2024 - online) with key national agencies.</p> <p>A stakeholder mapping was carried out, identifying all relevant institutions who directly or indirectly were connected to using or potentially benefiting from the technology. Consultations were held with stakeholders to gather inputs and further insights into the technology context. This output built a common understanding of stakeholders, and also included preparing a bibliographical list of existing documents on hydrometeorology in Malawi.</p> <p>Output 3 – Diagnosis and pre-feasibility of using simple mobile technologies as a solution to comprehensively collect and digitize weather and climate observations for application in impact modelling and developing climate futures for purposes of adaptation and disaster risk management</p> <p>Output 3 involved six activities for the diagnosis and prefeasibility.</p> <ol style="list-style-type: none"> 1) A diagnosis of the current hydrometeorological information systems in Malawi was performed, covering both DCCMS and DWR data collection systems, equipment, similar initiatives, and capabilities. 2) User needs were reviewed, discussed and refined through Workshop No.1 (Assessment of needs and requirements of future users and administrators of the system) with the Working Group members (April 30, 2024 in Dedza District). The workshop captured requirements for improving manual river, lake, rainfall and temperature data collection. 3) The Preliminary Analysis on the Use of Simple Mobile Phones for Observation Data Digitization Report was produced, evaluating how community Gauge Readers (GRs), Observers (Os) and synoptic Meteorologists could use basic phones and mobile communication technologies to send water level and rainfall measurements.
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<p>4) A Challenges, Barriers, Risks, Opportunities & Strengths Report evaluated the context and capabilities of DCCMS and DWR to absorb and adopt the new technology.</p> <p>5) Informed by preceding activities and pre-project piloting, the Preliminary System Architecture for an integrated digital platform (branded “BlueIQ”) was designed mapping the integration of staff and community-collected observation data into cloud computing service for national water and climate databases and models.</p> <p>6) Workshop No.2 (Prototype Demonstration & Validation) was organised (June 06, 2024 - Salima District) to present the mobile-based prototype to the Working Group and additional government stakeholders for feasibility feedback.</p> <p>Output 4 – Piloting the use of mobile phone technologies as a solution to comprehensively collect and digitize weather and climate observations</p> <p>Through Output 4, a set of 11 activities were performed - constituting the bulk of the iterative technology development, testing, and validation.</p> <p>1) A Preliminary Site Assessment Report was produced evaluating the best sites for piloting areas and river basins across Malawi. Ten proposed areas and river basins were assessed against the mandatory criteria as well as impact criteria. From the ten areas, the assessment ranked three top areas that best met the criteria.</p> <p>2) Workshop No.3 (Working Group Ranking and Selection of Piloting Sites) was held with the Working Group members and stakeholders (June 07, 2024 in Salima District) for final review and selection of three priority areas from which one would be selected in the forthcoming workshop. The three priority areas were:</p> <ul style="list-style-type: none"> ● Ruo & Mwanza River Basins (tributaries in the Lower Shire River basin) as part of the lower Shire River basin in southern Malawi. ● Bua & Dwangwa River Basins (tributaries into Lake Malawi) in northern Malawi. ● Linthipe River Basin in central Malawi. <p>From the workshop, a List of Piloting Sites was produced. Sites refers to DCCMS and DWR’s existing locations of manual observations where there is monitoring equipment and individuals mandated with</p>

	<p>daily collection of measurements (i.e., river gauges, rainfall gauges, synoptic meteorological equipment). In total, the initial site selection included 23 river and lake observation sites and 28 rainfall and synoptic weather observation sites (a total of 51 compared to the initial 20 target of the Response Plan).</p> <p>3) A Detailed Pilot Implementation Plan was developed for deploying the prototype with the new technology and digital system for large scale, high quality, and professional access to digitised manual observations.</p> <p>4) An Online Meeting for Final Site Selection and Discussing the Implementation Plan was held with the Working Group confirming the testing sites and deployment plan (July 16, 2024).</p> <p>5) A set of community level consultations were held for seeking approval and support from village chiefs and community members. These events proved invaluable - particularly for lake and river gauging sites - to raise awareness, explain the function of the physical monitoring equipment in the field, as well as the Gauge Reader's government duty. In addition, it strengthened the protection of equipment against vandalism.</p> <p>These community consultations constituted Workshop No.4 (Community Engagement). In total, three were organised with government in Alufazema Village in Nsanje District near the Shire River @ Nsanje Port station (September 12, 2024); Namani Village in Mulanje District near the Ruo River @ M1 Old Bridge station (September 12, 2024; and, Namunda Village in Thyolo District at the Mkwakwasi @ Mangunda station (Nov 14, 2024). Community Endorsement Letters were conveyed for all sites.</p> <p>6) From the station surveys performed as part of the initial at-station training of GRs, Os, and Meteorologists in Activity 4.7, and initial technology scoping, detailed information was collected for the need for Purchasing, Installation, and Rehabilitation of Equipment. Scoped for 10 locations in the Response Plan, the activity involved rehabilitating and installing monitoring equipment in 29 stations. Ten river and lake gauging stations were restored to full capacity (nine in the southern region, one in the northern region), and 19 rainfall gauging stations were rehabilitated with associated monitoring tools. Under the equipment activity, personal protection equipment and station maintenance tools were also distributed to GRs, Os, and Meteorologists (slasher, spades, gumboots, and rain coats). In addition, the activity covered procuring essential computing technologies including shortcode 2-</p>
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way SMS, API development, cloud computing services (Microsoft Azure), and AI services for machine learning functions as part of big-data processing. A subsequent **Equipment Installation Report** documented the output.

7) **Implementation of the Small-Scale Project in the Pilot Area** started July 2024 lasting until project end April 2025, ten months compared to initial four months and at an initial 51 stations compared to 20 per the Response Plan. The extension was done to maximise technology development, benefits, and adoption and for stronger integration with other activities. Deployment entailed: training of GRs, Os, and Meteorologists in how to use free SMS to submit daily observation measurements (including surveys and signing Terms of References, and distribution of personal protection equipment); collection of station and personnel metadata; assessment of equipment; and community consultations. Observations from stations were compared and validated against NASA SWOT mission's data observed, showing strong correlation between the two sets of data - thereby showing credibility and high-frequency benefits from manual observations.

8) In parallel, the back and front-end **Development of the Digital System** for and in alignment with the DCCMS and DWR data management systems (Climsoft and HYDSTRA), was developed - from the mobile communication APIs through to software development and UX/UI interface designs.

For activity 4.7 and 4.8, the **Report: Demonstrating the Start of Testing Digital System Development & Operationalisation** was delivered in September 2024.

9) **Workshop No.5 (Demonstration & Interim Validation)** was organised to demonstrate and validate the data collection technology and its integration into an online software tool - "BlueIQ" (October 18, 2024 in Dedza District). The Working Group prioritised draft software features to be integrated into the remaining iterations of software development.

10) **Adjustments to the Demonstration Prototype and Pilot Demonstration** continued through the end of 2024 and first quarter of 2025 in an organised and iterative testing and development process. The pilot initially involved GRs, Os, and Meteorologists at 51 stations which in turn increased to 76 in total when Observers in central and northern Malawi adopted the SMS-solution. In February 2025, an associated **Report: Updated Equipment & Digital System** captured updates and successful results and findings for piloting.

<p>11) In Workshop No.7 (Final Prototype Validation), the Working Group and stakeholders from other government agencies validated the final technology - i.e., the BlueIQ software built with the mobile communication, cloud computing and AI enhanced system for large scale digitization and integration of daily manual observations alongside data from automated sensors (February 17, 2025 in Salima District). In addition, participants validated the quality of the technology - confirmed through comparing manual river level data collected with the NASA Surface Water and Ocean Topography mission data, for example.</p> <p>At the end of the pilot, the Technical Assistance (TA) consultant Water in Sight Ltd, has built in resources into the system to ensure the data collection technology and the BlueIQ software are operational and available to the Malawi Government for one year until April 2026.</p> <p>Output 5 – Financial mechanisms for sustainability</p> <p>Output 5 explored the financial and operational design for 15 years of adoption at 330 monitoring stations across Malawi countrywide (high capacity hydromet network).</p> <p>A Cost Analysis of the System identified and projected the technology costs (mobile communication, software maintenance and development) at a cost of USD 246,000 over a five-year period.</p> <p>Costs of parallel investments in the enabling environment were also projected, from training of government staff and data collectors, countrywide manual equipment rehabilitation, remuneration to GRs, and national project management, to advanced flood hazard analytics and warning systems. The total five-year investment project cost, ideally supported by donor funding, would cost USD 2.3 million - as a foundation for 15 year adoption (est. USD 7.3 million).</p> <p>The analysis found that the technology component is 1) small at 11%, and 2) cost competitive at less than 10% of the conventional technology cost of automated sensor equipment.</p> <p>In parallel, Business Model(s) for Ensuring the System is Financial Sustainable were explored and evaluated. The criteria for the model was to outline a sustainability strategy to ensure the technology can be scaled and maintained beyond the TA. Because the technology serves the public service of hydrometeorology/climate information services, the optimal business model was found to be a Partnership Model between government</p>

	<p>departments (responsible for delivering activities per their mandate) and private sector actors (i.e., software maintenance provider and TA), backed by long-term funding (which is a conventional investment solution in low-income countries where tax and commercial revenues to adopt the technology are limited).</p> <p>A dedicated Workshop No.6 (Business Model Validation) refined both the cost analysis as well as the partnership model (February 19, 2025 in Salima District).</p> <p>Subsequently, a Meeting for Business Model Selection was held whereby the Working Group performed a final review and adopted the proposed Partnership Model (March 13, 2025, online).</p> <p>Output 6 – Train future users, administrators and beneficiaries of the system</p> <p>Two activities were performed to ensure capacity building and strengthened technology adoption. First, a detailed Manual for the Digitization of Manual Observations and the BlueIQ Software was produced in both English and Chichewa (printed and digital) supported by a demo BlueIQ Tutorial video: https://fromsmash.com/3.YnWKzb5w-dt</p> <p>The Manual is a step-by-step guidance for government staff managing hydro-meteorological information services to continue to use but also scale the UNEP CTCN technology. As such, enhancing the technology transfer success.</p> <p>In April 2025, three targeted Trainings for Users, Administrators and Beneficiaries were organized in Lilongwe (April 7 and 8, 2025) and in Blantyre (Apr 14, 2025). The training events were an opportunity for users to share feedback and learn in greater detail how the technology is used in daily government operations.</p>
<p>Methodologies applied to produce outputs and products</p>	<p>The TA employed a mix of participatory and analytical methodologies to achieve the outputs. A stakeholder-driven approach was central: the implementers facilitated workshops, Working Group discussions, and structured interviews with relevant agencies, data collectors, and community members to gather requirements and feedback. Desk research and literature review of existing policies, hydromet data systems, and past projects were conducted to inform diagnosis. The team applied a “learning by doing” prototyping methodology, iteratively developing the mobile data collection and software system and testing it in real conditions with users at a large scale for highest potential impact and findings, then refining based on</p>

	<p>feedback. Technical methods included on-site field surveys and measurements (for installing water level gauges and calibrating them), and development of a custom IT solution (BlueIQ platform) following agile principles. The financial analysis used cost projection models and scenario analysis to devise a viable business model. Throughout, gender-responsive and participatory rural appraisal techniques were used during community engagement to ensure inclusive input (e.g. scheduling community meetings at convenient times and encouraging women’s involvement).</p>
<p>Reference to knowledge resources</p>	<p>No specific UNFCCC Technology Executive Committee (TEC) knowledge products were explicitly used in implementing this TA. The implementers did consult general best practices in climate information services and community-based adaptation, but no TEC publications or tools were directly referenced (The TA primarily relied on in-country expertise and stakeholder knowledge of local conditions, as well as data science, full stack development processes and AI, rather than published toolkits).</p>
<p>Deviations</p>	<p>A major positive deviation from the Response Plan was in terms of enhanced piloting scope and software capabilities. The scope was expanded from the Response Plan as follows: from 20 monitoring station sites to a final total of 76; from 10 stations with improved or fully rehabilitated equipment to 29; and from 25 capacity building events through training and workshops to a total 84. Furthermore, the scope for improving gender balance improved, especially for capacity building, access to protective equipment, access and use of new technologies, as well as income generation. In terms of software capabilities, AI was leveraged as was generating a data platform for not only manual observations but enabling integration of sensor and satellite observation data - which was in response to pain-points experienced by government staff in managing a broader system of observation data.</p> <p>However, there was one aspect of reduced scope in data integration and application into forecasting models whereby observation data should automatically be applied by DWR and DCCMS’s data systems and models. Implementers found that they could not access government technology systems but provided all API keys and authentication tokens to counterpart management and their IT staff. It was unclear whether the lack of integration into data management systems or modelling software was due to a lack of government will (fear of data mining, deviation from established data</p>

	<p>sharing protocols of applications and approvals which are often in writing) or issues with the technology capacities in the government forecasting and modelling softwares.</p> <p>All planned outputs, activities and deliverables were however produced and submitted per the Response Plan and within the timeline (completing project activities two weeks prior to scheduled end date). The implementation timeline was slightly adjusted during implementation: for instance, some field activities were rescheduled to align with the rainy season and availability of stakeholders (ensuring meaningful data collection during floods). Minor changes included combining certain stakeholder engagements (some Working Group meetings were held back-to-back with workshops to maximise participation) and refining the format of deliverables (e.g. merging some sub-reports for conciseness). These adjustments were made in consultation and with approval from the UNEP CTCN team and support from the NDE. They did not affect the overall objectives. The TA remained on track and achieved its intended outputs.</p>
<p>Anticipated follow-up activities and next steps</p>	<p>End-of-project surveys reflect individual and institutional technology capacity building and endorsement: <i>“The project has made tremendous milestones which are beyond what was initially projected. This can be attributed to the project management’s flexibility in taking our suggestions into account, good organization, strict adherence to timelines among others. Looking forward to making the best of the technological innovations that this project has brought to DWR.”</i> (Survey respondent, April 2025).</p> <p>Countrywide Scaling Up: The pilot demonstrated the feasibility of mobile-based data collection. In the final months of the project, GRs and Os in the central and northern region adopted the technology. Having pre-funded and designed the communication technologies and software for scaled adoption beyond the TA, the government can access the software at no cost until April 2026.</p> <p>The Business Model activity produced a Terms of Reference and a detailed design for a countrywide project concept that would enable expansion of the technology system to more observation sites across Malawi. DCCMS and DWR intend to continue using it. For DCCMS it entails no necessary additional expenses. But for DWR, they lack the financial means to pay GRs their monthly compensation which is essential for</p>

<p>sustainability as they are mostly community members and subsistence farmers. DWR mandate for monitoring has shifted and is partly shared with the National Water Resources Authority and they lack government funds to pay GR.</p> <p>Both beneficiary departments have validated the adoption. DWR, for example, has actively used the water level data in the production of The 2024 Malawi Hydrological Year Book.</p> <p>Mobilising Funding for Sustainability was initiated by TA implementers in October 2024 and the technology has gained interest from agencies such as the WMO. In Somalia, the implementing consultant has secured funding for advancing the technology to serve Early Warning Systems starting February 2025. For Malawi, however, no funding source for sustaining and scaling has been identified as the Adaptation Fund pipeline has been allocated to a separate project.</p> <p>The long-term financing plan developed in Output 5, however, equips the NDE and departments to seek potential donors and local UN agencies have expressed demand for the solution, had there been financing programs in the pipeline.</p> <p>Sustained capacity building is supported through providing access to the manual and demo video through the BlueIQ software.</p>

2. Lessons learned

	Lessons learned	Recommendations
Lessons learned from the CTCN TA process	<p>1. Early director and financier/donor engagement is critical for B2G technology transfer (& private investor for B2B or B2C)</p> <p>Involving the key government national stakeholders (DCCMS, DWR, NWRA DoDMA etc.) from the very start – through the Working Group and inception meetings – proved essential in ensuring local buy-in and alignment with national needs. Close collaboration with the NDE and proponent agencies smoothed the implementation (e.g. facilitating field access and data sharing).</p>	<p>1. Recommendation</p> <p>Future CTCN TAs should allocate sufficient financial resources for joint planning and awareness raising with national actors but also with partners, such as international donors who are supportive and have financing for B2B innovative technologies. Early engagement and endorsement of the innovation process of management and directors will also enhance ownership from the onset - rather than being observers of pilot results and completion.</p> <p>When project sites are selected, activities and financial resources should allow for involvement of district level staff.</p>

	<p>2. Adaptive management and communication</p> <p>Regular communication with the CTCN Secretariat and flexibility in project management helped overcome challenges. For example, minor delays (due to weather or procurement) were promptly communicated and contingency plans devised, preventing major schedule slips. The support and guidance from the CTCN Climate Technology Manager (through periodic check-ins) helped keep activities on track.</p> <p>3. Local capacity and resource constraints</p> <p>One challenge was working within the limited human resources of the beneficiary institutions – staff were often balancing the TA with their regular duties and a multitude of other projects and off-site workshops. This required scheduling flexibility and sometimes additional support and ensuring that engagement was incentivised (e.g. bringing in short-term assistants, ensuring workshop and in-field work were both efficient and rewarding, and hiring additional local consultants for project coordination). Being mindful of local partners’ workloads and adjusting accordingly proved important. In addition, the TA found that it was easier for government counterparts to provide feedback as part of activities (e.g., using the BlueIQ software, rehabilitating stations, and workshops) compared to time needed to review the large number of written and comprehensive reports produced under the project.</p> <p>4. Success factors</p>	<p>2. Recommendation</p> <p>Maintain informal progress updates with CTCN and seek approvals for adjustments proactively. Contingent on technology success, the CTCN could support technology showcasing in global or regional forums; and to donors and government ministries together with implementers at national levels, to enhance the likelihood of long-term adoption and overcoming market barriers.</p> <p>3. Recommendation</p> <p>CTCN processes could incorporate financial support to broaden engagement of department counterparts beyond the Working Group through training events at project start, middle, and end.</p>
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	<p>Several factors contributed to successful implementation:</p> <ol style="list-style-type: none"> 1) active participation of Working Group staff as well as additional technical staff from the departments. 2) on-ground presence of a local partner (T-Notch) and local consultants of Water in Sight Ltd, who understood the context and the operational realities. 3) incremental milestones (each workshop provided tangible interim outputs, keeping momentum and stakeholder interest high). <p>As a result, the end-of-project survey with key stakeholders and the Working Group revealed that:</p> <ul style="list-style-type: none"> ● 92% of respondents said their knowledge, capacity and understanding of digitisation of manual observations increased as a result of the project; and, ● 92% of respondents said the project technology improved their individual capacity (medium and high) to respond to and mitigate impacts of climate related events, whilst 85% said it increased the said capacity of their institutions. 	<p>4. Recommendation</p> <p>Although critical to success, Workshops could be reduced in number. Their scheduling also needs to be more flexible (i.e., allowing implementing TA to determine timing) to better match the progress and iterative cycles of the innovation process. One of such workshops or training events should ideally also be organised by the government department themselves, financially supported by the TA. This would enhance ownership of the technology from within the project.</p> <p>To lessen the administrative burden on a small part of the TA team, allowing more time for iterative technology development and client engagement, it is also advisable to reduce the number of deliverables and reports that require substantial analytical, coordination and editorial work.</p>
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<p>Lessons learned related to climate technology transfer</p>	<p>1. Appropriate technology choice</p> <p>Using simple mobile phones (basic SMS and enabling WhatsApp) as the technology for data collection was found to be highly appropriate in the Malawian context. Even though more advanced digital sensors exist and smartphone penetration is growing, the project learned that simplicity and user familiarity are key for adoption. GR and Os are commonly community members, many of whom had only basic handsets. They quickly learned how to send coded SMS with the observation reading. Had the project chosen a complex smartphone app or expensive sensors, adoption would have faced barriers.</p> <p>2. Capacity building and trust</p> <p>Effective technology transfer in this TA required building trust with government staff on the one hand, as well as community members on the other - often across very distanced geographic areas. Initially, some gauge readers were hesitant about whether their SMS contributions would be valued. Through the “learning by doing” training, built-in automatic confirmation SMS, and continuous engagement by the TA and government staff, they gained confidence and skills.</p> <p>By project end, local GR and Os felt a sense of ownership and pride in contributing to national data – a non-tangible but crucial success. Additionally, involving end-users in testing (rather than only after full development) meant the technology was adapted to their feedback (for instance,</p>	<p>1. Recommendation</p> <p>When transferring technology in developing contexts, prioritise solutions that match the local users’ capacity and existing tools. High-tech is not always high-impact – sometimes leveraging ubiquitous tech (like 2G phones) yields the best results.</p> <p>2. Recommendation</p> <p>End-user involvement at every stage (design, testing, implementation) should be standard in technology transfer projects. This not only improves the technology design but also empowers users and fosters sustainability through local ownership.</p> <p>Because the above recommendation depends on the stage at which the innovation technology is developed (technology readiness), the Response Plan should be adjusted accordingly - being flexible to whether there is a need for broad exploration and scoping, and early prototyping to arrive an MVP - or, unlocking innovation adoption and growth for a technology that is ready to go to market.</p> <p>The design of the Response Plan should therefore mirror the timing or level of evolution of the innovation. This is challenging. The timing of the TA contracting to enable implementation and piloting often does not align with the innovation technology’s technology readiness at this time. Small companies with resource constraints are</p>
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	<p>adjusting the SMS format and software interfaces to be more user-friendly).</p> <p>3. Barriers and how they were overcome</p> <p>A minor barrier encountered was poor network connectivity in some pilot areas, which occasionally delayed SMS transmission. The team mitigated this by working with observers to adjust the technology software and data input format - enabling late manual observations to be submitted once the network recovered.</p> <p>There was also a hesitancy to trust data coming from “manual” sources – initially, some staff and technical experts were skeptical of manual data quality. This was overcome by comparing with and confirming correlation of manual river observation with satellite data.</p> <p>4. Opportunities and sustainability</p> <p>The TA uncovered opportunities to leverage the introduced technology beyond its initial scope. For instance, the same SMS reporting mechanism could be used for other climate-related observations (like rainfall by farmers, submission of other weather or environmental data parameters, or damage reports</p>	<p>particularly vulnerable to the misalignment in timing and can not financially survive the financing process time.</p> <p>For example, in the case of this TA, it took 24 months from concept design to contracting. Thanks to parallel innovation grant funding and other income sources, the implementer company could sustain and also cover financial costs for developing the technical and financial proposals (approximately 1 full month of labour).</p> <p>3. Recommendation</p> <p>Future efforts should include risk mitigation measures like offering dual data reporting modes (in case of network issues) and formalising data verification steps into the software design to build trust in new sources.</p> <p>4. Recommendation</p> <p>To sustain and scale the technology transfers, it’s recommended to institutionalise the innovation from early on - both with the government clients as well as major donors who are supporting water management, climate information services, resilience interventions, weather forecasting for agriculture and disaster risk management. Partnerships with the private sector should also be encouraged and financially supported -</p>
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	<p>after extreme events), effectively creating a broader network of scientific data and insights.</p> <p>The collaboration between DCCMS, DWR, NWRA, and DoDMA could also open the door to more integrated water-weather services (e.g. jointly developing flood bulletins and automating notifications from various data platforms - one being BlueIQ).</p> <p>In terms of long-term sustainability, building endogenous and decentralised capacity is vital: with local technicians at district level and operational engagement of central level staff knowing how to maintain and rehabilitate equipment and use the system, it can continue running with minimal external support.</p> <p>The business model provided a clear path for funding, where the opportunity lies in public-private partnership.</p>	<p>in this case with insurance companies that are aiming to develop parametric insurance instruments where insights and data on hydrological risks and floods are foundational (e.g., Africa Risk Capacity).</p>
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3. Illustration of the TA and photos

For communication purposes, please provide 2-4 Power Point slides, including illustrations or charts, describing barriers, opportunities, methodology, activities, outputs and achieved results. The illustrations must be copied into the TA Closure report but must also be delivered as powerpoint files. Also, please provide at least five high-resolution pictures in jpg format, capturing technical assistance. The pictures should illustrate how the TA has impacted the lives of the beneficiaries in particular and the communities in general.

BARRIERS

Lack of Market & Funding Opportunities

- Despite technology approval and high success, government lack financial resources for B2G contracting or open-source adoption
- Donors supportive yet long project design and sales cycles means B2G & PPP opportunities do not exist
- Few opportunities to demonstrate technology to management or donors



Integration into climate services value chain

- Data ownerships concerns and lack of IT and modelling capabilities to automate integration into climate services



Station conditions

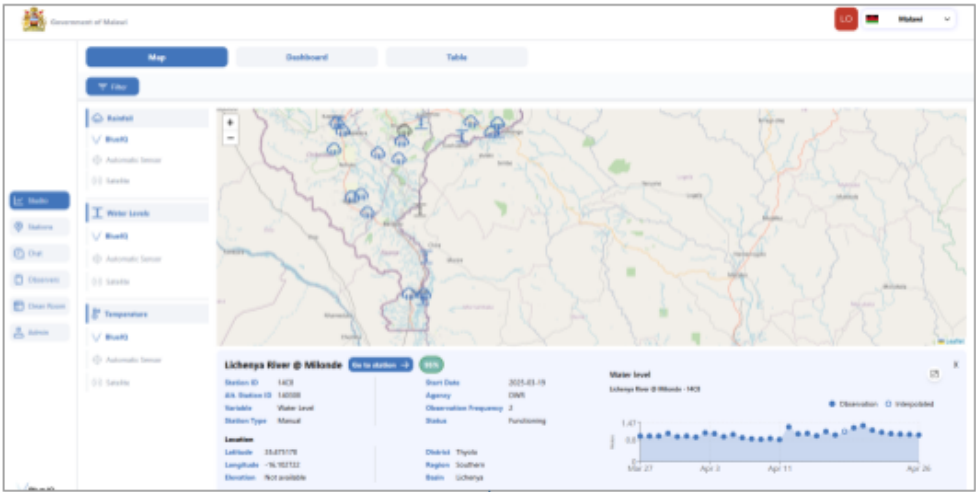
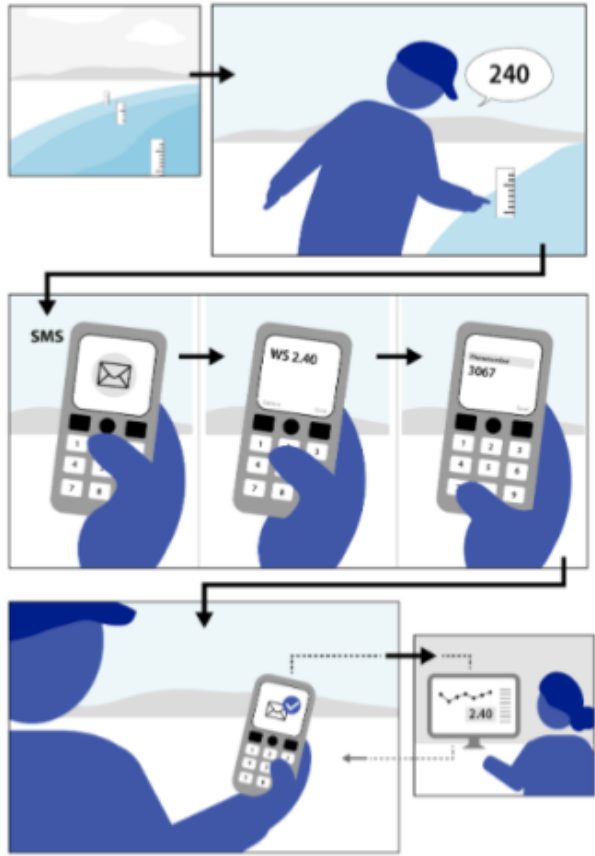
- Broken equipment with status unknown, and demotivated Observers, lacking payment and materials

OPPORTUNITIES

- Real time water and climate data transmission and integration
- Technology can close 75% observation data gap in low income countries much faster and at 10% of the conventional technology cost
- Automatic integration of data into early warning systems and models for forecasting, climate change analysis, and hydrological models
- Increased efficiency of governments' countrywide hydrometeorological monitoring systems
- Technology tailored to users and context, empowering local communities



METHODOLOGY

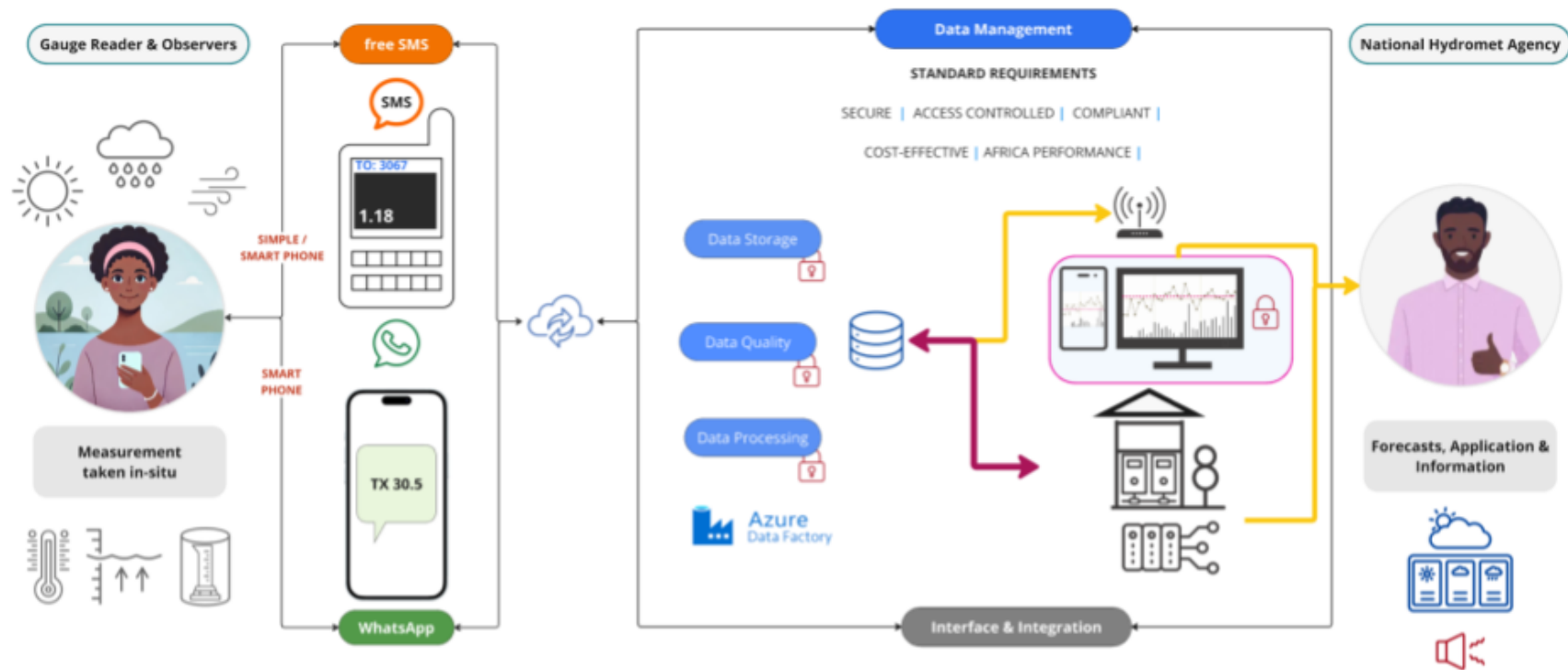


Free SMS to 3067 for the quick and easy transmission and digitization of a manual observation measurement.

- Any language
- Any type of phone
- Any literacy level
- Any type of network

ACTIVITIES

From Assessments and Training with Observers & Staff, to Full-Stack Software Development



OUTPUTS & ACHIEVED RESULTS

- DWR & DCCMS manual river/lake, rainfall & synoptic weather stations performing above WMO standard 80%
- Total stations, 76:
~ 26 river & lake stations
~ 50 rainfall stations
- 801 Beneficiaries
(383 Direct, 418 indirect), plus Indirect beneficiaries of forecasts & hydrological yearbooks.
- New analytical software solution to - **BlueIQ** - with AI capabilities fully adapted to government IT environment



Figure 1: Stephen Allan Khwalala, Gauge Reader at Phalombe River, Phalombe District. Mr Khwalala began piloting with Water in Sight Ltd and the Department of Water Resources in 2024. The project rehabilitated all gauge plates at his station as they were destroyed in Cyclone Freddy, March 2023. Stephen could thereby restart his work and gain supplementary income during the UNEP CTCN project. During the cyclone, the Phalombe River was swollen with floodwater and snatched his mother as she crossed back home from visiting her other son, and it swept her downstream. Stephen shares that “If there had been an opportunity like we have today where information is shared in real time during disasters’, he said, reflecting on the tragedy. ‘She might have been saved.’ Photo: Lisa Murray.



Figure 2: Community engagement in action at pilot sites in Mulanje district. Project officers, village chiefs and government staff lead discussions with local residents. Community meetings introduced the mobile data collection solution to villagers and Gauge Readers. A participatory approach was central to technology testing, scaling and adoption within the TA, ensuring that community members, both women and men, understood the value of the monitoring infrastructure and the role of the Gauge Reader.



Figure 3: A technical team from the Department of Water Resources, with the support of the TA team from Water in Sight Ltd, installed and calibrated water-level measurement equipment at the Domasi River monitoring station as part of the project's equipment rehabilitation work (October 2024). DWR, TA staff and the Gauge Reader worked together to improve the reliability of the manual gauges, forming the physical backbone for digital data collection.



Figure 4: A close-up of the BlueIQ online software, showing the landing page of manual monitoring stations and its broad range of functions and capabilities developed as a response to the needs, pain points and requests of the government TA clients (taken during the final prototype validation and training workshop in Salima district with the Working Group and departmental stakeholders, February 2025).



Figure 5: (top) The Malawi's government Working Group and the TA implementation team worked collaboratively in an iterative process of technology transfer through training, testing and feedback - such as this technology prototype demonstration workshop in Dedza district, October 2024 (L-R: Chimwemwe Chiutula, Lyson Kampira, Louise Croneborg-Jones, Japhet Khoza, Dr. Vincent Msadala, Leman Ngwena, Love Eve Nsandu Mtike, Chilungamo Banda, Harold Nkhoma, and Tapiwa Kanyinji).

(below) Deputy Director of the Malawi Department for Climate Change and Meteorological Services, Mr Amos Mtoya: ““In the past, the main problem was that there was no systematic means of maintaining weather records,” explains Amos Mtonya, Deputy Director of the DCCMS. “There was a huge delay in the access to data, especially in the forecasting office.”
Photo: Lisa Murray.



4. Impact Statement

The information in the table below will be used to communicate results and anticipated impacts of this technical assistance publicly. Please copy information from the impact statement developed in the M&E Plan and update as relevant.

<p>Challenge</p>	<p>Malawi needs to abate the impacts of climate change and natural hazards. Floods alone account for 75% of natural disaster losses and cost the country on average \$68m/year. Resilience, however, depends on precise water and weather observation data. Yet, digitisation of observations in Malawi remains low, mainly due to few technology options, limited human and institutional capacity, and hesitancy to support untested innovations.</p>
<p>CTCN Assistance</p>	<ul style="list-style-type: none"> ● Mobile tech tested by DCCMS and DWR validating how Gauge Readers from local communities use their phones to digitise in-situ observations of water and weather countrywide. ● New software delivered for integration and application of water and weather data into modelling, supported by a plan for long-term financing and operations. ● "Learn by doing" workshops ensured user efficiency, fostering technology adoption beyond project end.
<p>Anticipated impact</p>	<ul style="list-style-type: none"> ● Mobile tech uncovered scalable digital collection and management of observation data for water and weather risk management above the WMO standard of 80%. ● 92% upskilling of citizens and government staff in digitisation and data application through pragmatic software approach.
<p>Co-benefits: Achieved or anticipated co-benefits from the TA</p>	<ol style="list-style-type: none"> 1) Technology scaled to 76 river, lake and rainfall monitoring stations (x 4 planned number), supported through training and workshops (x 3 planned scope), financial remuneration per government policy to gauge readers with raised income security for both women and men (8 months instead of 6 planned), and efficient rehabilitation of monitoring infrastructure within project timeframe (x 3 planned scope). 2) Leveraging new ChatGPT AI technologies efficiently for enhancing the quality of water and climate data processing and quality, a central component of ensuring data management is automated and brings value to climate data records and applications. 3) Government endorsement of data quality, for example by data transfers into central systems and use of data in Hydrological Year Books. 4) 92% surveyed stakeholders said their knowledge, capacity and understanding of digitisation of manual observation increased (69% said they have "high capacity", and 23% have "medium capacity" as a result of the project). 5) Rather than building a simple API with cleaned data, a unique software solution, BlueIQ, was built to enhance user experience

	<p>and address systematic problems of hydrometeorological data management in Malawi.</p> <p>6) Mobile communication and software solutions accessible to the government for an additional one year after TA project-end, to provide a “bridge” during the void of financial support. (i.e., to DCCMS, DWR and the National Water Resources Authority who now hold a mandate for hydrological monitoring in Malawi).</p>
<p>Gender aspects of the TA</p>	<p>Direct gender benefits were achieved in three key areas:</p> <ol style="list-style-type: none"> 1) Capacity building activities during meetings, workshops and field work (25% of project technical events and training involved women, from anticipated 15%; government Working Group representation was 50% women from DWR and DCCMS). 2) 21% of Gauge Readers and Observers were women during the project pilot, up from the anticipated 10-15%, who received individual training and support, income and personal protection equipment). In addition, of the indirect beneficiaries, 52% of the 418 household members were women, and 25% youth. 3) Technology design and operationalisation was improved by providing guidance on gender-based-violence (toll-free numbers, names of NGOs and government services), communicated through training instruction, bulk SMS, and individual responses (as a mitigating and public awareness effort). <p>The team’s Gender Expert performed a gender assessment at the start of and at strategic points of piloting, with actionable recommendations on gender monitoring, the design of technology solutions, communication and training events.</p>
<p>Anticipated contribution to NDC</p>	<ul style="list-style-type: none"> ● Climate Services: Effective & Efficient Early Warning System <ul style="list-style-type: none"> ○ NDC action/anticipated contribution: an informal community based early warning system and flood water monitoring system was trialed for nationwide scaling. ● Water: Flood Management <ul style="list-style-type: none"> ○ NDC action/anticipated contribution: improved data to facilitate delineation of flood prone areas with flood zoning maps were trialed for Chikwawa. ● Water: Integrated Watershed Management <ul style="list-style-type: none"> ○ NDC action/anticipated contribution: strengthening of water policies and plans in priority watersheds (e.g., Hydrological Yearbook) <p>Source: Republic of Malawi - Updated Nationally Determined Contributions (July 2021)</p>

<p>The narrative story</p>	<p>Malawi, like many developing countries, confronts a significant deficit in water and weather observations. With 70% of people not reached by Early Warning Systems (EWS) on average in LDCs, the costs of floods and droughts are substantial. Malawi also grapples with increasing water stress due to rising demand and seasonal fluctuations. Essential data on water availability is thus crucial for infrastructure development for water supply, irrigation, and hydropower.</p> <p>Efforts to bridge the data gap mostly focus on automated sensors. Despite offering advanced technologies, they require high CAPEX and maintenance costs. Cyclone Freddy in March 2023 alone destroyed half of surface and groundwater sensors, emphasizing the technology’s vulnerability. A hybrid strategy, combining diverse technologies and capacities, becomes imperative.</p> <p>In Malawi, the UNEP CTCN pioneered the use of mobile tech that digitises in-situ water and weather observations in real time. Gauge Readers collect manual data and use phones for real-time transfer, coupled with quality control and integration into a cloud-based software for data processing, visualisation and API integrations into forecasting and risk modelling. The innovation is cost-effective at 10% cost of conventional sensors, rapidly closes water and climate data gaps, and improves countrywide climate records and services.</p>
<p>Contribution to SDGs</p> <p>A complete list of SDGs and their targets is available here: https://sustainabledevelopment.un.org/partnership/register/</p>	<p>SDG 2. End hunger, achieve food security and improved nutrition, and promote sustainable agriculture. Indirect benefits in the promotion of climate smart agriculture with smallholder farmers as a result of the technical assistance’s contribution to services, such as digital advisory services explored by the Ministry of Agriculture’s Department of Agricultural Extension Services.</p> <p>SDG 6. Ensure availability and sustainable management of water and sanitation for all. Water and weather data deficiencies, and lack innovations therein, hinder progress when and is identified as one of five top obstacles to achieving SDG6. (UN Blueprint for Acceleration: SDG6 Synthesis Report 2023)</p> <p>For Target 6.5, Malawi also commits to achieving national water resources management and information system that meets the following criteria: (a) national coordination and integration of water resources management; (b) comprehensive and up-to-date data and information; (c) participation of relevant stakeholders; and (d) periodic reporting to the public and relevant stakeholders).</p> <p>An indirect benefit from the technology is improved flood management. With better understanding of hazard risks, DCCMS and DWR can strengthen their contributions to early warning and disaster management services.</p> <p>SDG 13. Take urgent action to combat climate change and its impacts.</p>

	<p>The use of simple mobile technologies to scale up digital collection and processing of climate observations for adaptation actions in Malawi is a direct response to combat the impacts of climate change by adapting accordingly.</p>
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Annex 1 Technical assistance data collection

Please add quantitative and qualitative values for the indicators selected in the M&E plan and monitored throughout the technical assistance in the tables below. Indicators which have been monitored in addition to the proposed indicators below may be added at the end of table A. Non-relevant indicators should be left blank.

A. Output and outcome indicators

Indicator	Quantitative value <i>Numerals only; disaggregates must sum to the total</i>	Qualitative description <i>List the various elements corresponding to the quantitative value as well as timelines and responsible institutions</i>
Please note indicators below highlighted as anticipated		
Total number of events organized by proponents and implementing partners	84	<p>Total number of events organised: 84 events in total were organised during the project (target was 25).</p> <p>Meetings & Workshops <i>February 2024 to April 2025</i> 11 in-person and 4 online workshops and meetings held according to Response Plan and additional ones held based on opportunities and needs.</p> <p>10 (of 12) Working Group meetings held monthly apart from Christmas government closure and field work with participation of WG members (two WG monthly meetings were held back-to-back with workshops)</p> <p>Field work and training <i>August - September 2024</i> 30 in-field training events at monitoring stations. 29 in-field equipment rehabilitation events.</p> <p>Organisers: Water in Sight and T-Notch TA implementers. Partners: Government Working Group and departmental staff</p>
Number of participants in events organized by proponents and implementing partners	383	In total the number of participants of events were 383, several which

		<p>participated on a recurring basis as part of the project design.</p> <p>The total amount of participants includes:</p> <ul style="list-style-type: none"> ● 74 community members in consultations (40% women) ● 100 gauge readers and observers (20% women) ● 172 government staff (26% women) ● 20 community members as local labourers ● 8 international donor staff (1 woman) ● 9 NGO staff (30% women) <p><i>(of the total events, the TA team participation totaled 96, of which 45% were women).</i></p>
a) Number of men	286	100% Malawi
b) Number of women	97 (25%)	100% Malawi
Number of climate technology RD&D related events	79	<p>From the target of 5 events, the project expanded RD&D events to:</p> <ul style="list-style-type: none"> ● 7 workshops and online meetings per response plan ● 10 monthly Working Group meetings (2 additional WG meetings were held back-to-back with workshop events) ● 3 community consultation meetings ● 30 in-field training events at monitoring stations, followed by 8 months of data collection during piloting) ● 29 in-field equipment rehabilitation events.
Number of participants in climate technology RD&D events	334	<ul style="list-style-type: none"> ● 71 workshop and online meetings participants (24% women) ● 30 monthly Working Group meeting participants (40% women) <i>not counting participants who joined monthly meetings back-to-</i>

		<p><i>back with online meetings and workshops.</i></p> <ul style="list-style-type: none"> ● 87 community consultation participants (31% women) ● 97 participants in at station training, surveys, testing, and data collection (17% women) ● 49 participants in installation and rehabilitation of equipment (12% women)
a) Number of men	255	
b) Number of women	79 (24%)	
Number of training organized by proponents and implementing partners	33	<ul style="list-style-type: none"> ● 30 in-field training events at monitoring stations with Gauge Readers, Observers and Government staff. ● 3 Training events as part of Output 6. <p><i>Training was included in several monthly Working Group meetings and workshops where Working Group members and government stakeholders were trained in the digitization and software technology - these numbers are not included as they are counted as part of events and RD&D events.</i></p>
Number of participants in trainings organized by proponents and implementing partners	117	<ul style="list-style-type: none"> ● 97 participants in at station training, surveys, testing, and data collection (17% women). ● 20 trained as part of Output 6 (15% women).
a) Number of men	97	
b) Number of women	20	
Total number of institutions trained	5	
a) Governmental (national or subnational)	4	<ul style="list-style-type: none"> ● Department of Climate Change & Meteorological Services (DCCMS) ● Department of Water Resources (DWR) ● National Water Resources Authority (NWRA) ● Department of Disaster Management Affairs (DoDMA)
b) Private sector (bank, corporation, etc.)	0	<i>None reached during the project due to the B2G nature of the</i>

		<i>technology. Several attempts were made, however, to reach the insurance industry active in developing parametric flood insurance in Malawi (e.g., USAID supported work with Africa Risk Capacity and JBA).</i>
c) Nongovernmental (NGO, University, etc.)	1	BASEflow <i>Invitations were made to Malawi Red Cross, Save the Children, World Vision and the Khulima project. However, no participants were registered and governments were not positive about potential external water and weather data access.</i>
Percentage of participants reporting satisfaction with CTCN training (from CTCN training feedback form)	80%	27% - 4 of 5 53 % - 5 of 5
Percentage of participants reporting increased knowledge, capacity and/or understanding as a result of CTCN training (from CTCN training feedback form)	92%	69% - high capacity 23% - medium capacity
a) Percentage of men	77%	
b) Percentage of women	23%	

<p>Total number of deliverables produced during the assistance (excluding mission, progress and internal reports)</p>	<p>46</p>	<ul style="list-style-type: none"> • Detailed Work Plan • Monitoring & Evaluation Plan • CTCN Impact Description Document (2-page, initial & final) • Closure and Data Collection Report • Minutes of Kick-off & inception meeting • Steering Committee establishment • Stakeholder Mapping Report • Inception meeting Report • Bibliographical document list • Bilateral meetings planning for IE1 whilst in Malawi • Diagnosis of hydromet information & systems (MW & Region) • List: equipment recommendations, barriers & opportunities • List: previous similar/complementing initiatives • IT characteristics of DCCMS & DWR data management systems • Workshop minutes • Report: client needs summary (ToR & system architecture) • Matrix: comparing available vs requested data & system • Report: Preliminary analysis on the use of simple mobile phones • Report: Challenges, barriers, risks, opportunities & strengths • Draft system architecture with user manual • Matrix: explaining needs reached (i.e., 3.2) or not reachable • Minutes: 1-day workshop • Pilot sites: preliminary assessment • Minutes: 1-day workshop • Pilot sites: final selection • Detailed pilot implementation plan (workplan) • Minutes: meeting • Final implementation plan
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		<ul style="list-style-type: none"> • Minutes: local workshop • Official community endorsement (written) • Report: reception & equipment installation • Report: demonstrating start of testing • Digital system development & operationalisation • Minutes: demonstration workshop (8 people)(MUST) • Report: updated equipment & digital system • Minutes: technology validation workshop • Cost analysis of the new mobile technology system • (1-3) Business models for 15 yrs financial sustainability • Minutes: business model validation workshop • Business model selection by working group • Business model review (up to 3) • Final business model • Detailed manual (digital) & printed (up to 3 local languages) • 3 sets of Minutes: capacity building workshop w future users, administrators, and civil society
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a) Number of communication materials, including news releases, newsletters, articles, presentations, social media postings, etc.	4	<ul style="list-style-type: none"> 3 Social media posts 1 AFCIA Fact Sheet (developed with UNEP CTCN team) <p><i>Not including video, photographs and press release developed by UNEP CTCN team to be released May 2025 where TA and government participated and helped organise.</i></p>
b) Number of tools and technical documents strengthened, revised or developed	5	<ul style="list-style-type: none"> Detailed Piloting Implementation Plan Digitisation and BlueIQ software Manual (English) Digitisation and Blue IQ software Manual (Chichewa) BlueIQ software Demo video
c) Number of other information materials strengthened, revised or created (For example training and workshop reports, Power Points, exercise docs etc.)	28	<ul style="list-style-type: none"> 10 Working Group PPT presentations 11 Workshop and online meeting PPT presentations. 6 Progress Reports to full government (NDE, departments etc.) 1 Summary Concept Note and Business Proposal
Total number of policies, strategies, plans, laws, agreements or regulations supported by the assistance	1	Comprehensive Partnership Model backed with Terms of Reference, financial model and budget for countrywide system scaling and 15 year sustainability.
a) Adaptation related	1	Comprehensive Partnership Model backed with Terms of Reference, financial model and budget for countrywide system scaling and 15 year sustainability.
b) Mitigation related	0	
c) Both adaptation- and mitigation related	0	
Anticipated number of policies, strategies, plans, laws, agreements or regulations proposed, adopted or implemented as a result of the TA	0	Project did not include activities related to policies, strategies, plans, laws, agreements, or regulations.
a) Adaptation related	0	
b) Mitigation related	0	
c) Both adaptation- and mitigation related	0	
Anticipated number of technologies transferred or deployed as a result of CTCN support	2	Through embedding the innovation journey with DWR and DCCMS, the user-fit and cost-efficiency of the technology was optimised, resulting in the deployment of:

		<p>1) a robust, cost efficient and secure free SMS and WhatsApp enabled technology for digitization and transmission of manual observations at countrywide scale;</p> <p>2) cloud-based, high-quality, secure and AI enabled software for data processing, management, visualisation and API integration for forecasting and modelling.</p>
Anticipated number of collaborations facilitated or enabled as a result of technical assistance	1	Technology is being replicated for early warning systems in partnership with Raagsan Consulting Ltd in Somalia with the support of GSMA (FCDO and Sida)
a) Number of South-South collaborations	0	Not part of TA or Response Plan.
b) Number of RD&D collaborations	2	NASA SWOT early adopter program ICESAT2 early adopter program
c) Number of private sector collaborations	0	None reached during the project due to the B2G nature of the technology. Attempts were made, however, to reach the insurance industry active in developing parametric flood insurance in Malawi (e.g., USAID supported work with Africa Risk Capacity and JBA).
Number of countries with strengthened National System of Innovation as a result of CTCN support	2	Malawi Somalia
Insert any additional indicators here		

B. Core impact indicators

Please fill in the tables for anticipated impacts of the CTCN assistance. Every technical assistance should contribute to at least one of the indicators below. For guidance on how to report on core indicators see the [‘M&E Guidance Document for TA Implementers’](#).

Core indicator 1	<p>Anticipated metric tons of CO₂ equivalent (CO₂e) emissions reduced or avoided as a result of CTCN TA</p> <p><i>Please add your calculations in word or excel format as an Annex to this Closure Report, where applicable.</i></p>
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	Anticipated metric tons of CO ₂ e reduced or avoided as a result of the TA on annual basis	Anticipated metric tons of CO ₂ e reduced or avoided as a result of the TA in total
Quantitative value <i>(emissions reductions)</i>	<i>Total number (numerals only, no rounding or abbreviations)</i>	<i>Total number (numerals only, no rounding or abbreviations)</i>
Unit	tCO ₂ e	tCO ₂ e
GHG assessment boundary (project emissions) Identify expected post-TA activities, associated effects and assess boundary for quantification of GHG emission reductions		
Baseline emissions Describe baseline scenario, baseline candidates, emission factors and emissions calculated		
Methodology Explain the method or process of verifying the indicator and how data was gathered		
Assumptions Describe assumptions made during calculation and quantification of GHG reductions		

Core indicator 2	Anticipated increased economic, health, well-being, infrastructure and built environment, and ecosystems resilience to climate change impacts as a result of technical assistance <i>Please provide a qualitative description of the anticipated impacts on the categories below</i>
Infrastructure and built environment Anticipated increased infrastructure resilience (avoided/mitigated climate induced damages and strengthened physical assets)	
Ecosystems and biodiversity Anticipated increased ecosystem resilience (areas with increased resistance to climate-induced	

disturbances and with improved recovery rates)	
Economic Anticipated increased economic resilience (e.g. less reliance on vulnerable economic sectors or diversification of livelihood)	
Health and wellbeing Anticipated increased health and wellbeing of target group (e.g. improved basic health, water and food security)	

Core indicator 3	Anticipated number of direct and indirect beneficiaries as a result of the TA	
	The TA results in direct beneficiaries and indirect beneficiaries of the interventions. We anticipate:	
	Quantitative value	Means of verification
Total beneficiaries	801	
Number of adaptation beneficiaries	801	383 Direct Beneficiaries (25% women, 75% men) <ul style="list-style-type: none"> • 74 community members in consultations (40% women) • 100 gauge readers and observers (20% women) • 172 government staff (26% women) • 20 community members as local labourers (0 women) • 8 international donor staff (1 woman) • 9 NGO staff (30% women) 418 Indirect Beneficiaries (52% women, 48% men, 25% youth)
Number of mitigation beneficiaries	0	Not part of TA project
Number of adaptation-and mitigation beneficiaries	801	

Core indicator 4	Anticipated amount of funding/investment leveraged (USD) as a result of TA (disaggregated by public, private, national, and international sources, as well as between anticipated/confirmed funding)			
	Quantitative value confirmed in USD	Quantitative value anticipated in USD	Qualitative description <i>List the institutions, timelines, and description or title of the investment</i>	Methods <i>Describe methods used for quantification</i>

				<i>n of funds leveraged</i>
Total funding	<i>Total number in USD (numerals only, no rounding or abbreviations)</i>	<i>Total number in USD (numerals only, no rounding or abbreviations)</i>		
Anticipated amount of public funding mobilised from national/domestic sources				
Anticipated amount of public funding mobilised from international/ regional sources				
Anticipated amount of private funding mobilised from national/domestic sources				
Anticipated amount of private funds mobilised from international/regional sources				

Annex 2 (for internal use – to be filled in by the CTCN)

CTCN evaluation

This section will be completed by the relevant CTCN Technology Manager.

- Evaluation of the timeliness of the TA implementation as measured against the timeline included in the response plan;
- Evaluation of TA quality as defined in the response plan;
- Overall performance of the Implementers;
- Overall engagement of the NDE and Proponent;
- Lessons learned on the CTCN process and steps taken by the CTCN to improve.