WORKSHOP REPORT

Capacity-Building Workshop Part 2: AI-Driven Digital Twin for Water Management for the Limpopo River Basin and Inclusive Integration with Citizen Science

Gaborone, Botswana | June 11, 2025

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Front cover photo: Workshop participants holding their certificates with the IWMI team (*photo*: Lesedi communications)
Back cover photo: Mariangel Garcia presenting at the workshop (*photo*: Valencia Mbatha)

Disclaimer

Contents

Acronyms and Abbreviations

AI	Artificial Intelligence
AWARD	Association for Water and Rural Development
CS	Citizen Science
DT	Digital Twin
IWMI	International Water Management Institute
LIMCOM	Limpopo Watercourse Commission
LRB	Limpopo River Basin
MDII	Multi-dimensional Digital Inclusivity Index
miniSASS	Stream Assessment Scoring System
OKACOM	Permanent Okavango River Basin Water Commission
UNICEF	United Nations Children's Fund

Capacity-Building Workshop Part 2: AI-Driven Digital Twin for Water Management for the Limpopo River Basin and Inclusive Integration with Citizen Science

1. Background

The International Water Management Institute (IWMI) conducted a 3-day multi-stakeholder capacity development workshop in Gaborone, Botswana, entitled AI-driven Digital Twin for Water Management for Limpopo River Basin and Inclusive Integration with Citizen Science.

Citizen science refers to the participation of non-professionals in scientific projects in activities such as data collection and monitoring in environmental studies but can also be applied in other disciplines. It is a critical agent in enhancing the scalability of work, democratizing science and enabling equitable access to scientific data and information (De Sherbinin et al. 2021).

The workshop's primary objective was to disseminate IWMI's Artificial Intelligence (AI) innovations developed for the Limpopo River Basin (LRB) and elicit substantive feedback from representatives of the Limpopo Watercourse Commission (LIMCOM) member states: South Africa, Botswana, Mozambique, and Zimbabwe who constitute the primary end-users of these decision-support technologies along with the local communities dependent on the LRB to sustain their livelihoods. This report presents findings on day 3 of the capacity-building workshop which focuses on incentivization and digital inclusivity, the social aspects of citizen science.

2. Report Overview

This report aims to provide feedback to stakeholders from the LRB on a capacity-building workshop in a co-development effort in the integration of citizen science data into the Digital Twin (DT). The particulars of the workshop are as follows:

Venue: Permanent Okavango River Basin Water Commission (OKACOM), Gaborone, Botswana

Date: 11 June 2025

Time: 09h00 – 14h00

The capacity-building workshop targeted a strategically selected cohort of active stakeholders and decision-makers operating within the LRB across the four member states. Participants were characterized by the following:

- Demonstrated expertise and institutional knowledge regarding LRB hydrological conditions and dependent community dynamics.
- Occupancy of positions with sufficient authority or influence to implement AI-driven tools for water resource decision-making.
- Capacity to influence policy formulation and governance systems within the LRB framework.
- Potential to translate data insights into tangible interventions that address critical water management challenges at the community level.

The meeting participants and the organizations they represent are shown in Figure 1. The list of participating organizations and their affiliated countries is represented in Table 1. The attendance register is available in Annex A.

Table 1. Participating organizations in each member state

Member State	Participants Organizations
Botswana	GWPBW, University of Bostwana (UB), Metsimotlhabe Trust, Emang Botswana, LIMCOM, BGI, MDCT, MDT, TWM Nexus, DWS-Botswana, Birdlife Botswana, SASSCAL, Skyberry Botswana, OKACOM
Mozambique	AraSul
South Africa	GWPSA, DWS-SA
Zimbabwe	Z'bwe Corf, ZINWA

Figure 1. Group photo for the meeting on the 11/06/2025, with most of the institutional affiliations depicted. (*photo*: Lesedi communications)

3. Meeting Purpose and Agenda

The capacity-building workshop constituted a core component of the strategic activities within the Enabel funded project initiative. The project's primary objective involves the systematic integration of citizen science data streams for real-time water quality monitoring throughout the LRB, with subsequent incorporation into the Digital Twin infrastructure to support evidence-based decision-making processes. To achieve effective and sustainable implementation, AI technologies are leveraged to develop intuitive visual interfaces that enable stakeholder interaction with complex technical information while maintaining accessibility for non-technical users. The workshop functioned as a comprehensive stakeholder engagement and consultation mechanism, designed to familiarize key stakeholders with IWMI's proposed technological frameworks and methodological approaches. This participatory approach aimed to elicit actionable feedback from domain experts and practitioners to enhance project outcomes through iterative refinement of implementation strategies.

4. Program Orientation

4.1. Workshop Goals and Methods

The workshop aimed to achieve the following goals as illustrated in Figure 2.

Figure 2. Flow diagram of workshop goals
(*Source*: IWMI 2025)

To provide comprehensive education and training to stakeholders regarding AI applications in water management and decision-making processes specific to the LRB context, while introducing participants to the technical capabilities and operational framework of the LRB-DT system pertaining to citizen science. To achieve this, there were presentations from researchers outlining critical concepts such as: citizen science, incentivization and digital inclusion and group work designing citizen science data visualization systems.

To systematically gather expert feedback on IWMI's proposed implementation strategy and evaluate the suitability of selected AI digital technologies for deployment within the LRB's unique hydrogeological and socio-economic context. The following activities were conducted:

- Question-and-answer (QnA) sessions with participants discussing what type of people are at risk of exclusion and how they should be incentivized.
- Multi-dimensional Digital Inclusivity Index (MDII) survey to assess the digital inclusivity of the WaterCopilot and Digital Twin.
- Menti feedback questionnaire on participants' data priorities, accessibility and integration challenges.

And lastly, to establish a sustainable network of practitioners and create designated focal points to support ongoing AI-driven activities and ensure long-term institutional capacity for technology adoption within the LRB management framework. Participants were awarded certificates and focal points were identified as contacts forming part of the citizen science for water management task force in the LRB.

5. Citizen Science Water Monitoring Tools

5.1. Model Framework

GroundTruth, a consultancy organization working with water, biodiversity and engineering has been a key partner in the citizen science for water management project. They presented progress on a model framework, Figure 3, on how citizen science data may be integrated into the Digital Twin (DT). The DT is a visual replica of the LRB that users interact with. It is the data visualization platform for citizen science datasets.

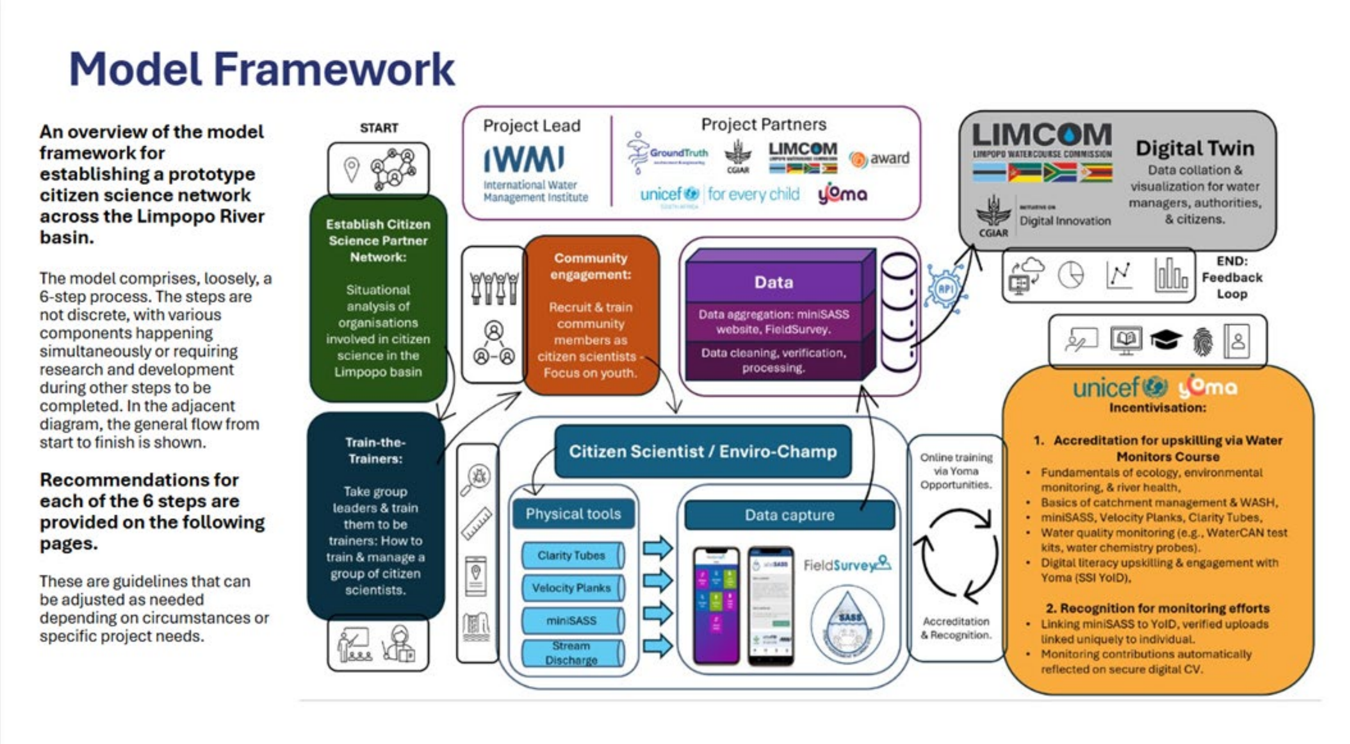

Figure 3. Citizen science model framework (*Source*: Russell 2025)

5.2. Stream Assessment Scoring System - miniSASS

One of the citizen science data collection tools that community members of the LRB will be trained on is miniSASS. Applying easy to use and simple equipment such as water nets, citizens can collect and identify aquatic macroinvertebrates which have different sensitivity levels assigned to them. They are each given scores, which are divided by the total number of aquatic macroinvertebrates identified. This provides an indication of river or stream health which ranges from natural, good, fair, poor and very poor conditions.

miniSASS was presented to the workshop participants, slides depicted in Figure 4 and 5 by a GroundTruth representative, Charlene Russell followed by a QnA session.

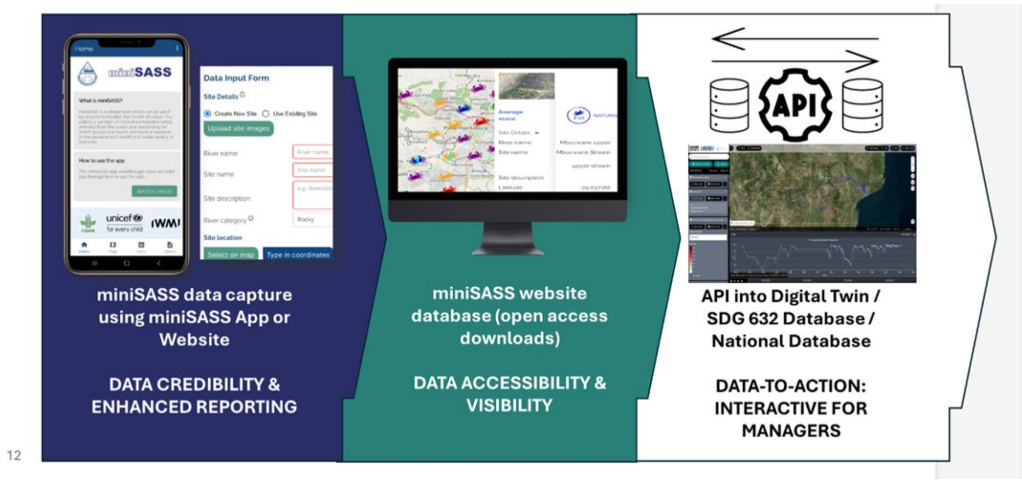

Figure 4. miniSASS data pathway presentation (*Source:* Russell 2025)

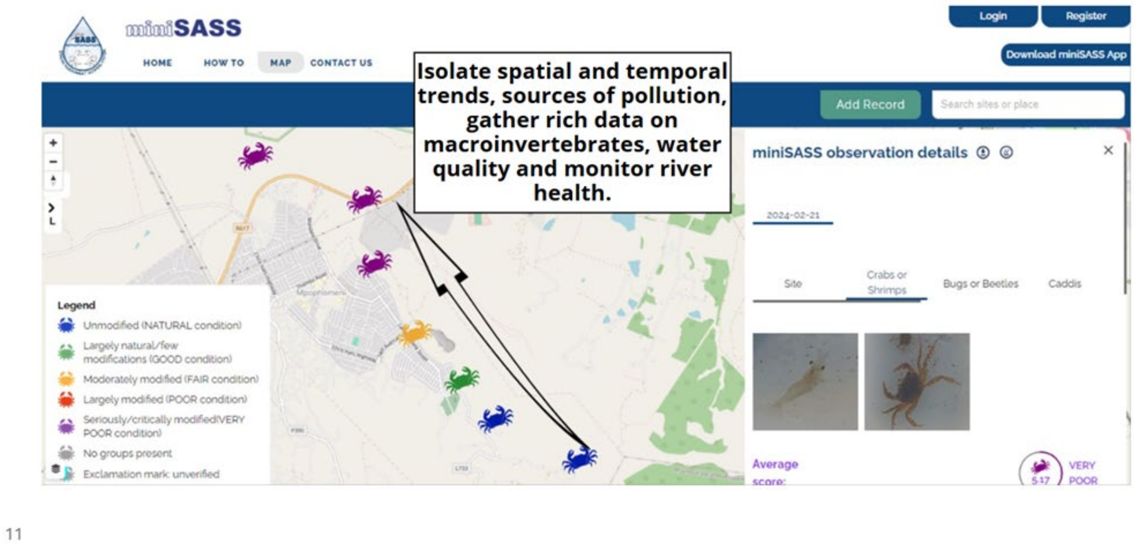

Figure 5. miniSASS web application presentation (*Source:* Russell 2025)

6. Co-Design Visualization of Citizen Science Data into the Digital Twin

The Digital Twin (DT) is a virtual replica of the LRB. It is a cloud-based computer model with an interface powered by AI (Garcia Andarcia et al. 2024) stakeholders that can interact with that features a high-resolution 3D model of the LRB, rainfall, river discharge rainfall data and other hydrological data sets. Water quality data provided by citizen scientists will be the one of the newer datasets to be integrated into the DT.

Hugo from the Association for Water and Rural Development (AWARD), led the facilitation of a brainstorming session on how to bring data collected by citizen scientists onto a platform that can be shared among decision makers, community members and policy makers. Participants were divided into four groups and were tasked with conceptualizing a data visualization system to connect data into the Digital Twin. They were prompted to consider points in Figure 6 to guide their discussion.

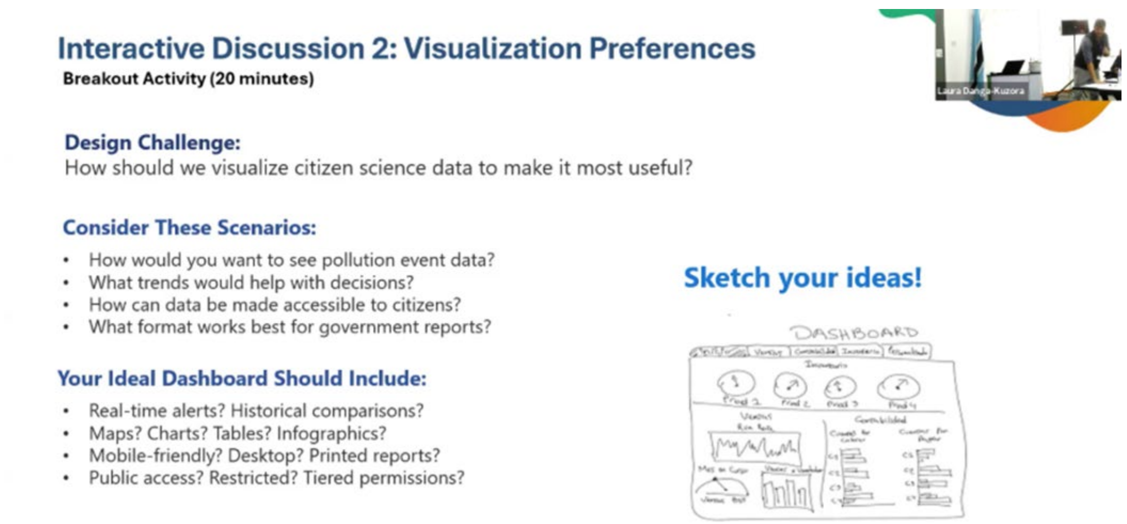

Figure 6. Presentation slide of Digital Twin co-design session (*Source*: IWMI 2025)

The exercise resulted in the following ideas:

The findings were that computer-based platforms need to be complemented with others such as radio and SMS to be effective. A hybrid approach is recommended. It is clear citizen science requires a digital ecosystem with a range of enabling technologies as no technology can address all the needs of communities, governments and policymakers.

Workshop participants were divided into groups of four and enthusiastically presented citizen science data visualization platforms they developed together in depicted in Figures 7, 8, 9 and 10 to each other. Further detail on this is discussed in the following sections.

6.1. Group 1

Figure 7. Presentation of Group 1's water quality dashboard. (*photo*: IWMI 2025)

Group 1's dashboard has the following features:

- **Real-Time Alerts and Communication:**

  Pollution trends are transmitted in real time via mass media platforms such as radio, television, mobile phones, and SMS.

  These alerts are disseminated to communities by government authorities.

- **Data Sharing:**

  Institutions like LIMCOM and GWP facilitate bottom-up transmission of community-collected data.

  Emphasis is placed on accessible formats (e.g., posters, billboards, banners) instead of lengthy reports.

- **Community Engagement via Apps:**

  Applications such as miniSASS enable community members to upload water quality data directly.

- **Citizen Science Water Quality Dashboard** displays:

  Real-time alerts on detected pollutants

  Geographic location and time of detection

  Comparisons between real-time and historical data

- **User Support and Accessibility:**

  A help feature and icon legend support first-time users in navigating the dashboard.

  An educational zone explains technical terms like *sewage* and *run-off* to enhance public understanding.

- **Data Sharing and Visualization:**

  Users can take and upload photos, and receive contextual feedback (e.g., identification of alien plant species)

  Data and complaints can be submitted directly to relevant authorities.

  Reports or posters can be downloaded, using icons and graphs to improve comprehension for individuals with low literacy levels.

6.2. Group 2

Figure 8. Presentation of Group 2's data visualization platform (*photo:* IWMI 2025)

Group 2's dashboard has the following features:

- **Data Collection Details:**

  Date the data was recorded is captured.

  Location where the data was collected, including coordinates and nearby landmarks (to aid elders and those unfamiliar with GPS).

- **Data Entry Interface:**

  A user-friendly data entry box with drop-down menus and toolboxes for easy input.

  Users input key details such as coordinates or landmarks and observed parameters.

- **Environmental Parameters to Record:**

  Presence of animals, fish, aquatic birds, and plants

  Indicators such as litter, water colour, and odour.

  Additional notes can be entered.

  Photos can be attached to complement the observations.

- **Activity Monitoring:**

  Users document human activities observed in the area, such as mining, swimming and agriculture.

- **Data Features and Feedback:**

  Real-time alerts triggered by significant observations.

  Access to historical data for comparison with current entries.

6.3. Group 3

Figure 9. Presentation of Group 3's data visualization platform. (*photo:* IWMI 2025)

Group 3's dashboard has the following features:

- **Data Sources and Integration:**

  Include historical citizen science data from the Limpopo River Basin.

  Incorporate oral histories from elders as time series data.

Integrate government reports for comprehensive insights.

- **Community Engagement Tools:**

  Use cellphones, radio, and loudspeakers to engage communities and disseminate information.

- **Pollution Event Monitoring:**

  Interface features colour-coded flags to indicate pollution severity:

  Green – Safe

  Pink – Moderate risk

  Red – Dangerous

- **Visualization and Analysis:**

  Use the Water Co-pilot tool to visualize and analyse water quality data. The Water Co-pilot should be accessible to the public for preliminary analysis before technician-reviewed reports are generated.

- **Communication of Results:**

  Produce detailed reports on data findings

  Alert communities via SMS, WhatsApp, and social media platforms

- **Government Decision Support:**

  Develop dashboards for government users featuring:

  Charts to identify trends

  Real-time simulations of data evolution

  Visuals to support presentations and decision-making

6.4. Group 4

Figure 10. Presentation of Group 4's data visualization platform. (*photo:* IWMI 2025)

- **Parameter Selection and Measurement:**

Users can select key parameters to measure (e.g., pollution levels).

Parameters are measured in relation to aquatic life (e.g., presence and health of fish).

Data is presented in time periods and includes both scientific and indigenous knowledge (IKS) on species observed.

- **Multimedia Upload and Community Input:**

The app allows users to upload pictures and videos as evidence.

Elders can view media uploads and share intergenerational insights based on lived experience.

- **Data Analysis and Presentation:**

Analysis is provided through graphs, videos, and images tailored for government stakeholders.

This enables informed decision-making based on both qualitative and quantitative data.

- **Educational Access and Youth Engagement:**

School representatives can use the app for learning purposes, especially in agriculture and environmental science.

Useful for initiatives like science fairs and local curriculum support.

- **Community and Knowledge Integration:**

Promotes full community participation and generational knowledge transfer.

Provides a platform where scientists can validate Indigenous Knowledge Systems (IKS).

- **Communication and Outreach:**

The app should be linked to social media for broad dissemination of alerts and announcements (e.g., flood warnings).

Radio is used to reach rural and remote communities with limited digital access.

7. Incentivization

7.1. Incentivization Conceptual Framework

Singer and Ye (2013) describe incentivization for citizen science in research as offering monetary or non-monetary rewards, compensation, or other motivational forms to encourage individuals to take part in a research study. Incentivization in the context of the citizen science for water management project is concerned with ensuring that citizens are seen as more than just data collectors. It strives to ensure that citizens are continually empowered, valued, acknowledged and appreciated for their contributions through their participation to promote sustainability.

A scoping review study was completed before the workshop on digital technologies used to disseminate incentives in citizen science projects. As a result of the study, an incentivization conceptualization framework guided by theoretical foundations was developed which is illustrated in Figure 11 below.

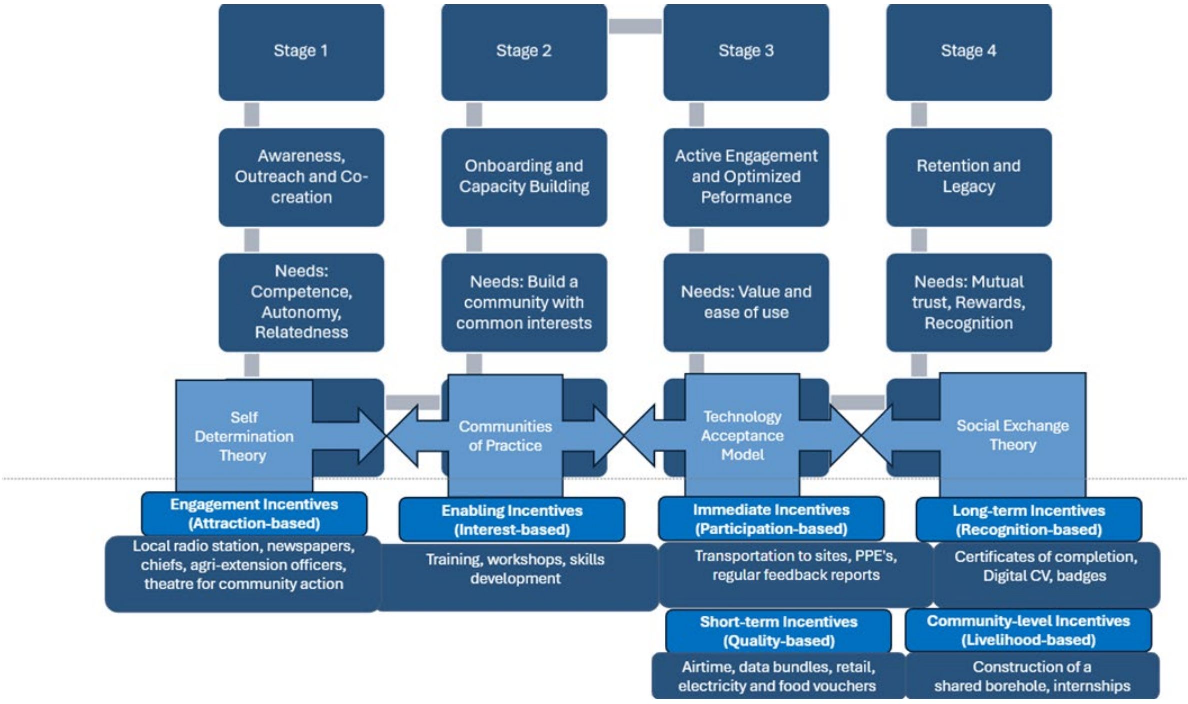

Figure 11. Incentivization conceptual framework (*Source:* IWMI 2025)

7.2. Research Survey Findings

The following results were presented to participants on findings from literature on citizen science digital technologies. The global distribution of studies found on the topic, technologies identified and incentive category type preferences. These findings are demonstrated in Figures 12, 13 and 14. In some instances, there was mention of more than one incentive type in studies.

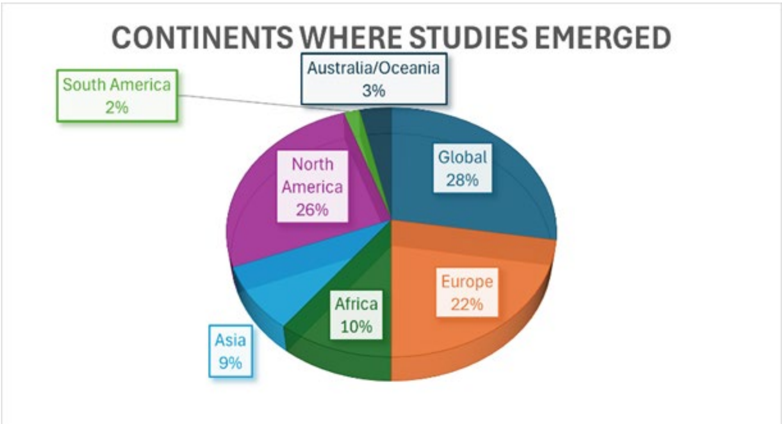

Figure 12. Global distribution of studies (*photo*: IWMI 2025)

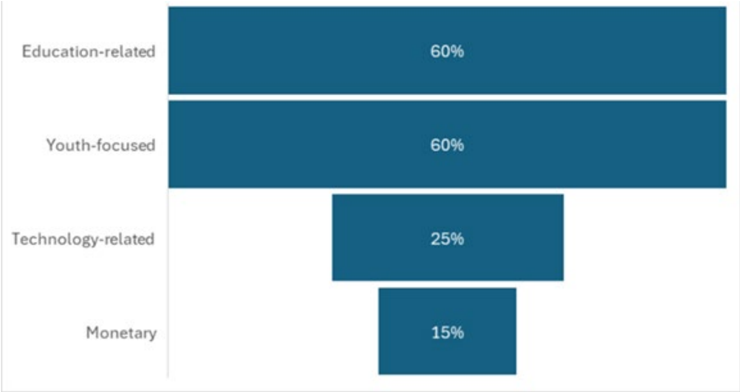

Figure 13. Incentive category preferences in studies. (*Source:* IWMI 2025)

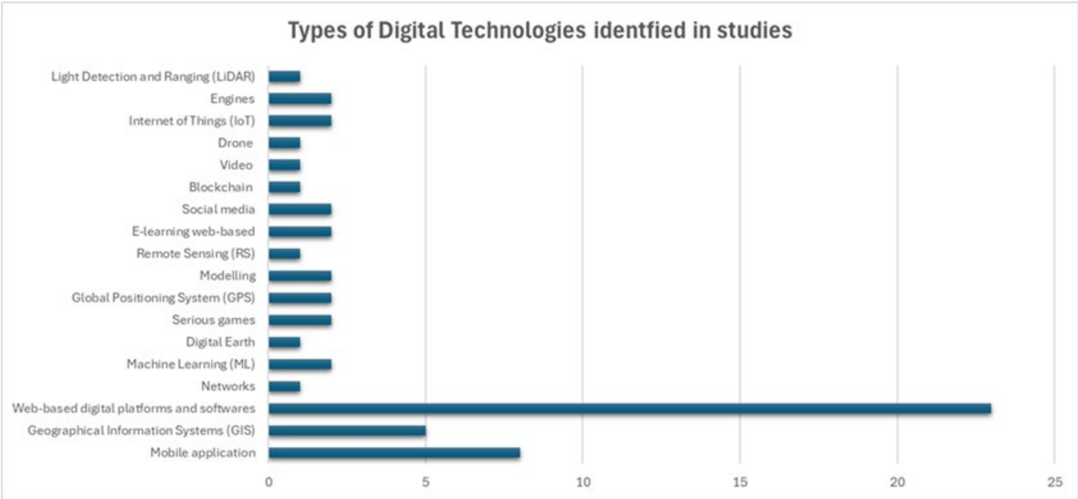

Figure 14. Digital technologies identified in studies on citizen science. (*Source:* IWMI 2025)

7.3. Youth Marketplace Agency (YOMA)

The onboarding platform, the citizen scientists' first point of interaction where they discover citizen science opportunities, they are eligible and able to participate in, is YOMA. Additionally, it also serves as an incentive distribution platform which facilitates what incentives are provided and to whom.

Khanya Bashe, an innovation consultant from UNICEF provided a brief online presentation to workshop participants on the citizen scientists' user journey illustrated in Figures 15 and 16.

Figure 15. Screenshots of YOMA website interface. (*Source:* IWMI 2025)

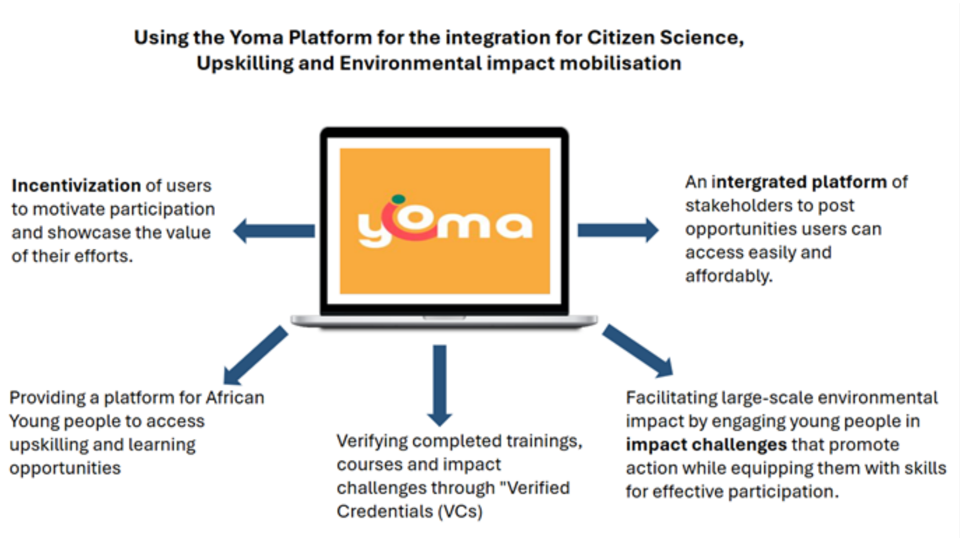

Figure 16. YOMA application in the citizen science project. (*Source:* Bashe 2025)

7.4. Stakeholder Feedback

This section explores strategies for recognizing the valuable contributions of citizen scientists in ways that align with their immediate needs, priorities, and lived realities. Citizen scientists are viewed not merely as data collectors, but as co-producers of knowledge whose insights and engagement are vital to the success and legitimacy of citizen science initiatives.

Strategic Approach: Prioritize partnerships and collaborations with existing community structures such as local programs, farmers' associations, and grassroots organizations to embed citizen science within trusted and sustainable networks. Incentive models should avoid unsustainable, one-off provisions like food packages, which risk fostering dependence. Instead, they must remain sensitive to the opportunity costs of participation for instance, the time spent on data collection that could otherwise be used for farming or income-generating activities.

Participants in the workshop proposed a range of incentivization strategies tailored to their contexts and aspirations in Table 2.

Table 2. Workshop participants' incentive preferences

Incentive Type	Description
 **Livelihood-based**	Employment creation for youth.
 **Community-based**	Sustaining the cultural heritage sites of the communities
 **Education-based**	Education on the importance of taking care of natural resources. Capacity-building, training, upskilling, ability for citizen scientists to interpret the data they provide.
 **Recognition-based**	Public acknowledgement and visibility such as certificates, inclusion in local news, include data in national reports and include citizen science in acknowledgments as contributors.

8. Digital Inclusivity

8.1. Multi-dimensional Digital Inclusivity Index (MDII)

The Multidimensional Digital Inclusivity Index (MDII) is a scientific tool (Opola et al. 2025) designed to evaluate and enhance digital inclusiveness across various tools and platforms, particularly within agri-food systems. By providing a structured framework, the MDII identifies strengths and areas for improvement, ensuring digital solutions are accessible, equitable, and inclusive for underrepresented communities.

The MDII framework, in Figure 17, evaluates seven aspects of digital inclusiveness organized around three mega-groups of analysis namely innovation usage, social consequences and stakeholder relationships. Within these dimensions are 27 sub-dimensions, including a granular evaluation of digital inclusiveness, and 90 indicators, guiding targeted assessments and recommendations.

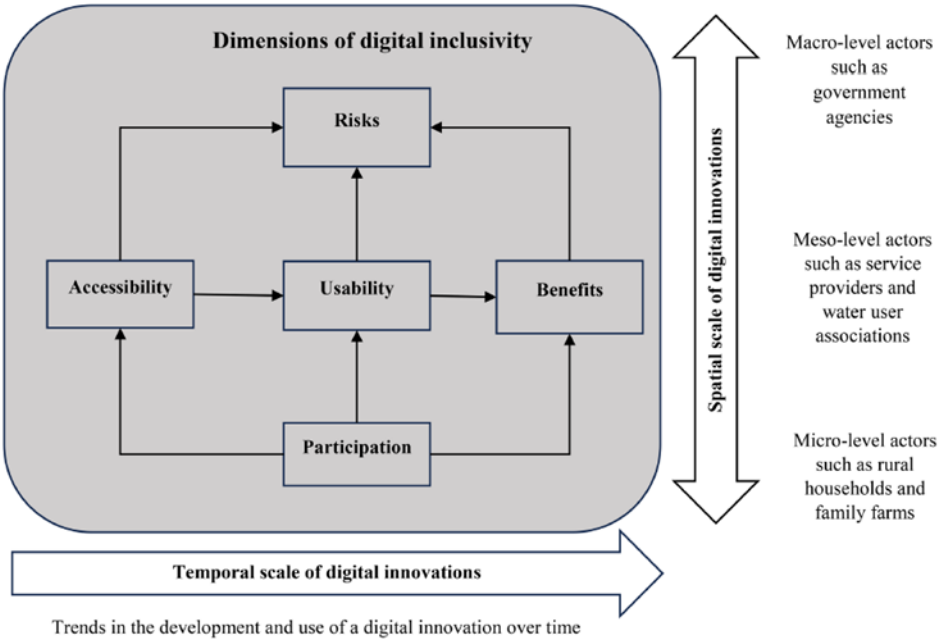

Figure 17. A multi-dimensional framework for digital inclusivity in food, water and land systems. (*Source*: Opola et al. 2025)

During the workshop, the WaterCopilot was assessed by participants using a survey designed on KoboToolBox. These were both manually distributed and shared using a QR code. The WaterCopilot is an AI-powered water management tool IWMI collaborated with Microsoft to develop. It operates as a Generative AI (GenAI) agent which has been specifically trained on data provided by LIMCOM on the LRB. Data included static documents provided by LIMCOM as well as non-static datasets produced by the operational SWAT model. Users can access it on the web; ask it questions and receive real time responses or recommendations on where to find more information on what they are looking for which has been specifically trained on data provided by LIMCOM on the LRB. Users can access it on the web; ask it questions and receive real time responses or recommendations on where to find more information on what they are looking for.

8.1.1. Reflections on the social and ethical implications of the WaterCopilot

Participants were offered an opportunity to reflect on various aspects regarding the social and ethical implications of developing and using the WaterCopilot for various individuals, organizations, and communities within the LRB. This was done through a questionnaire based on the MDII, a framework for fostering inclusive and ethical digital innovation in agri-food systems. The questionnaire addressed three key themes: Usability of the WaterCopilot, consequences, including benefits and risks, of using the WaterCopilot, and nature of relationships between different stakeholders. The questionnaires were answered by nine intended users and beneficiaries of the WaterCopilot across the four countries of the LRB. This information was complemented by observations and discussions carried out throughout the day about the WaterCopilot. The following are key insights from this assessment.

8.1.2. Usability of the WaterCopilot

Since the WaterCopilot had only been deployed in staging at the time to the workshop participants, the questionnaires were not able to evaluate user experience with the tool. However, it was observed to be user friendly from the demonstrations and hands on exercises done at the workshop. There are also plans to make it available in Portuguese, and to customise its prompts to different audiences, which will further enhance its usability. The WaterCopilot was ranked relatively high by the participants concerning its affordability, awareness about its benefits, and confidence in the support that will be offered to use it, with 89% of participants giving it a moderate to very high score regarding these indicators. However, several concerns emerged over its usability. First, many participants (55%) feel that they cannot predict all the costs associated with using and maintaining the WaterCopilot. Second, discussions during the workshop raised concerns about the availability of human resources needed to use the co-pilot due to understaffing, high turn-over, and challenges in attracting talented staff. Third, it was revealed that the responsibility and accountability involved in using the copilot for decision making may cause anxiety and discomfort for staff who are using it to make important decisions. Fourth, it was pointed out that the technology could be intimidating to use for staff within LIMCOM that do not consider themselves 'fully digital'. Finally, discussions pointed out that there might be sufficient data in some member states for the development and use of the WaterCopilot.

8.1.3. Consequences of using the WaterCopilot

The main benefit of the WaterCopilot, as pointed out by the participants, is making information access, as well as data collection and analysis faster and cheaper. Almost all participants (89%) think that the WaterCopilot will have all the needed features to function well, it is addressing an important and agent problem and will make their internal processes more modern and digitalised. The co-pilot is trained using documents from LIMCOM, which makes the solution it offers relevant to its users. While only 22% of surveyed respondents think that the tool poses risks to individuals, organisations, and communities within the LRB, discussions during the workshop pointed out a number of concerns. First, the technology is expensive to implement and maintain, raising doubts over its long-term viability as a decision-support tool within LIMCOM and the member states. Second, there might be lack of trust in the data and information provided through the WaterCopilot. Strategies such as including sources of information and data could help to mitigate this. There is also a need to carry out due diligence on the data and information provided by the tool. Third, there are concerns that relying on the WaterCopilot might replace manual processes of decision making, thus leading to loss of critical thinking skills within LIMCOM and other tool users. There is therefore a need to assess the extent of this risk and to document and archive alternative forms of knowledge and decision-making processes in case the risk of loss is substantial. Fourth, there is a risk of the technology replacing staff such as data scientists and software developers, which needs to be investigated and mitigated. Finally, if there is any bias in the data collected and used for the digital twin, the WaterCopilot will mirror this bias. There is therefore a need to carry out due diligence on the ethical aspects of the data used.

8.1.4. Stakeholder relationships in development and use of the WaterCopilot

The water-co-pilot is co-designed with LIMCOM, with feedback from the latter integrated into the tool's development at every stage. There is therefore an environment that fosters collaboration between tool developers and tool users in the tool's development and use. This is reflected in the questionnaire responses where 89% of respondents highly agree that they were actively involved in identifying the problem that the co-pilot addresses, they are actively involved in its development and have adequate channels to communicate with tool developers. Many respondents (78%) are also very confident that the procedures and policies used for the tool's development and use are transparent. However, discussions pointed out a need to establish and document protocols for data collection, storage, and use. There is also a need to align with pre-existing AI policies within member states, and to harmonise policies across member states. This can be done through AI policy dialogues involving all stakeholders of the WaterCopilot, as well as the relevant government agencies. Participants also highlighted the need for guidelines on accountability and responsibility on the decisions made using the WaterCopilot, and for engagements with rural communities as key stakeholders in the Digital Twin's development and use.

Feedback on the WaterCopilot was largely positive:

- It was described as "very simple, direct," and providing "verified" and "area-specific" information, making it preferable to general AI tools for regional work.
- The absence of paywalls and its user-friendly interface were highlighted as benefits.
- Participants noted its usefulness for real-time decision-making during emergencies like floods, allowing for immediate access to historical data, mini-reports, and future forecasts.
- The tool was seen as an "innovative way to invite them into the system," potentially countering initial user reluctance and fostering greater engagement with data.
- However, the impact on human skills was a notable concern raised. The potential for AI to foster "laziness" and erode fundamental human thinking skills, especially among younger generations, as AI provides immediate answers without requiring deep thought or manual processes. For water managers potentially losing traditional hydrological knowledge is a risk. The need to encourage young people to understand the respective roles of human and AI intelligence and to engage in critical thinking exercises was proposed.
- The importance of human verification of AI outputs was consistently emphasised, especially before sharing information with third parties.

- The tool highlighted the importance of continuous monitoring and ground observations to enrich the data feeding into the AI, making it even more useful.
- The ability to upload one's own data (e.g., shapefiles, CSVs) was seen as a valuable feature for filling data gaps and customising analysis to specific sub-basins or recent information.
- It was recognised that while the WaterCopilot is currently strong in hydrological aspects, there is interest in expanding its ecological functionalities (e.g., miniSASS, water quality, fish activity).

Overall, Day 3 provided a comprehensive exploration of AI's capabilities and challenges in water management, with a strong focus on practical application and the critical role of data quality, governance, and human oversight.

8.2. Stakeholder Feedback

This section presents insights from workshop participants on the groups they believe are at risk of being excluded from the benefits of the citizen science project. During the discussion, participants were encouraged to reflect on a range of potential exclusion factors, including gender disparities, literacy levels, unemployment, socio-economic status, and disability.

Figure 18 presents the question and prompts workshop participants were tasked to engage with.

Figure 18. Presentation slide on people at risk of digital exclusion. (*Source:* IWMI 2025)

Table 3 below summarizes the key findings from these discussions, highlighting the perceived vulnerabilities and underlying structural barriers faced by different groups:

Table 3. Individuals at risk of digital exclusion

People at risk of exclusion	Description
 **Elders and Indigenous people**	Elders are the custodians of indigenous knowledge which they have passed on orally for generations. They need to be included in the citizen science project because of this valuable contribution they offer.
 **Youth**	Raising awareness on water resource management at the stage of early childhood development. Involving schools is a good way to do this.
 **School leavers**	It is an opportunity to give them skills, especially if they are directly dependent on the Limpopo River Basin to support their livelihoods.
 **Women and girls**	Women are the main users of water in these communities inhabiting the Limpopo River Basin. They have the first points of contact with water as the managers of water in the household. Women are also mostly uneducated in comparison to men**.**
 **People with disabilities**	They can participate through data interpretation and analysis enabling them to make contributions from the comfort of their homes.

9. Next Steps Post-June 2025

In August and September 2025, GroundTruth and IWMI conducted a training workshop across the four member states to build the capacity of citizen scientists. IWMI led efforts to promote incentivization and digital inclusivity by engaging directly with local communities to collect data on their incentive preferences and explore the underlying motivations and immediate needs that the project can help address. This process ensured the collection of disaggregated data on age, gender, and disability to ensure that engagement strategies are equitable and responsive to community demographics.

The digital inclusivity of citizen science tools such as miniSASS, YOMA, and the DT was also evaluated, with particular focus on accessibility, usability, and relevance to diverse user groups. Feedback was collected from citizen scientists to inform the iterative improvement of these platforms, ensuring they are more user-friendly and accessible to a wider range of participants. These results will be available in an MDII report which will be published in March 2026 on CGSpace.

10. Conclusion

This report summarised the first, multi-stakeholder meeting that was facilitated by IWMI, with the support of LIMCOM, as part of a co-development effort in the citizen science for water management project funded by Enabel. The meeting was hosted in Gaborone, Botswana on the 11th of June 2025 and was well-attended by national government representatives, university students, water resource practitioners, public and private organisations.

This report provided a concise summary of the events, presentations and findings of the workshop. The takeaways of the workshop were considered in the planning and development of key activities of the project such as research methodologies and the train-the-trainers workshops educating LRB communities on citizen science and water monitoring. This report framed critical insights and learnings which will continue to be reflected upon beyond the lifespan of this project.

Annex A. Workshop Program.

Day III *11 June 2025: Session 1 Citizen Science*		
Time	**Description**	**Participants**
09:00 – 09:30	**Citizen Science Enable Project (P)** From Concept to implementation and the vision for scaling • Enabel Presentation (15 min) Citizen Science Project (10 m)	Henry Roman (IWMI) Khanya Bashe (UNICEF)(Online)
9:30 – 10:00	**Overview of the Citizen Science effort in the Limpopo River Basin (P)** GroundTruth (20 min and 10 min Q&A) • Digital tools to enable data collection • Actors in the Basin • Present how these data have been visualized and used by management - examples as case studies Implementation plan	Charlene Russell (GroundTruth) (Online)
10:00 – 11:30	**Co-design Visualization of citizen science data into the digital twin (P & H)** Group discussion by countries to facilitate discussions • Purpose and applications of CS in DT • Identifying key success metrics • Co-development of visualization - on paper, freehand drawings and text, and at the end of the session, key findings to be consolidated Decision Point: Clear definition of the visualization tool for each member state, identify similarities and differences	Hugo Retief (AWARD) Surajit Ghosh (IWMI) Nicole Langa (IWMI)
11:30 – 11:45	Coffee break	
11:45 – 12:15	**Youth Incentivization and Digital Inclusivity (P)** (20 min and 10 min Q&A) • Incentivization model - Education, engagement, upskilling • Inclusion evaluation of the project Results from partner survey	Daniella Darlington (IWMI) Nicole Langa (IWMI) Khaya Bashe (UNICEF)
12:25 – 12:30	Group photo	All
12:30 – 14:0	Lunch	All

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