# Workshop Report


Participant's group photo taken during tea break of the workshop (*Photo*: Rahel Mesganaw/IWMI)

**Unlocking local knowledge production for global water reanalysis**

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Organizer: International Water Management Institute (IWMI)

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# Unlocking local knowledge production for global water reanalysis

## Co-creation workshop report for case of Akaki catchment, Ethiopia.

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## Highlights of the workshop

- Developed a preliminary inventory of local knowledge, community practices, and non-conventional datasets relevant to hydrology, water resources management, flooding, droughts, land use, and water quality in Akaki catchment.

- Identified and characterized key datasets based on their type, spatial and temporal coverage, collection methods, accessibility, ownership, and relevance for hydrological modelling and water reanalysis applications.

- Mapped major data sources and stakeholder groups, including government agencies, universities, local communities, NGOs, citizen science initiatives, and development projects contributing to water-related observations and knowledge generation.

- Documented critical local practices influencing hydrological processes, including informal drainage management, flood adaptation strategies, groundwater use practices, and community-based environmental monitoring.

- Improving non-conventional data use in the Akaki catchment requires digitizing records, standardizing formats, and centralizing scattered data for hydrological modelling.

- Addressing data limitations will also require integrated data of local studies to provide spatial coverage of the catchment, improving continuity of time series records, and strengthening quality assurance procedures.

# 1 Introduction

## 1.1 Project background

Hydrological models are essential for managing water resources by enabling the assessment of catchment responses to changes in climate, land use, and different water management strategies. They also form the backbone of global water reanalysis products, which piece together past water cycle behavior by blending process-based models with historical records and satellite data. That said, in many parts of the world, particularly in data-scarce environments, the limited availability of long-term constrains the performance and applicability of these models, high-quality hydrological datasets.

This limitation in conventional data availability has directed attention toward non-conventional data and local knowledge. Non-conventional data refers to non-statutory qualitative and/or quantitative information collected by entities, whether government, non-government organizations, citizen science initiatives, community observations, projects, universities, or any institute, that do not have an official mandate to collect and provide that data. Such sources also include local knowledge held by residents and communities. While these non-conventional sources cannot fully replace standard hydrological records, their systematic integration into modelling frameworks enhances the reliability of water resource assessments, particularly where conventional data remain sparse.

Even though these non-conventional data sources hold real promise, they remain largely unrecorded, scattered across different places, and rarely used in process-based hydrological modelling or global water reanalysis. The main hurdles are finding them, accessing them, and fitting them into existing modelling frameworks. To tackle this problem, the International Water Management Institute, working with Imperial College London, is stepping in through a Schmidt Science-funded project called Unlocking Local Knowledge Production for Global Water Reanalysis. The aim is to develop a blueprint for a simulation system that is tailored to local and regional needs, which includes identifying where local knowledge is missing and setting priorities to fill those gaps. As part of this effort, a workshop was held in Addis Ababa, Ethiopia (for Akaki catchment, which is one of the three pilot countries—Ghana, Ethiopia, and Laos) aiming to identify and characterize local knowledge, practices, and non-conventional datasets, thereby supporting the broader goal of unlocking historical and community-based information to improve hydrological models and water reanalysis.

Akaki catchment is a suitable pilot site because it combines high water risk, strategic importance, and an existing citizen science platform. As the headwater of the Awash River and an area closely linked to Addis Ababa, agriculture, and water supply reservoirs, the catchment is under growing pressure from water scarcity, pollution, flooding, and public health threats. At the same time, the citizen science program established by IWMI and local stakeholders provides a practical entry point for testing how reanalysis water data can be better understood and used by communities and decision-makers to improve water risk management.

### 1.2 Workshop objectives

The main aim of the workshop is to identify and prioritize existing local knowledge, practices, and non-conventional historical datasets related to hydrology, water resources management, and land-water interactions in the Akaki catchment.

Specifically, the workshop was aimed at:

- Reach a common understanding about the importance of non-conventional datasets in global water reanalysis data.
- Make an Inventory of local knowledge, practices, and non-conventional datasets relevant to water systems in the Akaki catchment.
- Characterize the identified datasets, including mapping the data sources, data owners for the identified datasets and mechanisms of accessing them.
- Gather stakeholders' feedback on the data gaps and limitations.

### 1.3 Participants

The workshop brought together participants from a range of institutions such as the Ministry of Water and Energy, Addis Ababa Water and Sewerage Authority, Ethiopian Space and Geospatial Institute, Addis Ababa Fire and Disaster Risk Management Commission, Addis Ababa Environmental Protection Authority, Ethiopian Meteorology Institute, Ethiopian Engineering Corporation, Water Witness International, researchers and community representatives. This broad representation across multiple sectors helped ensure that the data inventory was reviewed from different perspectives and assessed more comprehensively and reliably.

The participants also have diverse backgrounds, including eco-hydrology, hydrological monitoring, data management, disaster risk management, environmental science and management, water resources management, and Gender Equality and Social Inclusion. They represent diverse positions including senior engineer, technician, manager, lecturer, and student. Some of them already have direct engagement in citizen science programs or participated in consultation workshops of such programs in the past.

The workshop participants expected to gain a clear understanding of non-conventional historical data and how it differs from conventional datasets, as well as how these diverse data sources can be integrated to improve and adjust existing hydrological and flood modeling approaches. They aim to identify additional non-conventional data sources that can strengthen reanalysis models and to develop practical knowledge on managing, collecting, organizing, archiving, and effectively using such data for water resources analysis. Participants also expect to learn how to systematically document and utilize local and indigenous knowledge to support evidence-based decision-making and policy processes, while enhancing model performance. Overall, they seek approaches to integrate fragmented community knowledge and non-conventional data into hydrological science in ways that improve the accuracy, relevance, and impact for decision-makers.

# 2 Workshop methodology

This section describes how the workshop was structured and conducted. The workshop followed a mixed format that included presentations, interactive discussions, group breakout sessions, and a final reflection on future steps. To prepare the participants for the workshop, it began with a set of presentations covering the project background, its rationale, and the concept of non-conventional data. Following the presentations, an open discussion was held to gather participants' feedback and address questions. The workshop then moved into group breakout discussions, concluded with a reflection session, and ended with an outline of the project plans in the Akaki catchment.

# 3 Workshop proceedings

This section summarizes the main activities and discussions that took place during the workshop.

### 3.1 Opening Presentations and Discussion

After a welcoming remark, presentations were delivered, followed by a discussion in which participants raised key points and questions. The first two presentations provided broad overviews. The first gave an overview of the “Unlocking local knowledge production for global water reanalysis” project. It described the consortium members and lead institutions along with their responsibilities in the project. The project will develop the science and methods for co-producing and integrating local knowledge and non-conventional data within reanalysis workflows, with a specific focus on transferability across locations and variables, and interoperability with diverse model structures and computing environments. This will allow the project to work closely with other consortia supported by [The Virtual Institute for Earth’s Water (VIEW)] to enable access to data streams, and integration of assimilation routines, model components, and visualization solutions, for example, through Application Programming Interfaces (APIs) and adoption of open standards. IWMI leads the first work package (WP1), which deals with Knowledge co-production, of the project (Figure 1). This WP addresses non-statutory monitoring, citizen observations and local and expert knowledge across pilot sites and beyond.

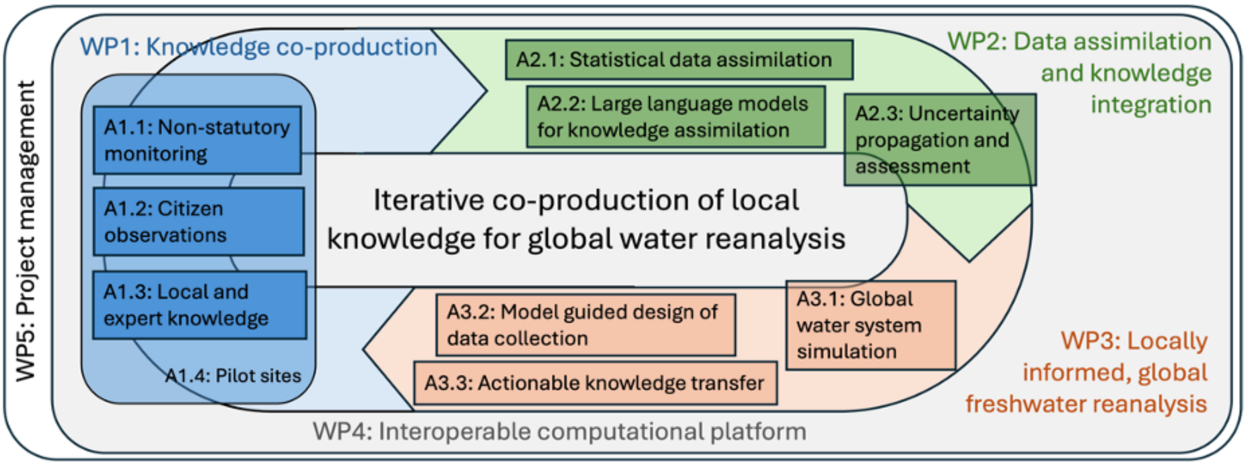


Figure 1 : Workflow and structure of the project - Unlocking local knowledge production for global water reanalysis[1]

The second presentation provided an overview of global reanalysis data, defined what reanalysis data are, presented examples of climate and water reanalysis data, and discussed how local actors can

[1] https://doi.org/10.5194/egusphere-egu26-14743, 2026

enhance the performance and applicability of water reanalysis data. Reanalysis, as defined in the presentation, is the process of correcting an existing global model by incorporating updated ground observation data, when made available and accessible. Therefore, data assimilation from various sources is essential for reanalyzing through global models to obtain accurate results. In the past, global water reanalysis models relied solely on conventional data; however, this project aims to maximize the benefit of non-conventional data for reanalysis. The gaps in reanalysis data are shown in Figure 2.


Figure 2 : Main gaps affecting the operational application of global water reanalysis data

Following the presentations, participants shared their reflections, which are presented in Table 1.

Table 1: key discussion points and way forward from the opening session

| Question | Response / Way Forward |
|---|---|
| Data security – Some basins are highly sensitive, making it difficult to implement open access to hydrological data. How will the project handle data security? | Data security concerns are mostly associated with conventional datasets. Non-conventional data – such as local community observations or information from published scientific papers – often do not carry the same level of sensitivity. These can be used without the same security restrictions, but any existing restrictions will be handled by consulting data owners. |
| Can this project be scaled up to other river basins? | The Akaki catchment has been selected as the pilot site based on previous experience with citizen science (CS) and community-based flood early warning systems (CBFEWS). Lessons learned from the pilot site will inform potential scaling to other basins. |
| Does non-conventional data include both surface water and subsurface water? | Any data that can affect water availability, use and management – whether surface water or subsurface water – is considered non-conventional data to feed into the global re-analysis model. |
| Much of the non-conventional data, such as local knowledge, is not continuous or time-series based, as it comes from various sources. How will data quality be checked, and how will such | This is precisely the core research question that the project will answer over its five-year duration. The project will develop robust methodologies and approaches to assess data quality, error propagation to models, and integration of data with various spatial and temporal characteristics. |

| | |
|---|---|
| data be integrated into the global re-analysis model? | |
| Who has the mandate to collect and organize this non-conventional data? | At the end of the project, a data center or an application programming interface (API) may be established to provide open access to the data for research purposes. This question will be addressed as part of the project's final outcomes. |
| How will the project integrate non-conventional data in the global re-analysis model? | This is one of the project's research questions to be answered. |
| What is the incentive mechanism for communities that participate in sharing non-conventional data? | In this research activity, barriers that may impede the tapping of community knowledge will be identified, and techniques to address them will be developed. Incentives for sharing non-conventional will be assessed and clearly communicated with the data owners. |

The third and final presentation was more detailed, focusing specifically on non-conventional hydrological data and practice in Ethiopia and the Akaki catchment. Drawing on a literature review and a conceptual framework, this presentation first clarified what is meant by "non-statutory" or "non-conventional" hydrological data and practices, and why they matter. The definition adopted was water-related observations produced outside government-mandated monitoring systems, which nevertheless hold scientific or operational value. However, IWMI is conducting a literature review to synthesize existing global knowledge on "non-conventional" hydrological data and practices. The definition of terms will be revised based on the findings of the literature review. The framework used to answer different research questions was organized around three axes: (i) sources of non-conventional data and local practice, (ii) characteristics of non-conventional data and local practice, and (iii) mechanisms for using them. The first two questions will be addressed by IWMI and partners in 2026.

In practical terms, the following non-conventional hydrological data sources were identified as being available in Ethiopia: NGO-managed water point information systems; private sector and construction-related hydrological practices; quality-controlled community monitoring networks and citizen science initiatives; remote sensing and derived products; citizen science initiatives for flood early warning systems; research-driven citizen science applied as modelling inputs; research-led monitoring campaigns; and stakeholder knowledge used as supporting evidence.

These non-conventional data sources can be characterized according to their spatial and temporal coverage, collection method, accessibility and ownership, reliability and uncertainty, and the challenges involved in accessing the data (Figure 3). The literature review on using non-conventional data in Ethiopia revealed several recurring issues: documentation and governance gaps appear across most sources; integration is lacking with absence of an institutional home; local and indigenous knowledge is largely absent from current efforts; and the utility of such data is clearest in data-scarce contexts.

**Stakeholder and community knowledge as evidence** (Hailesilassie et al., 2024)

**o data type and format**

- Qualitative social data on water use and governance
- Structured household and community survey responses
- Interview transcripts and observational field notes

**o spatial and temporal coverage**

- *Spatial*: Akaki River system
- *Scale:* household, community, institutional levels (one-time)
- *Temporal*: 2022

**o collection methods**

- Structured and semi-structured surveys
- Key informant interviews and household discussions
- Direct field observation by researchers

**o accessibility and ownership**

- Data held by research team
- Access via academic publications
- No formal data-sovereignty framework reported

**o reliability and uncertainty**

- Contextual, experience-based evidence
- No standardized hydrological validation
- Highlights governance and institutional uncertainty

**o challenges in accessing data**

- Not part of statutory monitoring systems
- No standardized metadata framework
- Limited availability beyond academic dissemination

Figure 3 : Typical characterization of non-conventional data using six themes.[2]

## 3.2 Identification of local knowledge and non-conventional data

This part of the workshop consisted of breakout group discussions. Four diverse groups were formed based on participants' experience and professional backgrounds in areas related to water resources management and engineering (Group 1), water supply and sewerage (Group 2), data and risk (Group 3), and water quality (Group 4), with a particular focus on the Akaki context. All groups worked on two common activities:

- **Activity (i):** To list and rank local practices and activities in the Akaki catchment that have a significant impact on water resources management, accessibility, and use – especially across different seasons.
- **Activity (ii):** To list non-conventional data sources in the Akaki catchment that could serve as evidence to support the above.
- **Activity (iii):** Characterize each of the identified non-conventional data and local knowledge practices based on:

[2] https://doi.org/10.1007/s40899-024-01068-5

- Data type and format
- Spatial and temporal coverage
- Collection methods and who collects them
- Accessibility and ownership
- Reliability and uncertainty
- Challenges in accessing data

After completing these two activities, each group prioritized the data baed on their impact in supporting improvements in global water reanalysis data (Figure 4).

Figure 4 : Discussion in group breakouts (Photo credit: Rahel Mesganaw)

# 4 key outputs and findings

This section presents the synthesized outputs generated by the four breakout groups during the workshop. The groups worked through a series of structured activities mentioned above, the results of which are summarized below.

### 4.1 Listing and ranking local practices affecting water resources management

For this activity, participants were asked to list and rank local practices and activities within the Akaki catchment that significantly impact water resources management, water accessibility, and water use. Building on this list, each group was then asked to rank the identified local practices and activities according to their direct impact on the water resources system of the Akaki catchment. The ranking considered factors such as the scale of each activity, its frequency, and the severity of its consequences for both surface water and groundwater. The synthesized lists and ranking outputs from the group breakout discussions are summarized in Table 2 and 3.

Table 2: Harmonized impact categories mapped to the original statements from each co-design group.

| Harmonized practice category | Group 1 | Group 2 | Group 3 | Group 4 |
|---|---|---|---|---|
| Urbanization / land use change | Urbanization, industrialization | Land use change (urbanization) | – | – |
| Deforestation & land degradation | Land use management (deforestation and degradation) | – | – | Deforestation |
| Traditional storm water diversion practices | Lack of a drainage system | Lack of proper storm water management | – | Poor drainage system |
| Inadequate solid and liquid waste management practices | Lack of liquid and solid waste management | Poor solid waste management | Liquid and solid waste management practice | – |
| Discharge of untreated wastewater discharge to the environment | – | Discharge untreated wastewater | – | – |
| Unsustainable agricultural practices (incl. fertilizer/pesticide misuse, farming methods) | Improper agricultural practices management | – | – | – |
| Intensive irrigation (urban & small-scale) | – | Over-abstractions of water for intensive irrigation | Urban and small-scale irrigation activities | Irrigation activity |
| Over-abstraction of water (surface & groundwater for multiple uses) | Groundwater over abstraction | Over water abstractions (surface & ground) | Borehole for household/industrial use | – |
| Water supply infrastructure issues (leakage, lack, failure) | Infrastructure related issues (pipe system leakage, failure) | – | – | Lack of water infrastructure |
| Sand mining / quarrying | – | Mineral exploration (sand and quarry) | Sand mining | – |
| Informal settlement encroaching on riverbanks | – | Informal settlements up to riverbank | Informal settlement riverbank practice | Unplanned settlement around buffer |
| Weak institutional coordination | – | Weak institutional coordination's | – | – |
| Livestock production pressure | – | Over abstractions of water: Livestock production | Livestock production | Livestock consumption |
| Flood protection & groundwater assessment activities | – | – | Flood protection and groundwater assessment; Flood marking from community field survey | – |
| Release of pollutants to water bodies | Water quality/ water quality deterioration | – | – | Water pollution (surface and ground) |
| Inefficient water utilization & wastage | – | – | – | Inefficient water utilization practice |
| Inadequate interventions to | – | – | – | Water scarcity |

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| alleviate water scarcity | | | | |
| Limited attention to flood & drought problems | – | – | – | Flood and drought problem |
| Practices that exacerbate Sedimentation | – | – | – | Sedimentation (degradation, construction) |
| Inadequate water quality monitoring network | – | – | – | Inadequate monitoring site |

Table 3: Ranking of human practices or consequences based on their impacts on the Akaki catchment water system, with the ranks assigned by each co-creation group.

| Human practices or consequences | Group 1 ranks | Group 2 ranks | Group 3 ranks | Group 4 ranks |
|---|---|---|---|---|
| Urbanization | 1 | - | - | - |
| Land-use change (deforestation & land degradation) | 2 | 3 | - | 13 |
| Agricultural & livestock practices (improper farming, irrigation, fertilizer/pesticide, livestock water use) | - | – | 4 | 5 |
| Over-abstraction of water (surface & groundwater, borehole drilling) | 5 | 1 | 6 | 3 |
| Water pollution / low water quality | 7 | – | - | 2 |
| Discharge of untreated wastewater | - | 2 | - | – |
| Inadequate solid and liquid waste management practices | 4 | 6 | 1 | |
| Traditional storm water diversion practices | 3 | 5 | - | 8 |
| Water supply infrastructure issues (leakage, lack of infrastructure) | 6 | – | - | 6 |
| Sand & quarry mining | – | 4 | 5 | – |
| Practices that exacerbate sedimentation | – | – | – | 10 |
| Weak institutional coordination & governance | – | 7 | – | – |
| Limited attention to flood & drought problems | – | – | – | 7 |
| Flood management & disaster risk reduction activities | – | – | 3 | – |
| Informal settlement encroaching on riverbanks | – | 8 | 2 | 9 |
| Inadequate interventions to alleviate water scarcity | – | – | – | 1 |
| Water wastage & inefficient water use | – | – | – | 4 |
| Inadequate monitoring network | – | – | – | 12 |

## 4.2 Non-conventional data sources existing for Akaki catchment

For this activity, groups compiled a comprehensive list of non-conventional data sources that are already available or potentially accessible within the Akaki catchment and the Addis Ababa area (Table 4). The list was noted to be rich in qualitative observations but fragmented in format and temporal coverage.

Table 4: List of Non-Conventional data sources that exist for the Akaki catchment

| Non-Conventional Data Source | Data Type |
|---|---|
| Community groups (including block/voluntary community groups and general community) | Local knowledge providing qualitative data; river water levels and discharge; flood-risk hotspots (existing); observations and reporting; experiential and indigenous knowledge. |
| Citizen science initiatives | Various hydrological and environmental data (including monitoring of water pollution, land use, and water use under projects such as Water Audit and GCRF). |
| Consultants / designing offices / consultancy firms | Project feasibility studies and reports that derive new data based on existing conventional and non-conventional data obtained through biophysical and socio-economic data collection. |
| Research centers, universities, and academic institutes (e.g., WLRC, Addis Ababa University) | Research datasets, monitoring campaigns, water pollution, land use, citizen science data, water use assessment, soil and vegetation data, satellite and geospatial data for flood hot-spot sites |
| Impact assessment reports | Environmental and social impact data. |
| Addis Ababa Water and Sewerage Authority (AAWASA) | Detailed water supply & wastewater operations;<br>Daily surface and groundwater production; number and locations of wells (private and government); withdrawal per well; water demand data (population, actual customer data); actual water distribution data; loss due to leakage; reservoir data (water level, capacity – Elevation-Storage-Area rating curves); wastewater treatment plant location, capacity, and wastewater quality data |
| Addis Ababa Environmental Protection Authority (AAEPA) | Water quality / pollution status |
| NGOs and related (e.g., Blue Deal, Vitens international, Water works drilling consultant company) | Industry water use and affluent discharge data, reservoirs' catchment data (type of intervention, land use data), groundwater data (drawdown, yield, depth) |
| Utility reports (e.g., from "Sertoaders and Berta utilities", around Saris Worku sefer) | Auditing of water use and water budget |
| Institutes (e.g., Space Science and Geospatial Institutes – SSGI) | Can access satellite and other relevant data for different institutes and flood hotspot sites |
| Social media | Location, time, and amount of flood (with photo) |
| Remote sensing | Digital Elevation Model data for terrain analysis, flood modelling, and catchment delineation |
| Different associations (e.g., Irrigation association, water association) | Local water use patterns, irrigation scheduling, and community water management practices |
| Water-related government offices – FDRMC (Federal Disaster Risk Management Commission) | Disaster risk data, flood extent, and early warning information |
| Campaign-based pollution data (2024-2025) | River water quality data, plastic, soil, and air pollution data from the most polluted river(s) in the entire Addis Ababa |
| Private institutions (Hotels, Industries – e.g., Beverage authorities) | Water abstraction and discharge data, internal water use, and pretreatment practices |
| Ministry of water and Energy, IWMI, Health sectors | Socio-economic related data |
| Woreda agricultural offices | Water audit |

## 4.3 Characteristics of Non-Conventional Data

The final activity focused on characterising the non-conventional data sources identified in Activity 2. Groups applied a common framework that examined each data source across six themes: data type and format, spatial and temporal coverage, collection method and collector, accessibility and ownership, reliability and uncertainty, and challenges in accessing the data (Table 5). The findings showed that most non-conventional sources in the Akaki catchment are paper-based or stored in unstandardized digital files (e.g., spreadsheets, photographs, handwritten logs). Spatial coverage is typically localized to neighborhoods or specific monitoring points rather than catchment-wide, and temporal coverage is often discontinuous, ranging from a few months to a few years of intermittent records. Collection methods vary widely, from trained NGO staff to volunteer community members, leading to variable reliability. Accessibility is generally high for community-held data but low for data locked within private companies or unpublished theses. The groups identified the lack of a centralised inventory and inconsistent quality assurance as the two most significant challenges to using these data in hydrological modelling.

Table 5: Characteristics of non-convectional data identified for the Akaki catchment

| Data Source / Practice | Data Type & Format | Spatial & Temporal Coverage | Collection Method & Who Collects | Accessibility & Ownership | Reliability & Uncertainty | Challenges in Accessing Data |
|---|---|---|---|---|---|---|
| Water quality parameters (micro-invertebrate, physical, chemical, biological; threat assessment; discharge permit identification) | Electronic | 2019–2024; whole catchment | Citizen scientists and researchers using MINISASS tool | WLRC (Research Institute) | Reliable | No challenge |
| Industry water use and effluent discharge data | Electronic | 2016–present; upper Awash (~120 industries) | Experts (Blue Deal NGO) | Blue Deal (NGO) | Reliable | No challenge |
| Bio-physical (land use mapping) | Electronic | 2019–2024; whole catchment | Researchers (WLRC) | WLRC | Reliable | No challenge |
| Utility records (water use, revenue, salary, audit reports) | Paper format | 2012–present; Saris Worku Sefer woreda | Water user association executive (WASCO) | Serto Aders and Berta Utilities | Reliable | No challenge |
| Community and voluntary groups | Qualitative and quantitative (GPS points, text, images) | Specific locations; rapid assessment twice per year | Mobile apps, manual logs, interviews, surveys. Collected by: AAFDRMC, AAEPA, Community Engagement Commission, urban agriculture, public health office, AAWASA, NGOs | Medium–high (spatial coverage varies) | Risk overestimation possible | Data security culture; manual records; no central database; overlapping mandates |
| Consultants/design firms (feasibility | Qualitative and quantitative | Catchment-wide, city, national | Surveys, key informant interviews, | High (but confidential) | Highly reliable | Not open access; metadata |

| | | | | | | |
|---|---|---|---|---|---|---|
| studies, project reports) | (GPS, text, raster, GIS layers) | | requests to mandated bodies. Collected by: ERA, EEC, AAWASA | | | missing; digital data often absent |
| Municipal operational records (hotspots, infrastructure damage, law enforcement, informal settlements, dam releases) | Quantitative and qualitative | City scale | Primary observation by AAWASA, AAEPA, Urban Commission, Riverside Development Authority, Addis Ababa Cleansing Agency | High | Data not well organized; not digitized; sensitive or confidential | Can be assessed upon request |
| Liquid and solid waste data | Qualitative and quantitative (GPS, text) | City scale | Primary observation by AAWASA, AAEPA | High | Data not well organized; not digitized; sensitive | Can be assessed upon request |
| Impact assessment reports (pollution hotspots, pollutant sources) | Qualitative and quantitative (GPS, text, images, raster, GIS) | Specific locations | Field surveys, interviews, and community discussions. Collected by: Addis Ababa Investment Commission, AAEPA | Highly | No organized database; produced by multiple parties; digital copies often unavailable | Can be assessed upon request |
| Research centers and universities (groundwater, surface water, soil, risk, flood profile) | Qualitative and quantitative (GPS, text, raster, GIS) | National, basin, catchment, city, woreda | Primary and secondary data generation. Collected by: IWMI, Addis Ababa University, Kotebe University, EEC | Medium-high | Not in an organized repository; not freely accessible; some data is outdated | Data request letter required |
| Surface water abstraction | Daily surface water production, reservoir water levels. Format: Excel | Spatial: Discrete points. Temporal: Daily coverage, 2010-current | Manual and semi-automatic tools. Collected by AAWSA | Medium-high | Compare daily recorded production with SCADA readings; check inflow/outflow pressure/flow rates for irregularities | Requires formal request; possible delays |
| Groundwater abstraction - private & government | Number of wells & locations, daily groundwater production, water level. Format: Excel, shapefiles | Spatial: Entire Akaki catchment. Temporal: Daily coverage, 2010-current | Manual and semi-automatic tools. Collected by AAWSA (Gashaw Mihret) | Data request letter to AAWSA | Compare daily production with SCADA output; check inflow/outflow pressure/flow irregularities | Requires a formal request; private well data may be incomplete |
| River water quality data - EPA | Physical & chemical river water | Spatial: Major rivers within Addis Ababa. | Laboratory analysis. | Data request letter to EPA | Follows standard | Access requires |

| | | | | | | |
|---|---|---|---|---|---|---|
| | quality. Format: Excel | Temporal: One-time campaign (2025) | Collected by the EPA | | guidelines (reliable) | official request |
| Water Use (Domestic, livestock, infrastructure, source type, abstraction, population no, collection date, water permit states, crop type, topology, scale | Excel, Geospatial | Catchment scale | Field survey | WLRC (Research Institute) | Not verified | Not accessible |
| Soil data | Excel, Geospatial | Basin scale | Field survey | MoWE | Not verified | Accessible |
| Flood Hotspot | Excel, Geospatial | Catchment scale (kebele level) | Field survey | AAFDRMC | Not verified | Accessible |

# 5 Conclusions and way forward

## 5.1 Summary of workshop outcomes

The workshop successfully brought together a diverse group of participants, including researchers, academics, construction professionals, students, interns, and citizen scientists. This diversity was essential for addressing the project's objectives. Breakout groups were systematically formed around four thematic areas: Risk, Data, Water Resources, and Water Quality, all centered on the Addis Ababa context. This structured approach enabled the collection of a wide range of insights and local knowledge, significantly enriching the workshop outputs. One of the key outcomes is creating awareness and common understanding about the need to identify, characterize and integrate non-conventional data sources to support water reanalysis data in Akaki and beyond.

Nevertheless, the workshop agenda proved too ambitious for a single day. As a result, the planned session on future activities could not be fully delivered and was instead communicated orally. This timing constraint will be addressed in future workshops by prioritizing core activities and allowing more time for forward-planning discussions.

## 5.2 Lessons learned

Several key lessons emerged from the workshop. First, engaging participants from multiple sectors and experience levels greatly enhanced the identification and characterization of non-conventional data sources. Second, the use of thematic breakout groups based on professional backgrounds (risk, data, water resources, water quality) proved effective at generating focused, actionable outputs. Third, the workshop highlighted the need for a structured, ongoing process to document and integrate local knowledge, as much of this information remains informal and scattered across different actors. Overall, the workshop provided more insights into non-conventional quantitative data than qualitative data, highlighting the need for further research on qualitative data and their characteristics.

A critical limitation was the insufficient time allocated to present and discuss the way forward. Future workshops should be designed as two-day events, or alternatively, the scope of presentations should be reduced to ensure that action planning receives dedicated attention.

### 5.3 Action plans drafted

In the Akaki catchment, seventeen rainfall monitoring sites and five streamflow monitoring sites have already been rehabilitated as part of the citizen science activity. Most of these stations have been operational since 2020, and the citizen scientist teams responsible for their maintenance are well-trained and experienced in hydro-meteorological data monitoring. This existing network provides a strong foundation for the current project, ensuring a reliable supply of high-quality hydro-meteorological data.

Building on this foundation, the project will expand the scope of citizen science data to explicitly include non-conventional data sources for the purpose of informing water reanalysis data. To this end, an inventory of non-conventional data sources will be compiled building on the workshop findings, and each identified source will be systematically characterized. This will be achieved through direct communication with stakeholders and data holders during the survey process, ensuring that local knowledge and non-statutory datasets are properly documented, assessed, and prepared for integration into the global re-analysis framework.

### 5.4 Way forward

The project will proceed with the following key actions in 2026:

- In collaboration with MoWE and local community, the project will expand citizen science monitoring to capture rainfall and streamflow data across the Akaki catchment.
- Develop a comprehensive inventory of non-conventional data sources, including their

characteristics, accessibility, and limitations.

- Further characterize each data source using the framework established during the workshop (data type, spatial and temporal coverage, collection method, ownership, reliability, and access challenges).
- Engage with data holders through structured surveys and interviews to ensure full documentation and quality assessment.
- Detail description of activities based on field survey results, community consultation and stakeholder interest to enhance and integrate prioritized non-conventional data into the hydrological modelling and global re-analysis workflow over the five-year project duration.

The workshop confirmed both the availability and the untapped potential of non-conventional data in the Akaki catchment. With systematic efforts to document, characterize, and integrate these data sources, the project will contribute significantly to improving global water re-analysis models, particularly in data-scarce regions such as Ethiopia.

The International Water Management Institute (IWMI) is an international, research-for-development organization that works with governments, civil society and the private sector to solve water problems in developing countries and scale up solutions. Through partnership, IWMI combines research on the sustainable use of water and land resources, knowledge services and products with capacity strengthening, dialogue and policy analysis to support implementation of water management solutions for agriculture, ecosystems, climate change and inclusive economic growth. Headquartered in Colombo, Sri Lanka, IWMI is a CGIAR Research Center with offices in 17 countries and a global network of scientists operating in more than 55 countries.

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