Title: Pangani Basin Rating Curve Initiative, 2025

A Group Photo Of Workshop Participants

A photo of participants working on computers

A fieldwork photo on the Kikuletwa River at 1DD1 streamflow gauging station – Kikuletwa at TPC

Executive Summary:

In November 2025, NTWAM partnered with the Pangani Basin Water Board (PBWB) to tackle a critical challenge: inaccurate river flow data due to outdated rating curves. This intensive 7-day workshop equipped 15 PBWB hydrologists and engineers with advanced skills to develop, maintain, and update these curves, directly enhancing water resource management for millions of people in the Pangani Basin.

Key Impact Numbers:

(i) **15** Hydrology & Water Professionals Trained (*with more than 30% women participation*).
(ii) **1** Basin Water Board (with **8** key gauging stations targeted).
(iii) **56+** Total Training Hours (Theory & Fieldwork).
(iv) **100%** of participants rated the facilitator's skill as "High" or "Very High".
(v) **Key Tools Mastered:** Excel Solver, HEC-RAS, QGIS

Context:

The Pangani Basin is a lifeline for communities, agriculture, and hydropower in northern Tanzania. However, the Pangani Basin Water Board (PBWB) faced a significant operational gap: their rating curves—the essential formulas that convert river water levels into flow data—were outdated. This led to potential inaccuracies in water allocation, flood forecasting, and overall resource planning, impacting everything from farmer irrigation schedules to dam operations.

The NTWAM Solution:

Recognizing this critical need, NTWAM designed an immersive 7-day training programme, held from November 24th to 30th, 2025, at the PBWB offices in Moshi, Kilimanjaro. The curriculum was built on a "learn-by-doing" methodology, moving beyond theory to tackle real-world problems:

(i) **Theoretical Foundations:** Participants revisited the principles of hydrology and the science of stage-discharge relationships.
(ii) **Hands-On Software Training:** The workshop focused on practical application, teaching participants to use tools like **Excel Solver** for parameter optimization, **HEC-RAS** for rating curves extensions based on hydraulic analysis, and **QGIS** for spatial analysis.
(iii) **Real-World Data:** Attendees worked directly with their own field data from key stations like **1DD1 (Kikuletwa at TPC)** and **1DC1 (Ruvu at Tingatinga)**.
(iv) **Field Validation:** The training culminated in a field visit to these very stations, where participants practiced discharge measurement techniques and assessed the physical conditions affecting the gauging sites.

The Facilitator(s):

The programme was facilitated by **Prof. Preksedis Marco Ndomba**, Executive Director of NTWAM and Rector of the Dar es Salaam Institute of Technology (DIT). Prof. Ndomba

brought decades of academic and practical expertise, ensuring the training was both globally informed and locally relevant.

Testimonials:

"The session on finding the parameters K, n, and Ho using the Solver in Excel was a game-changer. We used to see these curves as fixed, but now we have the power to build and validate them ourselves, ensuring our data is always accurate."

— Workshop Participant, Hydrology Section

"The fieldwork at Kikuletwa was invaluable. It's one thing to analyze data in the office, but to be at the station, understanding how the channel control and sediment impact the readings, gives us the full picture. We're now much more confident in assessing our stations' suitability."

— Arone Peter, Hydrologist

Photo Gallery:

Intensive Learning: Participants engage in a hands-on session using Excel Solver to analyze complex rating curve data.

The Expert(s): Prof. Preksedis Ndomba leading a discussion on data quality control and shift adjustments.

Fieldwork in Action: The team at the 1DC1 gauging station on the Ruvu River, putting theory into practice.

A Group Photo Of Workshop Participants

Spotlight Question from evaluation forms:

Q: What aspects of this course were most useful or valuable?

"The most valuable aspects involved developing rating curves using simple types (power and polynomial), calibrating, maintaining, and updating them, as well as complex rating curve development. Finding the parameters K, n, and Ho using the Solver in Excel... was highlighted as a useful skill."

— Compiled from participant feedback

Assessment Results:

While formal pre- and post-tests were not conducted, participant feedback was overwhelmingly positive. 100% of respondents rated the facilitator's skill and responsiveness as high, and the course content was praised for its direct applicability to their daily tasks. The most significant outcome is the creation of a concrete, resourced plan.

Action Plans: The 12-Month Roadmap

The training's most powerful output is a **comprehensive, 4-phase action plan** developed *by* the participants *for* the Pangani Basin. This is not just a wish list; it is a resourced roadmap to permanently solve the rating curve challenge.

(i) **Phase 1 (Months 1-2): Prioritization.** PBWB will prioritize key stations like 1DD1 and 1DC1 for immediate review.
(ii) **Phase 2 (Months 3-6): Data Collection.** Field campaigns using ADCP and current meters will capture new data across all flow conditions.
(iii) **Phase 3 (Months 7-9): Recalibration.** Using the skills learned, staff will redevelop and validate the curves with statistical tests.
(iv) **Phase 4 (Months 10-12): Implementation.** New curves will be integrated into PBWB's database, with full documentation and staff training on routine maintenance.

Next Steps:

NTWAM will continue to provide remote technical backstopping to the PBWB team as they embark on their action plan. This pilot programme also serves as a model for similar initiatives with other Basin Water Boards across Tanzania. Based on participant feedback requesting even more practical application, NTWAM is exploring a follow-up "advanced practicum" focused on sediment sampling and hydrological modeling.