Auditing Groundwater for Sustainable Futures: Performance audit on the POG TANK Water Supply Project in Surin Province

Session 2: Drinking water stream: Audit cases on drinking water projects

Abstract

This case study presents a performance audit of the POG TANK groundwater supply project in Surin Province, Thailand — a local innovation aimed at improving rural access to clean water. Despite substantial public investment, the audit by the State Audit Office of Thailand found that 60% of the systems were underutilized or non-functional due to issues in infrastructure, water quality monitoring, and local governance. The findings underscore the need for feasibility screening, routine testing, capacity-building, and community engagement. Introducing the "Blue Value" perspective, the study calls for recognizing groundwater as a strategic natural asset to ensure sustainable investment and governance in line with SDG 6.

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Auditing Groundwater for Sustainable Futures: Performance audit on the POG TANK Water Supply Project in Surin Province [1]

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Access to clean and safe water remains one of the world's most fundamental human rights and development goals. Yet, for many rural communities, particularly in developing countries, **groundwater** is the only reliable source of water — often hidden beneath the surface, underappreciated, and unmanaged.

In Thailand, the **POG TANK system** (Production of Groundwater Tank) was introduced as a local innovation to bring clean water to underserved rural villages. With support from the central budget, more than 100 million baht was allocated to install 20 POG TANK systems in Surin Province, aiming to enhance water accessibility, safety, and infrastructure efficiency.

POG TANK: Boosting Community Access to Groundwater in Thailand

POG TANK (Production of Groundwater Tank) is a compact, community-scale groundwater treatment solution designed for rapid deployment in rural and remote areas of Thailand. It features a modern, all-in-one design comprising:

1. **ACFS Multi-Purpose Storage Tank** – utilizes aeration, agitation, slow-up flow filtration, and gas drainage to remove sediments, rust, and odors.
2. **PnP Plug & Pump Station** – automates raw water intake, chemical dosing, aeration, and pumping with sensor-based protection systems.
3. **SFX Tower Tank** – a high-rise storage unit providing final-filtration and distribution after treatment.

POG TANK systems are:

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[1] This paper is prepared for 23rd INTOSAI WGEA Assembly on 1 July 2025 in session 2 at Qawra, Malta.

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- **Space-efficient** and easy to operate and maintain by a single person.
- **Customizable** to match raw water conditions and community size.
- **Resource-efficient**, delivering WHO-standard clean water quickly using minimal infrastructure.

Available in three sizes—Small, Medium, and Large—they serve from approximately 30 up to 120 households, with capacities ranging from 2.5 m^3/h to 7 m^3/h and quick 90-day installation timelines.

As a Thai innovation listed in the national innovation registry, POG TANK provides communities with a reliable link to groundwater, transforming an invisible natural asset into **safe, affordable drinking water**, while simplifying installation and upkeep.

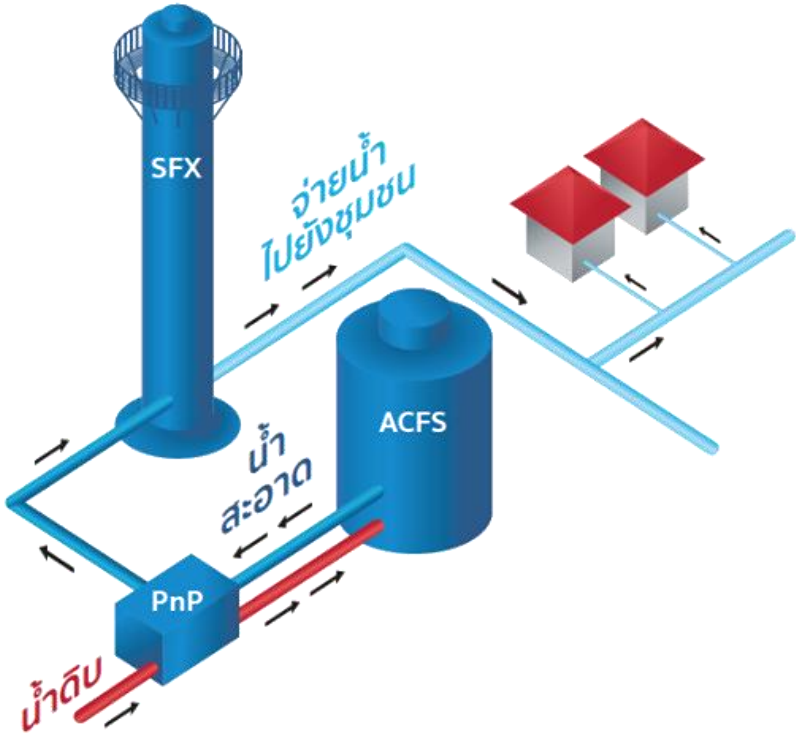

Figure 1: POG TANK (Production of Groundwater Tank) is a compact, community-scale groundwater treatment solution designed for rapid deployment in rural and remote areas of Thailand.

Figure 2: ACFS Multi-Purpose Storage Tank

Figure 3: PnP Plug & Pump Station

Figure 4: SFX Tower Tank

Why Audit a Groundwater Project?

Despite the intention to improve rural water access, many **POG TANK systems were either unused or underperforming**, leading to **missed development outcomes and eroded public confidence**. In response, the **State Audit Office of the Kingdom of Thailand (SAO)** launched an environmental performance audit to evaluate four core areas:

1. **Functionality and Usage**
   – Whether the POG TANKs were actually in operation and delivering water as designed.
2. **Water Quality Compliance**
   – Whether the treated groundwater met Thailand's drinking water standards and WHO guidelines.
3. **Value for Money**
   – Whether the significant public investment (THB 102 million for 20 systems) translated into tangible community benefits.

4. **Local Management Capacity**

   – Whether the community water committees had the knowledge, tools, and oversight to manage the system sustainably.

Key Findings from the Audit

- **12 out of 20 systems (60%)** were either not used or operated far below their intended capacity.
    - Causes included **water discoloration**, **electricity shortages**, and **poor raw water supply**, particularly in dry seasons.
    - In some cases, **communities reverted to old water systems** due to dissatisfaction with water taste, smell, or reliability.
- **Water quality was not consistently monitored**:
    - **80%** of systems lacked quarterly water quality testing.
    - Some had **no pH testing kits**, while others failed to send water samples for annual analysis.
    - As a result, **74% of local residents did not use POG water for cooking**, and **all respondents still purchased bottled water** for drinking.
- **Infrastructure challenges** emerged early:
    - **Control panels and chemical dosing systems corroded** within months of installation.
    - Equipment failures often went unreported or unresolved due to **lack of technical capacity**.
- **Weak governance and accountability**:
    - **84% of local water committees** had not received training in financial reporting or system maintenance.
    - Many committees did not report system status or problems to local authorities.
    - Some did not understand the ongoing **costs of purchasing water treatment chemicals**, leading to untreated or poorly treated water.

Policy Recommendations from the Audit

1. **Integrate feasibility checks before installation**

   Ensure that each project site has:

   - Reliable electricity
   - Sufficient groundwater supply
   - Community commitment to manage and maintain the system

2. **Strengthen post-installation support**

   - Mandate **regular water quality testing** and reporting to provincial authorities.
   - Supply all systems with **basic water testing kits** and training.
   - Develop **maintenance plans** and ensure spare parts availability.

3. **Build local capacity**

   - Provide **training in technical operation, financial management**, and preventive maintenance to local water committees.
   - Establish a system for **real-time reporting of malfunctions or risks** to municipal authorities.

4. **Reinforce community engagement and trust**

   - Communicate clearly about water safety, chemical usage, and operating costs.
   - Encourage **citizen feedback loops** to help ensure responsiveness and continuous improvement.

5. **Develop national standards for rural groundwater systems**

   - Use insights from the POG TANK case to set **minimum service and safety standards** for all decentralized water systems.
   - Promote **innovations that are adaptable to local environmental and institutional contexts.**

Strategic Reflection

This audit underscores a crucial insight: **Infrastructure is not enough.** Without proper governance, monitoring, and local ownership, even the best-intentioned innovations can fail. The case offers valuable lessons not only for Thailand but for **all countries investing in decentralized water systems** as part of their commitment to SDG 6.

In the next step, this experience could be used to develop a broader framework under INTOSAI WGEA, integrating **auditing tools with economic valuation** to better manage water governance through the **Blue Value lens**.

How Does This Relate to the SDGs?

The POG TANK case offers an important lens to view how **auditing aligns with Sustainable Development Goals (SDGs)**:

SDG	Relevance
SDG 6: Clean Water and Sanitation	Core connection – ensuring safe and affordable water for all
SDG 3: Good Health	Prevents waterborne diseases
SDG 11: Sustainable Communities	Improves local infrastructure resilience
SDG 12: Responsible Consumption	Highlights efficiency in water use
SDG 13: Climate Action	Enhances adaptation in drought-prone areas

Environmental auditing plays a critical role in **bridging policy intentions and real-world results**, ensuring that infrastructure investments truly improve people's lives and ecosystems.

Introducing the Blue Value Perspective

A key takeaway from the audit is that **groundwater remains economically invisible** — it's critical, yet undervalued in planning, budgeting, and community engagement. This gap creates inefficiencies, poor maintenance, and unsustainable practices.

This is where the concept of **Blue Value** comes in.

Blue Value encourages governments and auditors to see water not just as a natural resource, but as a **strategic asset** that must be valued, monitored, and governed. By applying **economic valuation tools** such as:

- Replacement cost
- Willingness-to-pay surveys
- Avoided healthcare or infrastructure costs

Auditors can make the case for smarter, more sustainable investment in water infrastructure.

Figure 5: Blue Value, the new initiative project that SAI Thailand proposes for INTOSAI WGEA Plan 2026-208.

From Audit to Action: The Way Forward

The Surin groundwater audit signals a bigger opportunity: to move from traditional infrastructure auditing to a more **integrated water governance audit** — one that embraces **natural capital accounting, climate resilience, and long-term sustainability**.

Thailand's State Audit Office envisions developing a **pilot model under the INTOSAI WGEA framework**, combining environmental audit with economic valuation. This model — rooted in the "Blue Value" approach — could serve as a global example for auditing **water governance and sustainability** in the SDG era.

Clean water is not only about pipelines and tanks. It's about foresight, fairness, and future-proofing. Through environmental auditing, we can hold systems accountable — and through Blue Value, we can ensure water truly counts.