



Solve Challenge:

Management of sludge from water treatment plants



The Challenge

Develop an affordable and sustainable sludge treatment solution for small private water operators (PWOs).

Many small PWOs lack access to sludge treatment plants due to the high cost of existing technologies. Their primary treatment methods rely on flocculant chemicals and regular tank cleaning, while some with sufficient resources construct disposal ponds. However, maintaining these ponds requires costly excavation, and sludge drying presents safety risks.

With no documented data on sludge production or disposal, there are concerns that untreated sludge is discarded in fields, open land, or rivers, potentially contaminating rice fields during annual floods.

Innovative, cost-effective solutions are needed to support small PWOs in managing sludge safely and sustainably. This could involve sludge management solutions or alternative water treatment solutions to reduce sludge volume, or a combination of the two.

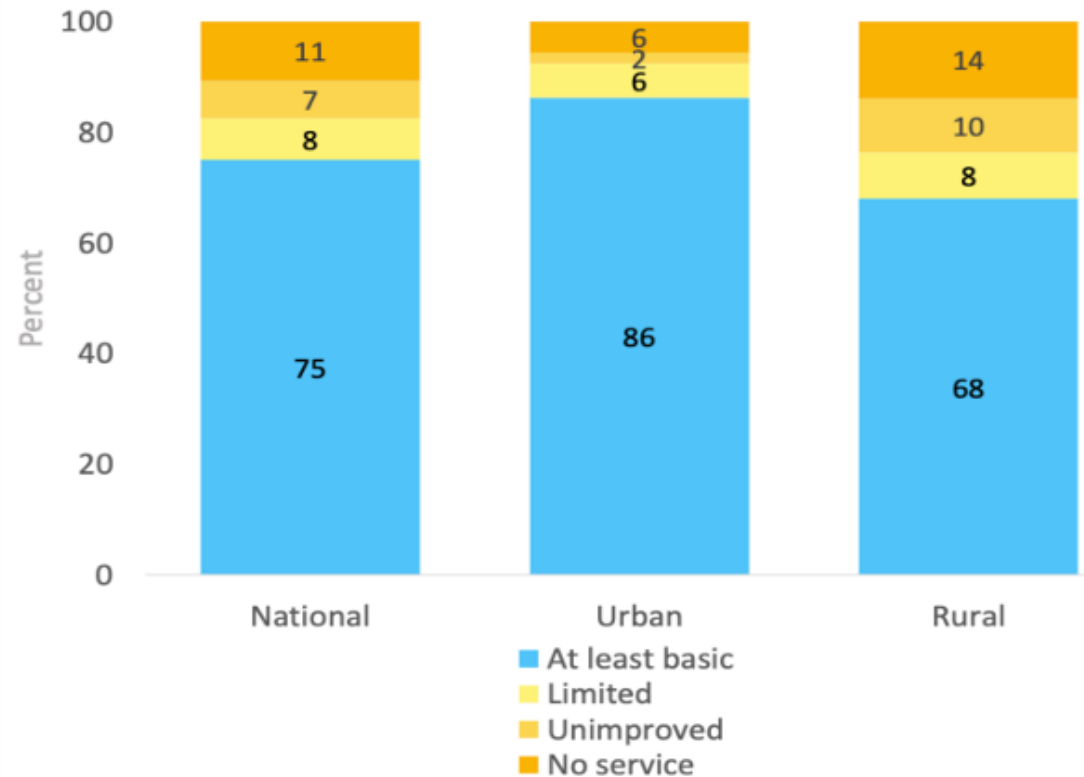


Background – Percentage of household's access to drinking water

Cambodia's population in 2024 stood at 17.2 million, with females 50.9% of the total (NIS, 2024). Poverty remains a significant challenge, with 18.03% of households classified as poor according to data from 2024 (MoP, 2024).

Furthermore, a considerable portion of the population, approximately 3.44 million or 24.4% of those aged five years and above, reported some form of disability in 2024 (CDRI, 2024). While access to drinking water is relatively high, reaching 75% of total households, a notable segment of the population, including those in the last mile and marginalised groups, continues to lack access to these essential services.

Percentage of household's access to drinking water (NIS, GCPP 2019)



Background - Piped water services

Piped water supply services in Cambodia are predominantly managed by private water operators, with an estimated 600 to 650 operating across the country, both licensed and unlicensed.

As of a 2024 report by MISTI, there are 11 state utilities (with 14 licenses) and 440 private operators. A significant majority of these operators, approximately 60 to 70%, serve fewer than 5,000 households under their licenses. Consequently, only about 40% of families in Cambodia have access to piped water supply, leaving a substantial portion of the population, particularly within marginalised and rural communities, reliant on unsafe water sources.

Small to medium PWOs produce an estimated 500-1000 m³ of water daily during the dry season and 400-800 m³ during the rainy season (May-Nov, with heaviest rainfall for 3-4 months).



Background – Water sources

The primary water source for PWOs is surface from rivers, ponds, lakes, and streams (utilised by 88% of PWOs), while the remaining 12% rely on groundwater from wells and boreholes. 84% of PWOs report complete access to their primary water source, with only 11% indicating limitations.

PWOs have observed environmental and climate changes, and 16% reported experiencing operational reductions as a result. These limitations in water source access are particularly evident during the dry season, when increased demand coincides with reduced surface water levels due to less rainfall and limited groundwater availability, leading to water source issues. In response, some PWOs are investing in land to construct reservoirs and ponds, aiming to increase water storage capacity.

Source: PWO survey report - WASH-FIN report (USAID 2023)
cambodia_pwo_survey_brief_december_22_updated.pdf



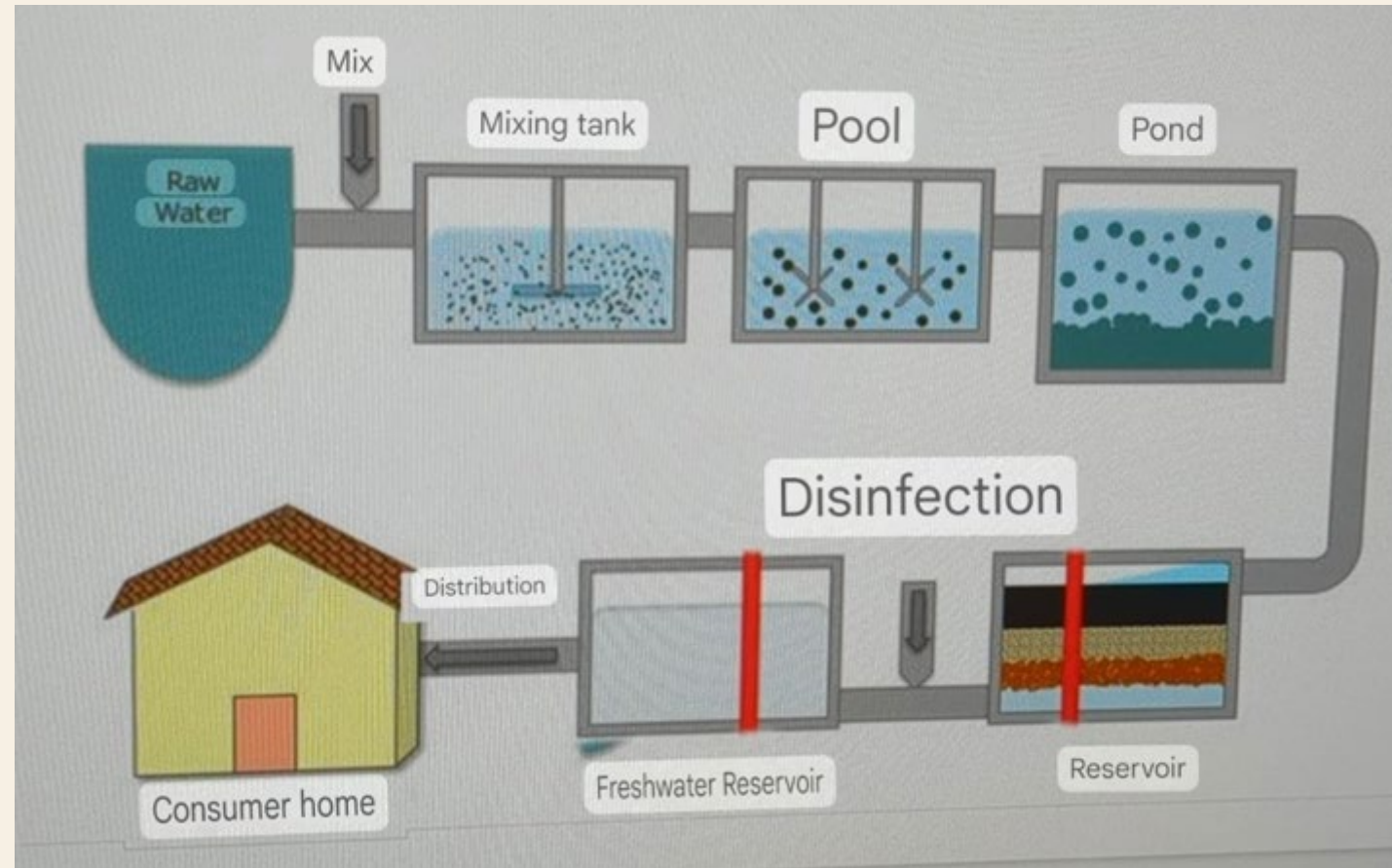
Intake pump and water source



Background – Water treatment

A schematic showing the common water treatment process by PWOs is shown here. This may vary depending on water source, size of PWO and volume treated.

After water is treated through addition of flocculation chemicals, settling and filtration, water is chlorinated before distribution.



Schematic of current common water treatment chain for PWOs



Background - Water quality challenges

- Based on available data, frequency of water quality testing varies between PWOs, some do not have regular testing regimes, while some test water quality daily, and some quarterly.
- PWOs surveyed reported that the water quality required is in line with the National Drinking Water Quality Standards: [link](#)
- A recent study in one district showed most piped water suppliers are not meeting bacteriological standards. All but one PWS surveyed met most chemical standards, except for one pollutant: Cadmium, along with traces of Barium and Copper.
- The study observed incorrect flocculation, coagulation, decantation process from inappropriate flocculant dosage or insufficient decantation time. The reasons for this was due to the absence of tools to conduct a jar test (to see the flocculant demand) as well as the absence of knowledge on how to use these tools, along with very basic flocculation injection systems with limited precision. In addition, at times of high demand, suppliers would speed up the decantation process meaning it would not be carried out properly.

Parameter*	Maximum Value
pH	6.5-8.5
Turbidity	5 NTU
Arsenic	0.05 mg/L
Iron	0.3 mg/L
Total Dissolved Solids (TDS)	800 mg/L
Thermotolerant Coliforms or E. coli	0 per 100 mL

Priority parameters for small water supplies (2004 guidelines)

Key stakeholders

Stakeholder	Some roles and responsibilities (Unofficial)	Links to resources
<p>The Ministry of Industry, Science, Technology and Innovation (MISTI)</p>	<ul style="list-style-type: none"> • Regulates urban water supply services across Cambodia. • Issues licenses for private water operators. • Sets water tariffs and monitors the performance of water supply operators. • Ensures compliance with water quality standards. • Develops policies to improve access to safe drinking water. 	<p>https://misti.gov.kh/en/</p> <ul style="list-style-type: none"> • MISTI report 2024: https://cdn.misti.gov.kh/documents/20250225022723CQTc8DDkETD1.pdf • Law on Clean Water Management (2023): https://cdn.misti.gov.kh/documents/202304061680762986.pdf • Principal Guideline for poor household subsidy for piped water connection: https://cdn.misti.gov.kh/documents/202209191663572993.pdf • Prakas on water meter: https://cdn.misti.gov.kh/documents/20240712081330q8DXvAYtJwTI.pdf




Key stakeholders (Cont')

Stakeholder	Some roles and responsibilities (Unofficial)	Links to resources
<p>The Ministry of Water Resources and Meteorology (MoWRAM)</p>	<ul style="list-style-type: none"> • Responsible for fresh and marine water resource management. • Oversees the development of irrigation schemes and all water-related infrastructure. • It needs to approve any direct use of water resources, during the licensing process of Private Water Operators for example. • It is also in charge of a significant monitoring effort, of water resources and of meteorology mainly. • Manages water allocation between domestic, agricultural, and industrial users. • Oversees policies on drought management, flood control, and irrigation. 	<p>https://www.mowram.gov.kh/</p> <ul style="list-style-type: none"> • <u>LAW ON WATER RESOURCES MANAGEMENT.pdf</u> • <u>Climate Change Strategic Plan for Water Resources and Meteorology.pdf</u>



Key stakeholders (Cont')

Stakeholder	Some roles and responsibilities (Unofficial)	Links to resources
Cambodian Water Supply Association (CWA)	<ul style="list-style-type: none">• Coordinate and encourage as well as build mutual understanding with all the related sector at local and international level.• A resource center of technical training support and business management to Domestic Private Water Operators (DPWOs) enable them to assure the sustainability and standardize water supply to Cambodian people.• Enhance the capacity of water operators and provide assistance for loan preparation from financial institution.• Represent the interest of DPWOs and assist their works with the government, developmental partners, and private sector.• An information center of the clean water sector and sharing center of professional practices among private water operators in Cambodia.	<p>https://www.cwa.org.kh/about-us/#1564328209558-5189b68c-68e2</p> 



What will you submit

A solution in the form of **one or more** of the following:

- 💧 1,000-word report (excluding appendices, which should not exceed five pages)
- 💧 A3 poster/board
- 💧 5-minute video
- 💧 10-slide PowerPoint

Final submissions are due by Friday 15 August 2025.



What can you win



Best Solve – Sustainable wastewater for healthcare facilities

Best Solve – Management of sludge from water treatment plants

For the judging rubric, refer to the 'Final submission instructions and information'



If your team excels in the Solve and Fund Challenges, you will win the title of:

Winnovators Overall Champion



WaterAid/ Oliver Dixon

What are the next steps

- ◆ Start thinking about the framework of your selected 'Solve' challenge. In no more than 500 words, prepare an outline and send to WaterAid at auswinnovators@wateraid.org.au. This is not part of the submission judging but is meant to help you establish a clear framework from the start and allow WaterAid to provide feedback on your initial direction and thinking.
- ◆ Check out the Submission Examples in the Resource Library on the website for ideas on the scope and format of submissions.
- ◆ Don't forget to capture your journey! Remember to take photos during your meetings, discussions, and activities, and share them with WaterAid to document your Winnovators experience.
- ◆ Contact the Winnovators team at WaterAid with questions – we're here to help: auswinnovators@wateraid.org.au.





Thank you

