



MOLE CONFERENCE 2025

From Source to Sip: Bridging Water Quality Gaps in Last-Mile Communities

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1 About Saha

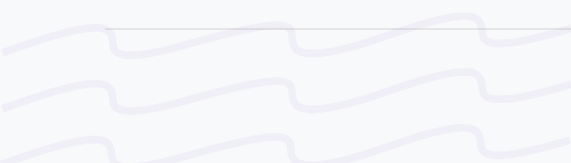
2 The Challenge

3 The Simple Surface Water Treatment System

4 The Water Quality Results

5 Next steps

6 Conclusion



01 · ABOUT SAHA

Saha Global is a nonprofit service provider focused on delivering and scaling utility-standard water service to Ghana's last mile.

Saha manages non-mechanized boreholes and the Simple Surface Water Treatment System (SSWTS)

5

REGIONS

25

DISTRICTS

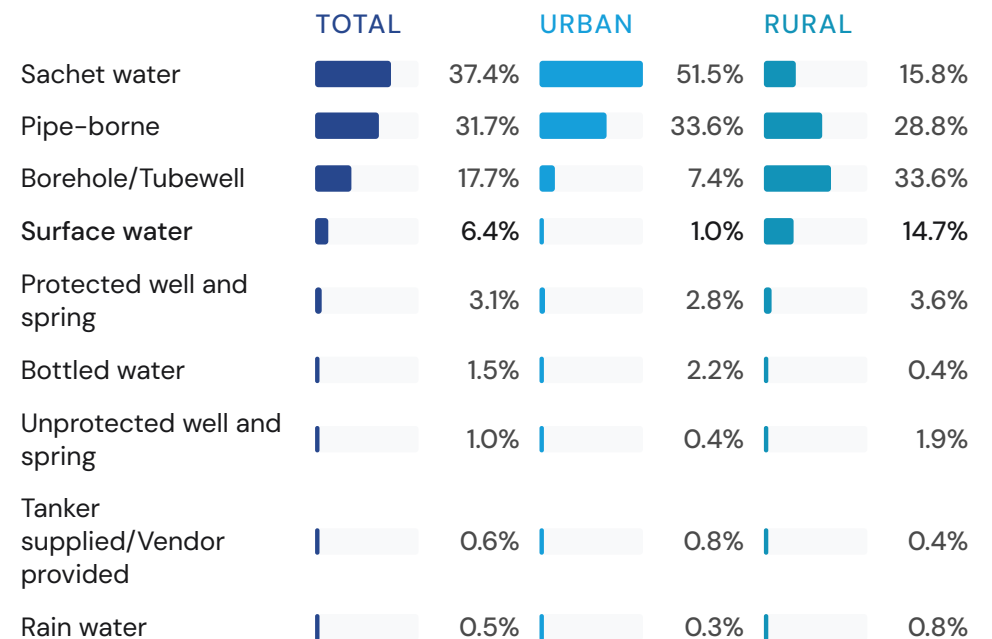
140,821

PEOPLE SERVED



Surface water is still the main source of drinking water for many

- Ghana Statistical Service, 2021 Census Report, Households in the Savannah (94.1%) and Northern (90.1%) regions use unimproved sources for drinking water.
- These regions also face difficult hydro-geological challenges. Groundwater sources are mostly inaccessible and even when they are, they are often not safe. The small sizes and scattered nature of make service delivery challenging and economically unattractive to traditional water service providers.



Proportion of Households using improved and unimproved sources of drinking water (Ghana Statistical Service, 2021)

03 · THE SYSTEM

The Simple Surface Water Treatment System (SSWTS)

In communities that rely on surface water, Saha partners with local women to run the Simple Surface Water Treatment System (SSWTS), a simple, robust, community-based alum and chlorine water treatment system.



VIDEO

How does the SSWTS produce safe drinking water?

A short video by the Hilton Foundation



STEP 01

Manual water collection process.

Workload of collecting water is shared amongst 3 to 4 operators per SSWTS.



STEP 02

Visual chart / guide helps operators determine how much alum to apply.

Saha team procures alum and ensures product quality.

MEASUREMENT OF ALUMINUM SULPHATE FOR RAW WATER TREATMENT	
Turbidity level (NTU)	Alum Measurement
 < 25 NTU	 1 Table spoon
 25-50 NTU	 1 Table spoon
 50-100 NTU	 2 Table spoons
 100- 250 NTU	 2 Table spoon
 250+ NTU	 3 Table spoons

STEP 03

Operators apply alum using the alum dosing guide.

200 L drums are cleaned and emptied before alum is applied.



When we treat the water, we first apply
[a water purifier called] alum to the drums.



STEP 04

**Alum is applied before
the 200 L
sedimentation tanks are
filled with raw water.**

"Shocking" improves coagulation

STEP 05

Clear water is manually scooped from the sedimentation drums into the storage tank.

A Saha-supplied filtration cloth captures any remaining unsettled sediments.





STEP 06

Operators disinfect the water using chlorine tablets — one tablet treats 200 litres.

The Saha team procures and supplies the chlorine to all operators.

STEP 07

The Saha team aims to conduct microbial tests monthly on treated water. (CSIR, 2x / yr)

The water is then sold to the community at an affordable price.

Water quality results are a KPI for Saha Operators.



Purpose and Methodology

CSIR–WRI conducted comprehensive water quality assessments to evaluate the effectiveness of the SSWTS in producing safe drinking water for last-mile communities.

SCOPE

Regions

Northern, Savannah, and Oti

Communities

Representative sample of Saha-operated treatment sites

Period

2023–2025, covering both rainy and dry seasons

STUDY DESIGN

Approach

Paired comparison of raw (source) vs treated (SSWTS) water samples

Sampling Method

Purposive sampling — based on accessibility, operational consistency, and representation across ecological zones

Sample Size

186 samples (93 raw and 93 treated) collected over 3 years

PARAMETERS TESTED

Microbial

E. coli, Total/Faecal Coliforms, Pseudomonas aeruginosa

Physicochemical

Turbidity, pH, Nitrate, TDS, Sulphate, Total Hardness, among others

Presentation will focus on the physicochemical tests

Treated water ≤5 NTU

Turbidity reduction — 2023

3-year average, NTU



Turbidity reduction — 2024 & 2025

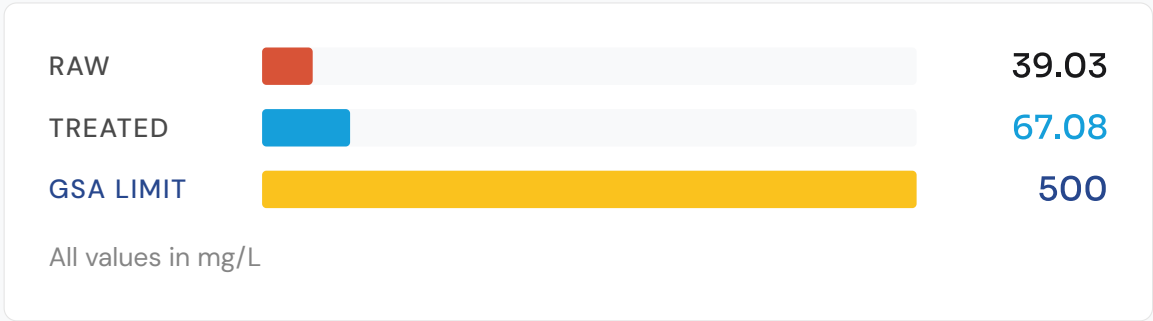
2-year average, NTU



Change in dosing approach (Visual charts)

RESULT · PHYSICOCHEMICAL

Total dissolved solids

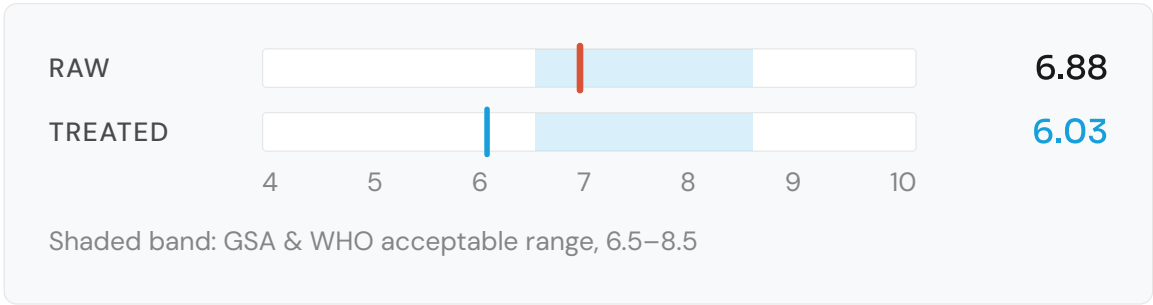


All values within <1000 mg/L limit set by WHO.

✓ confirms treated water remains visibly clean and palatable.

RESULT · PHYSICOCHEMICAL

Change in pH levels

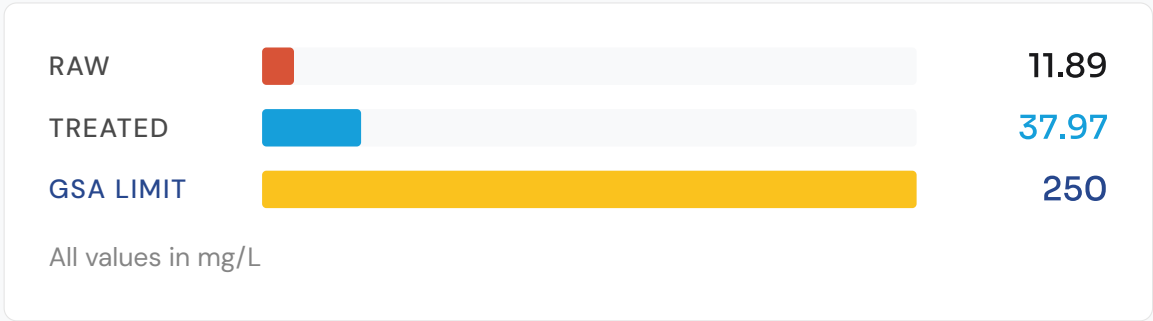


Treatment slightly lowers pH (avg. 6.2), but remains close to GSA & WHO's 6.5–8.5 range.

CAUTION
Acceptable but slightly acidic. lime dosing under trial.

RESULT · PHYSICOCHEMICAL

Change in sulphate levels



Sulphate remained well below GSA & WHO's 250 mg/L limit, confirming chemical safety.

✓ Chemically safe; no taste or health concerns.

RESULT · PHYSICOCHEMICAL

Total hardness



Hardness within acceptable range. < 500 mg/l

☒ Suitable for domestic and drinking use

RESULT · PHYSICOCHEMICAL

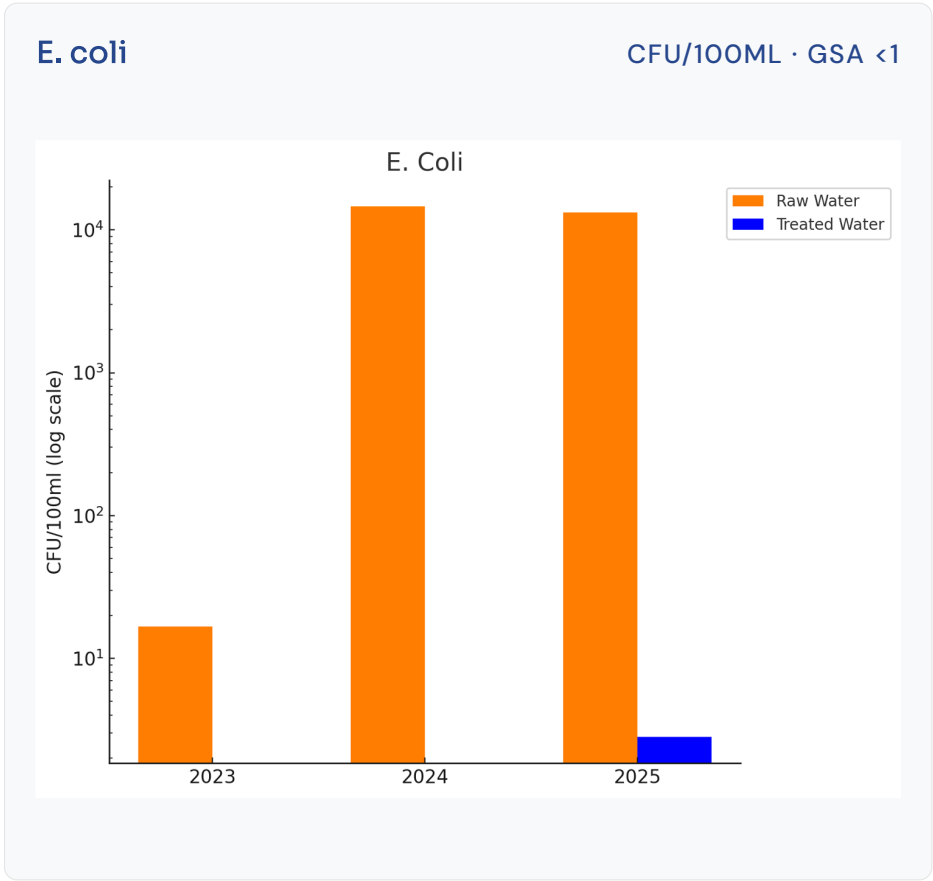
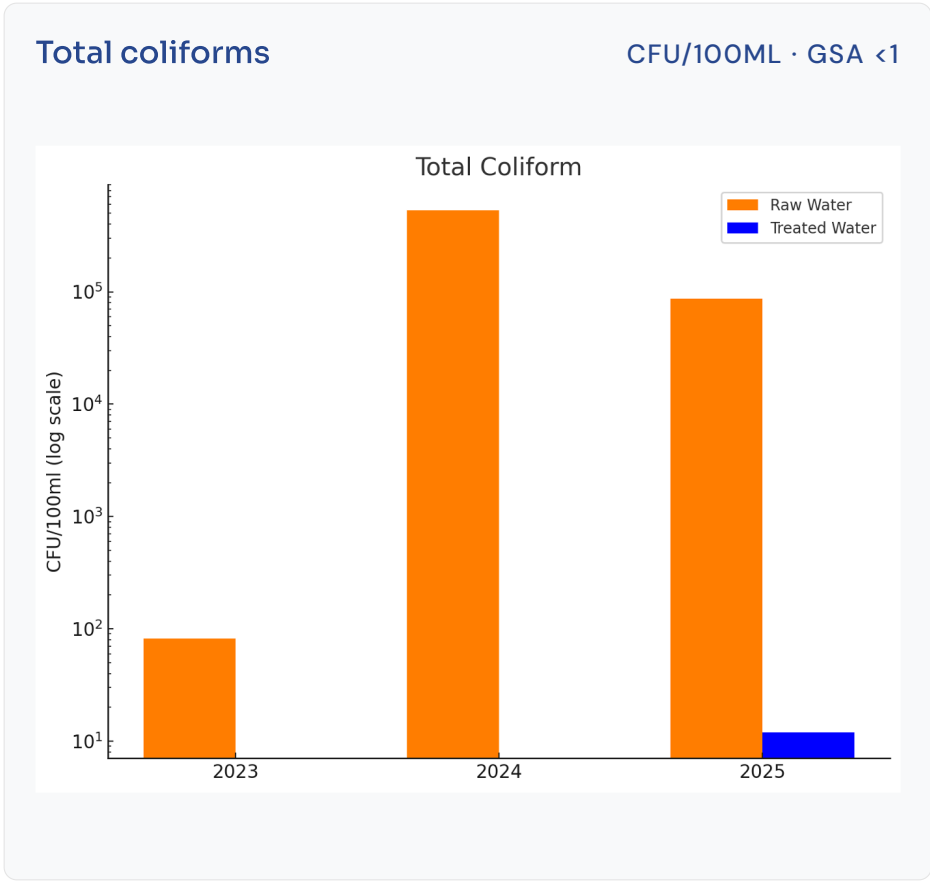
Nitrate-Nitrogen



All treated samples below GSA & WHO limit (≤ 10 mg/L $\text{NO}_3\text{-N}$), indicating no agricultural or faecal contamination risk.

✓ Acceptable

Total coliforms and E. coli, raw vs treated



CSIR-WRI opinion on SSWTS



Water quality is generally safe, showing strong reductions in turbidity and acceptable chemical parameters.

However, pH fluctuations remain a key challenge. The slightly acidic pH and occasional borderline turbidity could affect disinfection efficiency.

Saha could explore low-cost options for pH correction, such as adding lime (Hydrated lime: calcium hydroxide, $\text{Ca}(\text{OH})_2$), and strengthen source management practices to reduce raw water turbidity.

Given that surface water quality varies with season, land use, and source protection, regular water testing and monitoring should remain a core part of Saha's operations.

Where do we go from here?

01 Pilot lime addition to stabilise pH.

02 Strengthen source protection measures (buffer zones, catchment management) to reduce water contamination.

03 Develop low-cost monitoring tools for women operators (e.g., pH color strips).

04 Update water safety plan to reflect operational changes.



Universal access will not come from utilities alone. We need localized, flexible, community-scale models.

With the right partnerships and local innovation, we can solve the water crisis in our lifetime and ensure that every sip is safe everyday for everyone.

Thank You!



APPENDIX

Community-level water quality data

Scan the code to gain access to the google sheet with water quality data for each community.



APPENDIX

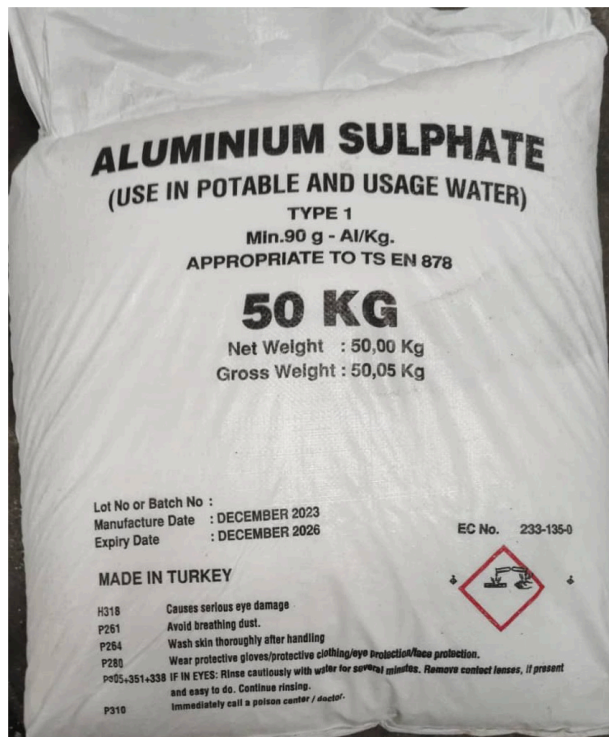
CSIR/WRI Scientists collecting samples for testing



APPENDIX

Chemical composition of Alum and Chlorine

Alum



Chlorine

