
HOW MANY DAYS CAN YOU SURVIVE
WITHOUT WATER?

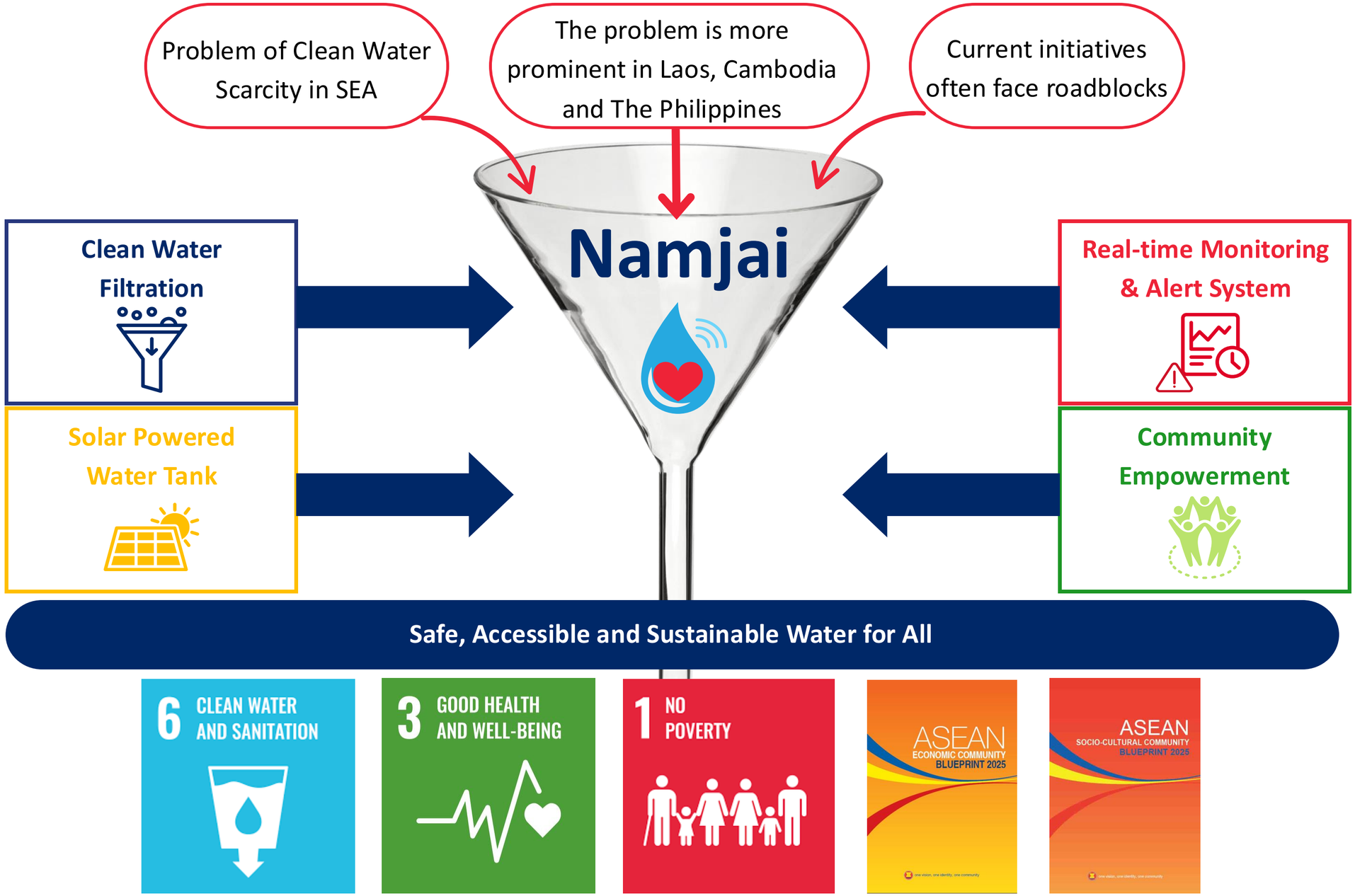

3

HOW CAN WE THEN, CREATE A SOLUTION THAT CAN REACH, MAINTAIN AND SUSTAIN THE COMMUNITY WATER

Presented by: **DATAMINIONS**

Palinya Sengdalavong
Kounlasatty Manivong

Executive summary



THE BIG PICTURE

Problem Overview: Globally

4 Billion

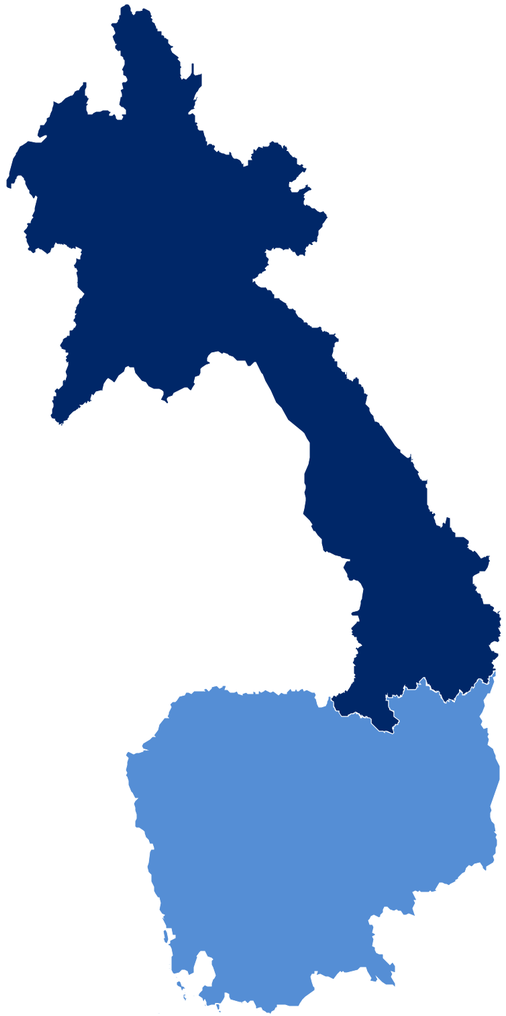
people experience **severe water scarcity** for at least one month each year (UNICEF).

Clean water scarcity, an uphill battle in Southeast Asia (SEA)

110 Million

SEA is amongst **the worst regions of the world**, with 110 million people, facing severe clean water scarcity (Genesis Water Tech, 2024).

Problem Overview: Southeast Asia (SEA)



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Laos & Cambodia

Laos and Cambodia are **among the 9 countries** with the worst clean water scarcity on the planet (Waterless, 2022).

With the current progress, we remain far behind.

With **5 years** left to meet the Sustainable Development Goals (SDGs), the world **remains far behind** on its water goals, especially in **less developed nations** (World Economic Forum, 2023).

Ensure the availability and sustainable management of water and sanitation for all by 2030

SITUATION AT HOME

Majority of households in Laos lack access to clean water

Why clean water is still a problem in Laos?

Anthropological Activities

- **Deforestation** exacerbates environmental degradation.
- **Ambitious dam development** raises concerns about its impact on water quality, fishery, and the livelihoods of downstream communities (Meadley & Lapuekou, 2024).

Clean water is still a problem in Laos, but some areas are more vulnerable than others

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Lack Maintenance and Early Warning System

- **The quality of water supply service** remains poor, with **outdated system** and **high leakage rates**.
- **Access to safe, piped water supply** across the country **remains an issue,** affecting the health and livelihoods (Asian Development Bank, 2024).

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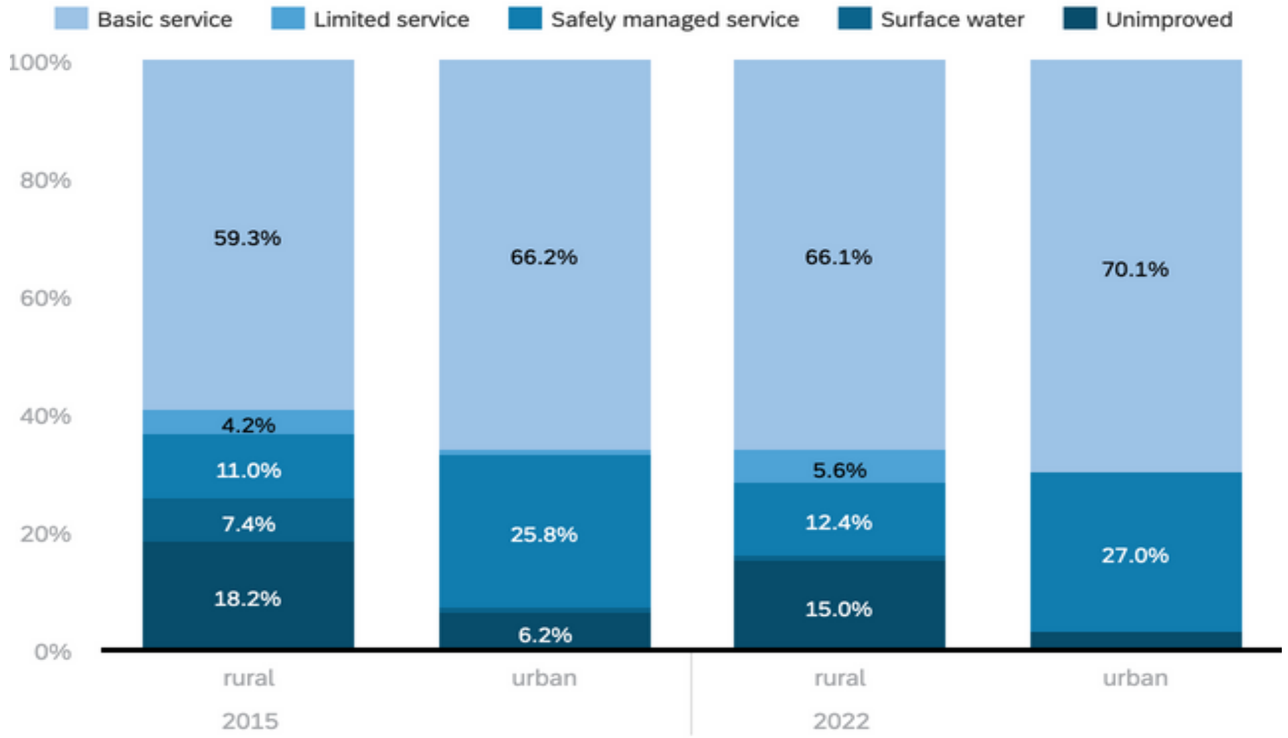
Centralized Urbanization & Rural Neglect

- **Rural communities** are grappling with lack access to clean water.
- They **rely on rainwater** for farming, lack of clean water heightens the risks **of financial instability** (Meadley & Lapuekou, 2024).

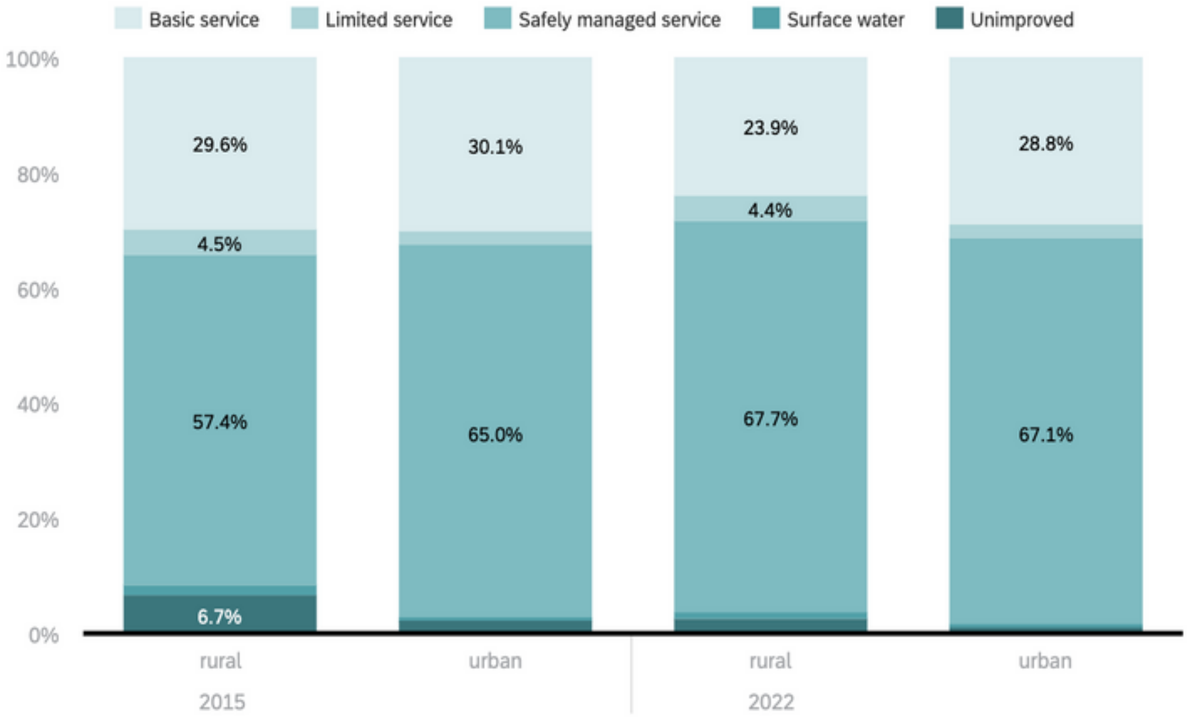
Clean water is still a problem in Laos, but some areas are more vulnerable than others

There are significant gaps between urban and rural areas

15% **Gap between rural and urban areas' access to clean water** (Interactive Country Fiches).



Rural and urban WASH* service level in Laos, 2015 and 2022



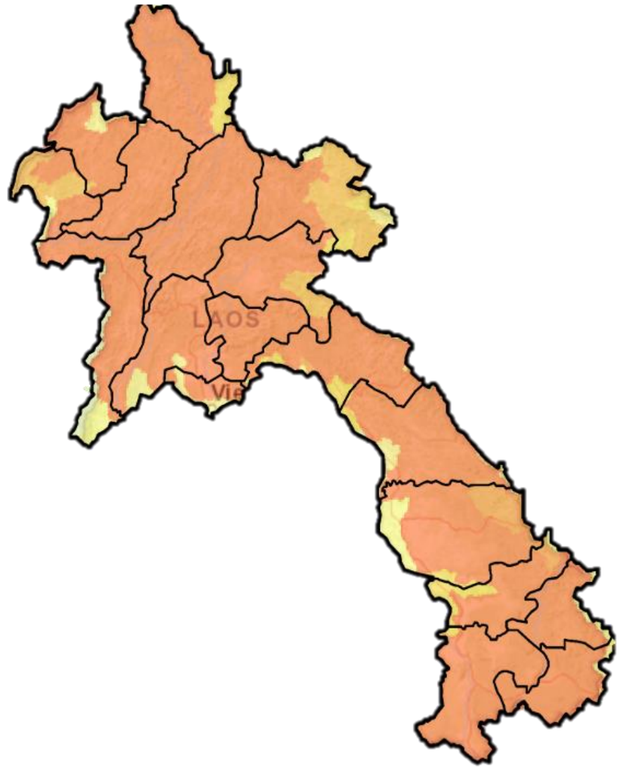
Rural and urban WASH* service level in Central and Southeast Asia, 2015 and 2022

Rural areas are in urgent need for safe and clean water sanitation

WASH: Washing, Sanitation and Hygiene, JMP. (n.d.)

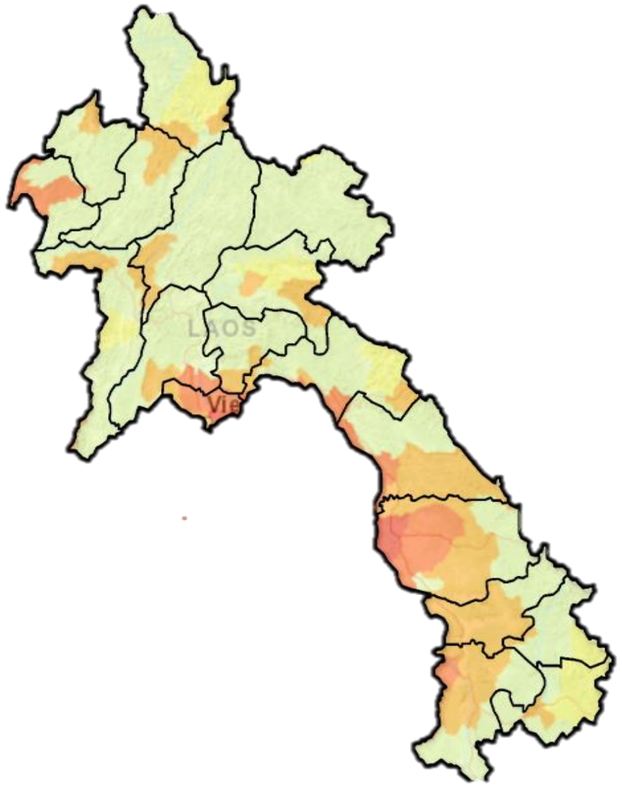
There are significant gaps between urban and rural areas

Access to basic sanitation

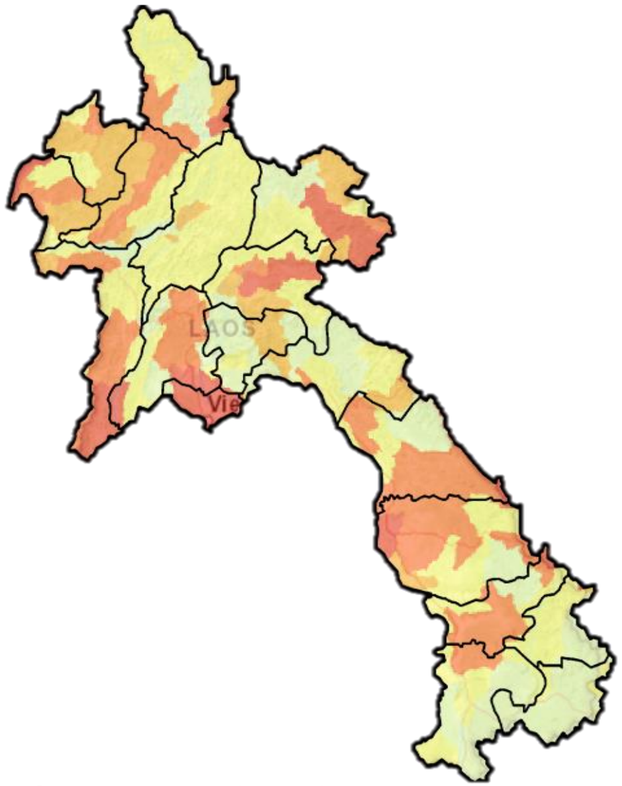


n/a Very low risk — Very high risk

Water quality



Toxicity Stress

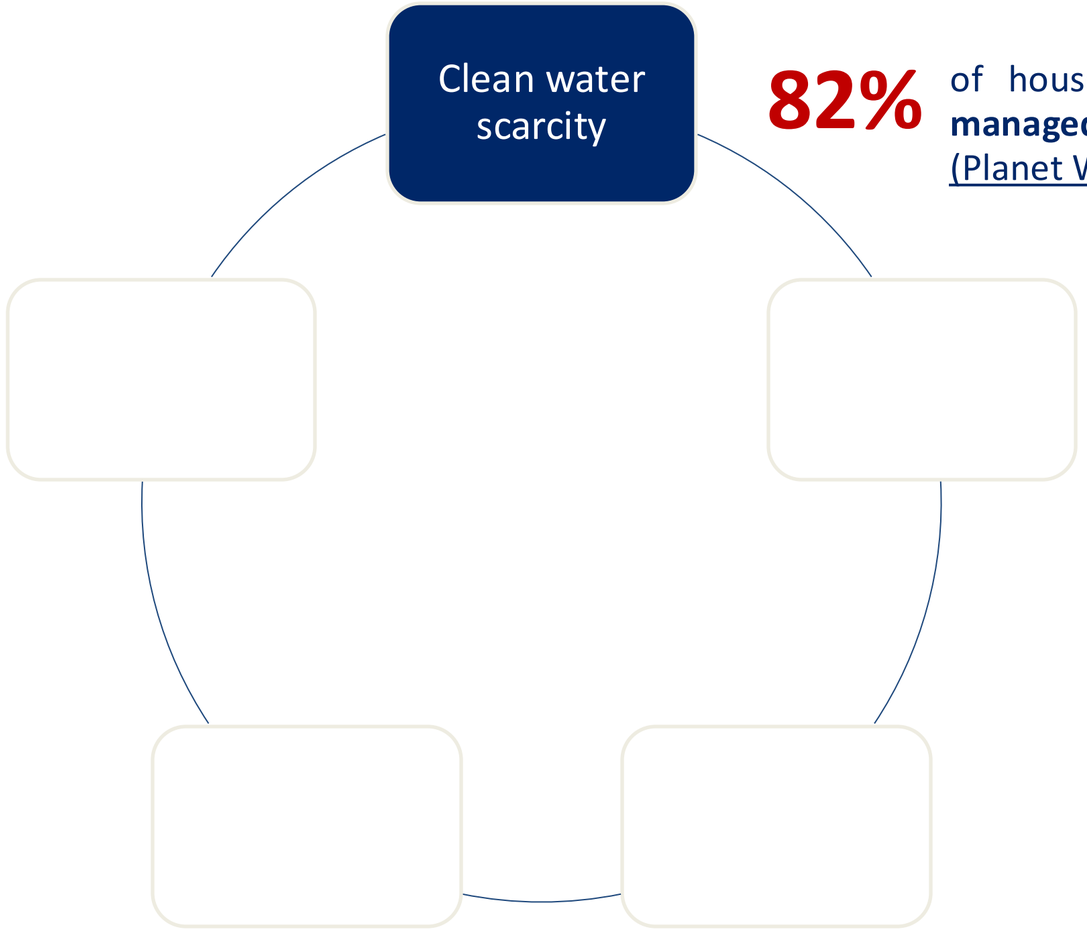


Surface Water Quality Index

Rural areas are in urgent need for safe and clean water sanitation

WWF Risk Filter Suite (2022)

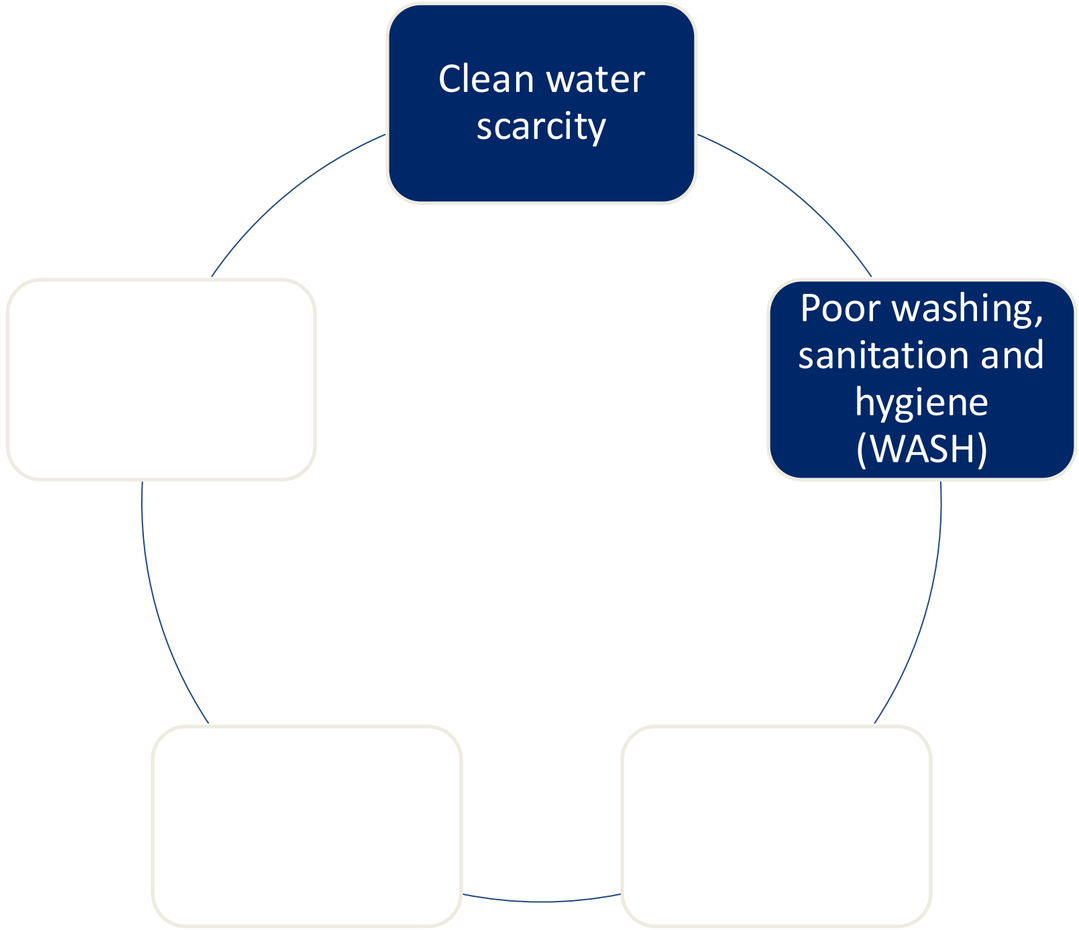
The impact is not just short-term illness…



82% of households in Laos **lack access to a safely managed water** supply and **39% lack safe sanitation** (Planet Water Foundation, 2025).

Clean water scarcity leads to a life-long, vicious poverty trap

The impact is not just short-term illness...



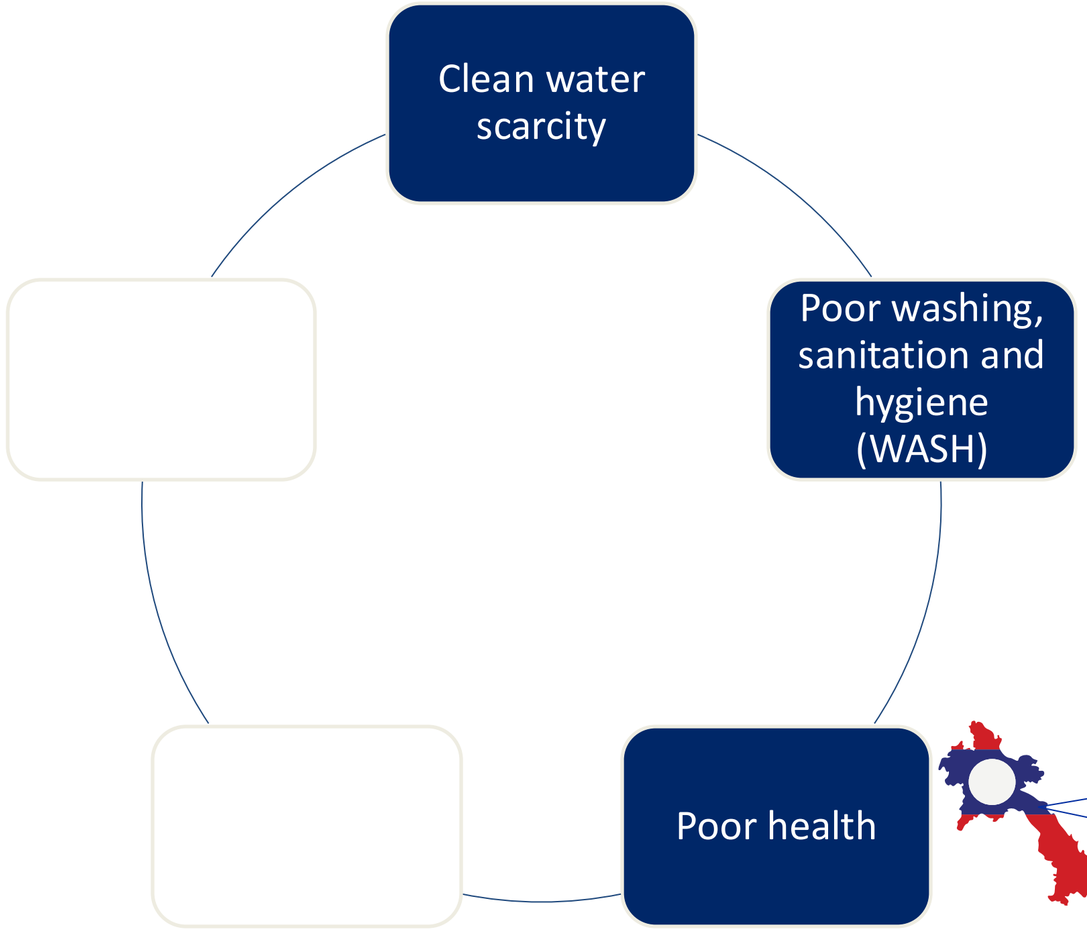
6000 Deaths

The lack of clean water gives rise to **waterborne diseases.**

The World Bank estimates that each year, there are **3 million cases of diseases**, including: diarrhea, dysentery, typhoid and cholera, and **6,000 premature deaths** directly linked to water.

Clean water scarcity leads to a life-long, vicious poverty trap

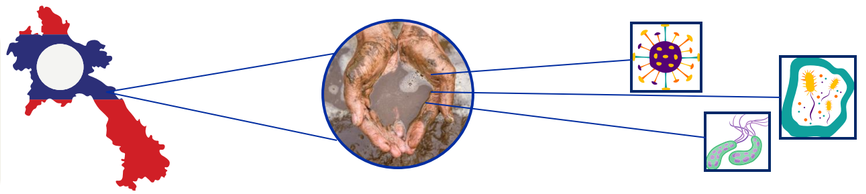
The impact is not just short-term illness...



The **mortality rate** in 2019 attributed to exposure to WASH (water, sanitation and hygiene) per 100,000 people is up to

20 People

in Laos (WHO, n.d.).



Clean water scarcity leads to a life-long, vicious poverty trap

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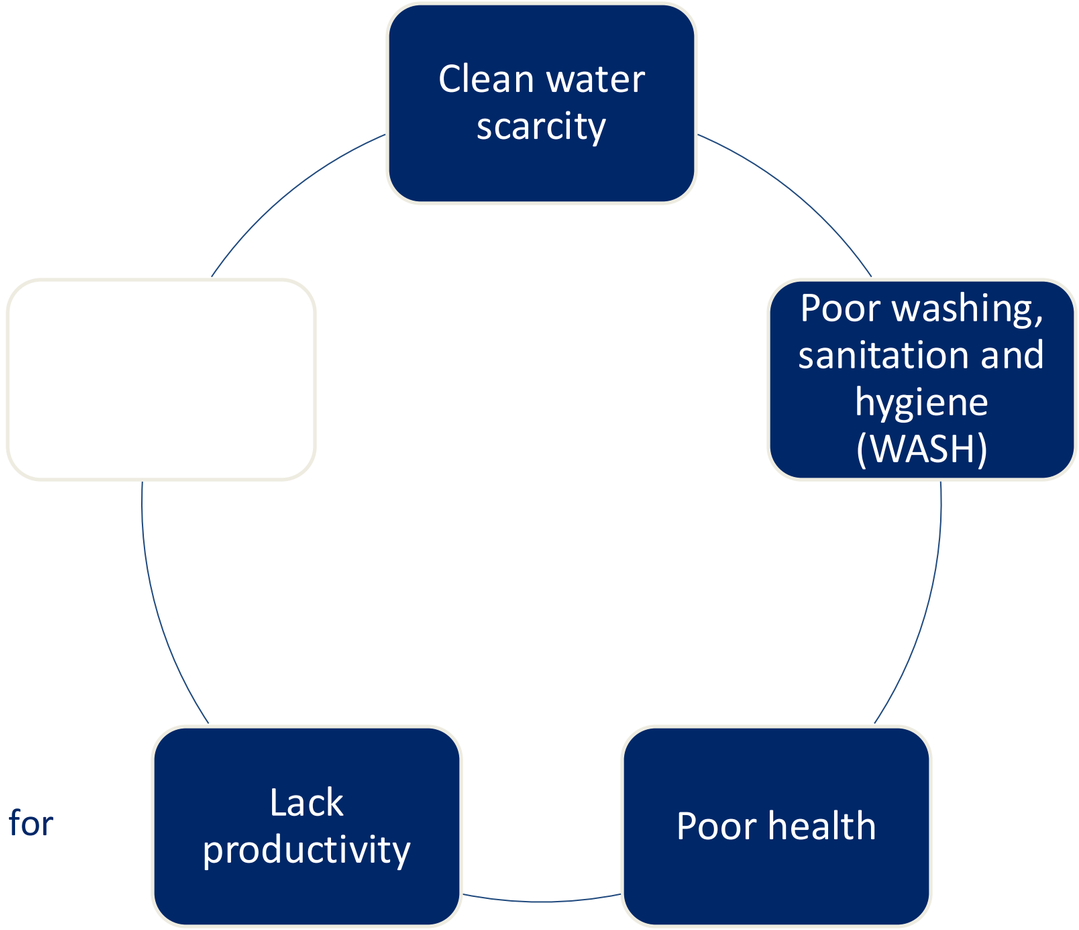


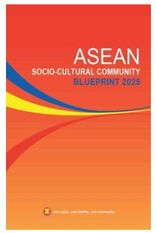
Water and poverty are inextricably linked

Poor access to water affect the health of the poor, their food security, and their prospects for making a living. Thus, this traps them in the **poverty cycle** (Asian Development Bank).

Clean water scarcity leads to a life-long, vicious poverty trap

The impact is not just short-term illness…

Narrowing the Development Gap
Enhance productivity and competitiveness of rural economies, especially in the newer ASEAN Member States.



Equitable Access for All
Promote a community that is healthy, caring, sustainable and productive, and one that practices healthy lifestyle resilient to health threats and has universal access to healthcare.

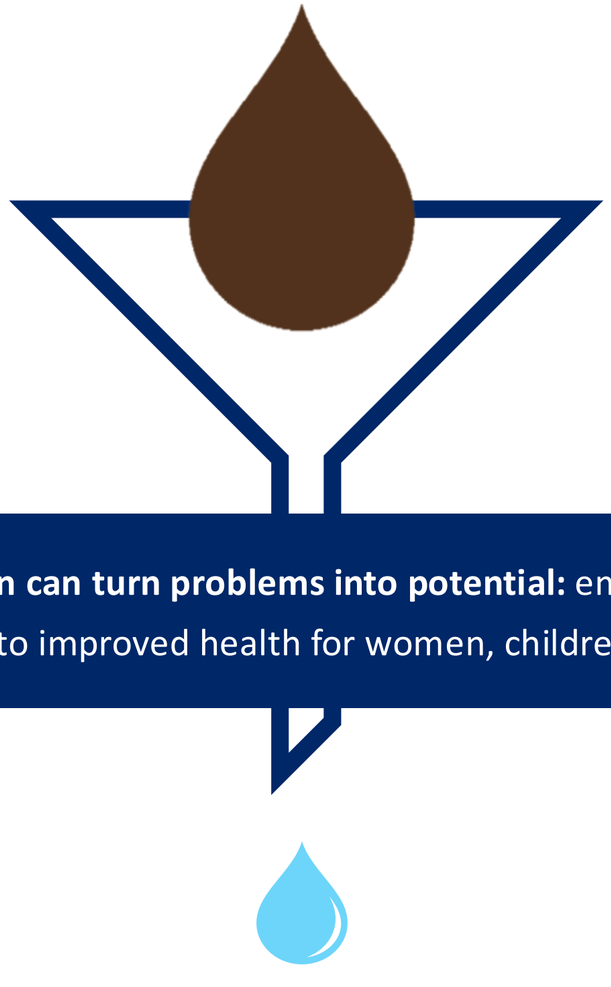
We are risking failure SDGs and ASEAN Blueprints

Without immediate actions, effects may be irreversible

By 2030, more than

40%

of the world population may face clean water shortages, and the consequences will **only become more dire** (World Green Building Council, 2023).



Climate change exacerbates water scarcity and water hazards (such as floods and droughts), as **rising temperatures disrupt precipitation patterns and the water cycle** (United Nations).

Access to safe water and sanitation can turn problems into potential: empowering people with time for school and work, and contributing to improved health for women, children, and families around the world.

The best time to start is today, but what is stopping us?

CURRENT INITIATIVES

Learning from current initiatives and their roadblocks

The common challenges of providing clean water

Limited Reach

Lack of Manpower

Lack of Funding

Problem statement: How can we then, create a solution that can reach, maintain and sustain the community water?

PROBLEM STATEMENT:

HOW CAN WE THEN, CREATE A SOLUTION THAT CAN REACH,

MAINTAIN AND SUSTAIN THE COMMUNITY WATER

Namjai

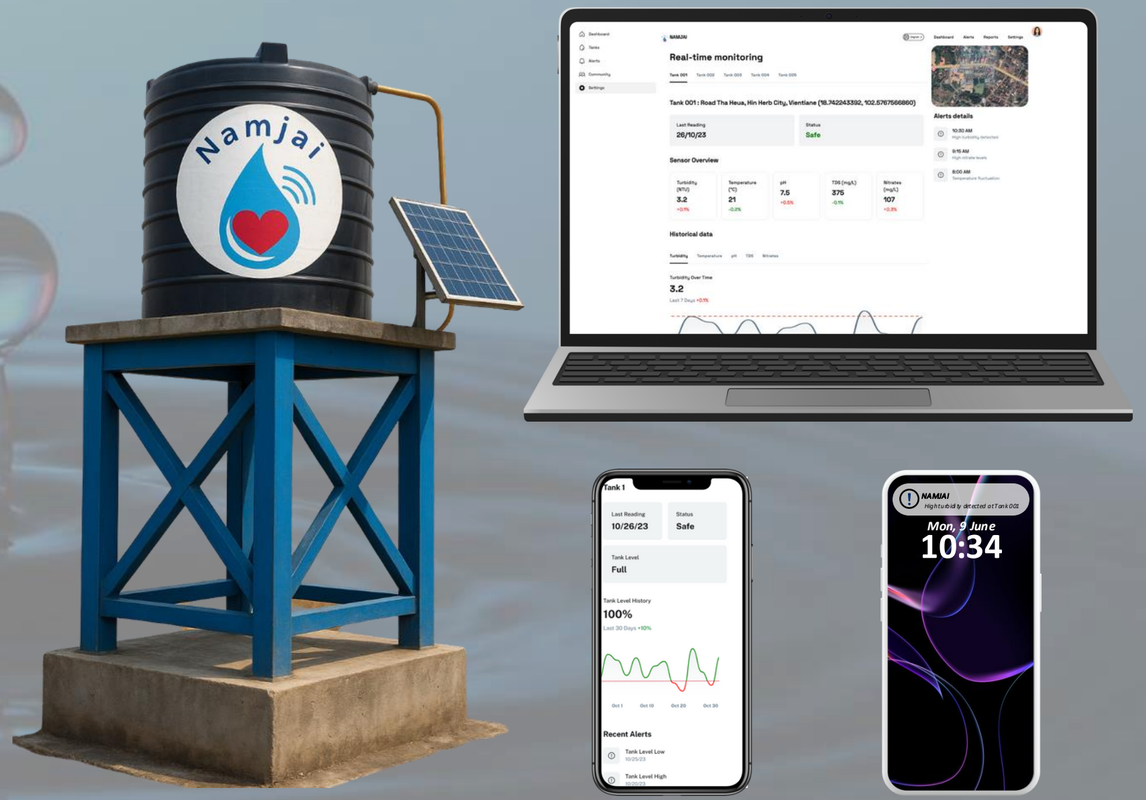
Clean Water Filtration

Solar Powered Water Tank

Real-time Monitoring & Alert System

Community Empowerment

Namjai is a **self-powered** community water tank that **filters**, **detects** harmful substances and **alerts** the **households, NGOs and authorities** to maintain clean water for all.



Clean Water Filtration

Solar Powered Water Tank

Clean water filtration & self-powered water tank

External Solar Power Powered Water Tank

- Clean water is stored and safely managed in **Namjai Smart Water Tank**.
- **Solar panel** helps to power **water sensors** to monitor and alert, syncing to **Namjai Website and Application**.

Namjai Smart Water Tank

Solar panel to power internal water sensors

The extensive filters and solar-powered sensors help to maintain clean water at the pre-determined standards

Clean water filtration & self-powered water tank

Water collected from water sources such as river and lake near the village.

The extensive filters and solar-powered sensors help to maintain clean water at the pre-determined standards

Clean water filtration & self-powered water tank

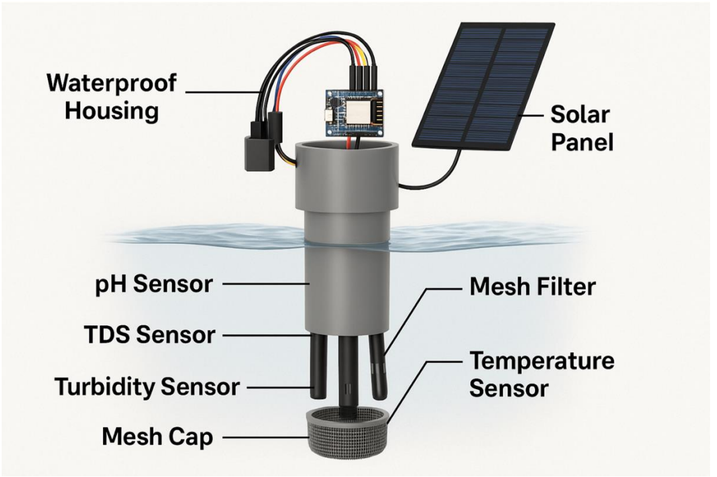
Internal Filtration & Sensors

- Untreated water from the water source (groundwater, rainwater and river catchments) **passes through the inlet water pipe**.
- Extensive **water filtration** happens at the filter, before releasing clean water into the tank.
- ***Water Quality Sensors** measure turbidity, pH Level, TDS, Nitrates and temperature.

1 Water inlet pipe

2 Water Filtration

3 Water Quality Sensors



The extensive filters and solar-powered sensors help to maintain clean water at the pre-determined standards

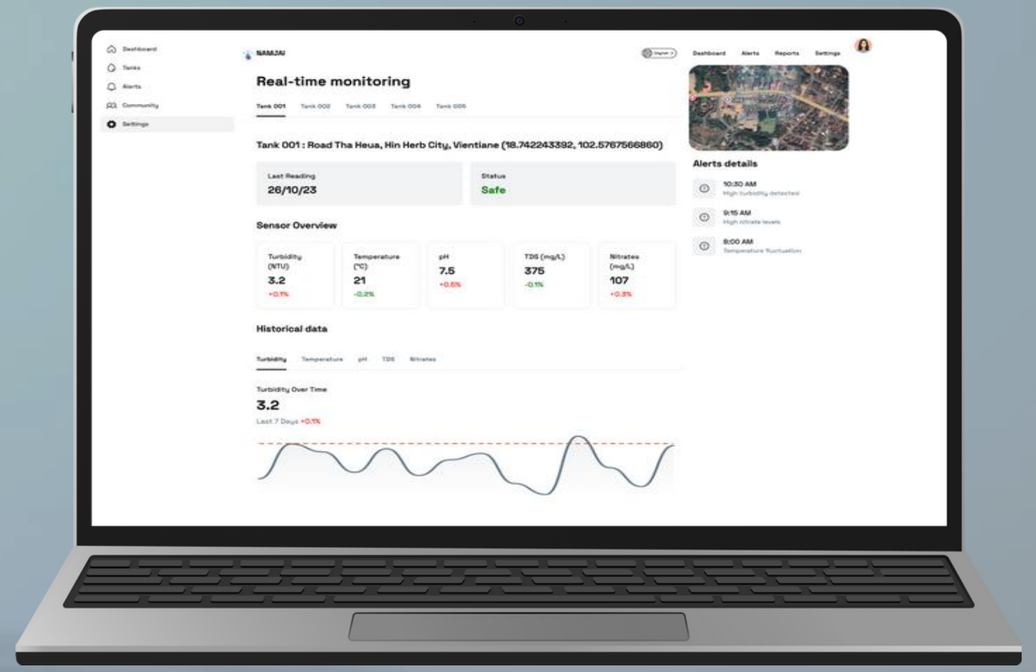
Clean water filtration & self-powered water tank

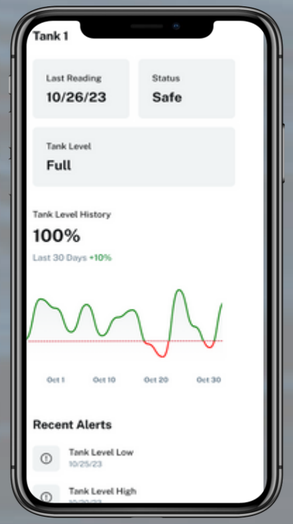
Clean water flows through the **outlet pipe** for community usage.

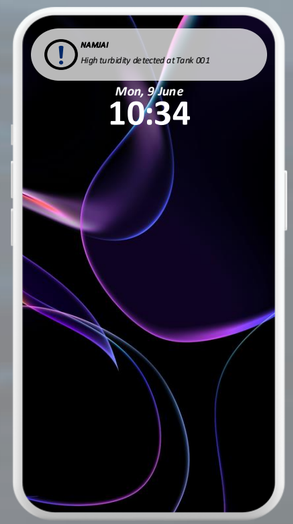
4 Water outlet pipe

The extensive filters and solar-powered sensors help to maintain clean water at the pre-determined standards

Real-time Monitoring & Alert System





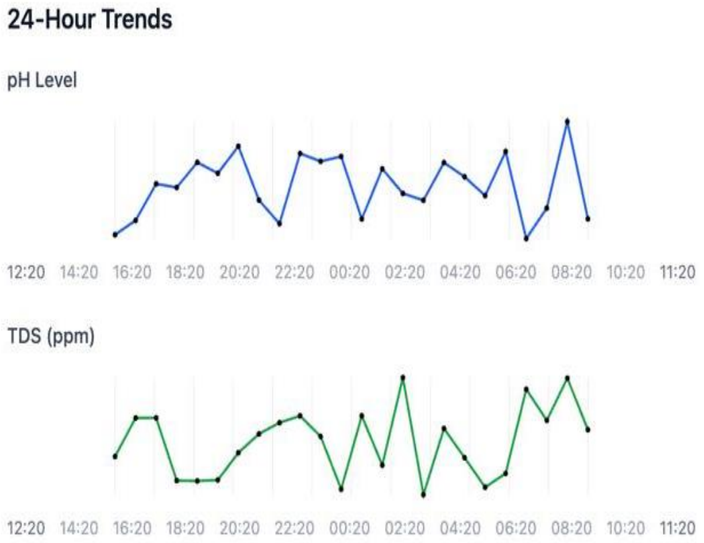


Real-time monitoring & alert system

Namjai Website & Application (3Rs)

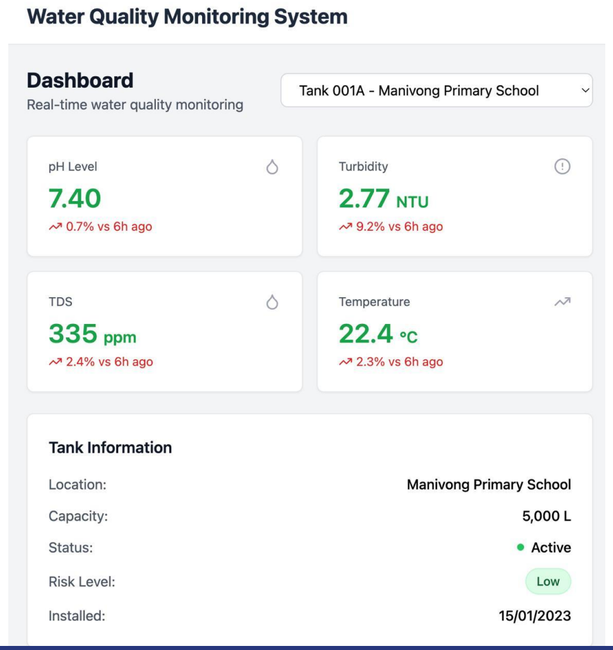
Real-time Detection

Water sensors measure turbidity, pH Level, TDS, Nitrates and temperature.



Report

Direct report of sensor results to Namjai application and website. **Authorities and village head can directly view issues.**



Receive

- Authorities and representatives receive automatic alerts, when water quality does not meet pre-determined standards.

- SMS alerts sent to local community if water quality is not safe for use.

Real-time monitoring and updates keep the villagers, NGOs and authorities informed, solving water problems immediately

Real-time monitoring & alert system

Namjai Website & Application: Additional Features

Language

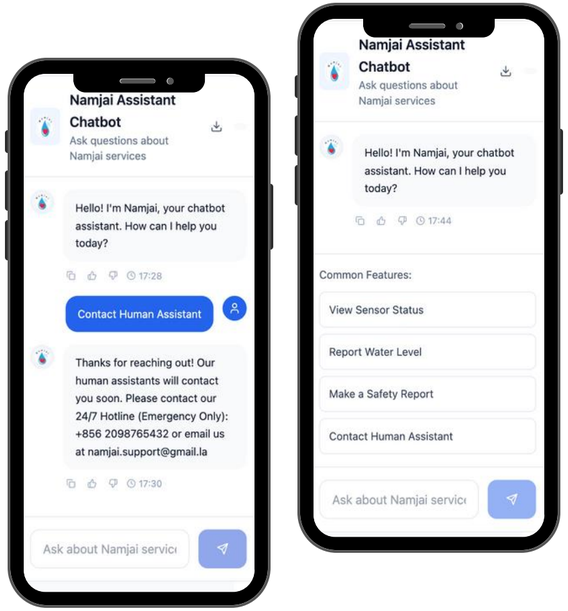
Language feature allows for **usage in various countries**, and **easy adoption** of Namjai to local communities

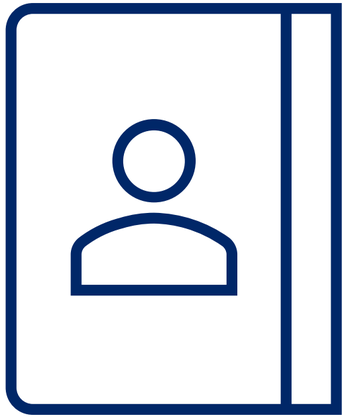
Chatbot

24-hour chatbot allows for **urgent reporting, quick-problem solving**

In-App User Guide

User guide available for quick information





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Namjai

Water Quality Monitoring System

Email Address

Enter your email

Password

Enter your password

Sign In

Quick demo login:

Login as Admin

Login as Field Officer

Login as Observer

Serving communities in underserved regions

Role Permissions:

Admin: Full system access, user management, review reports

Field Officer: Submit reports, manage maintenance, acknowledge alerts

Community Empowerment

Community Empowerment

Namjai Education & Outreach Program

Educational Outreach

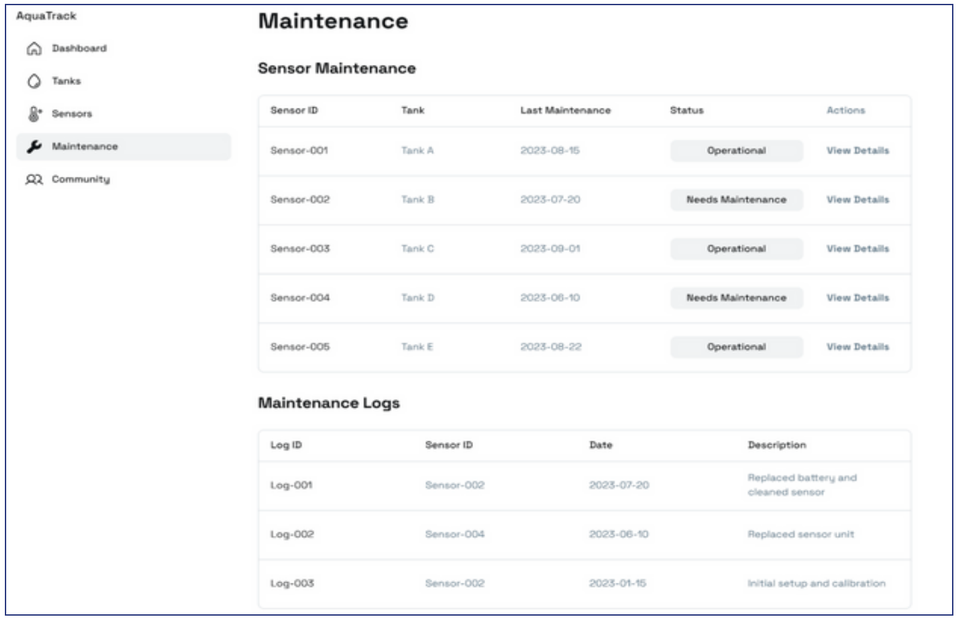
- Focuses on **understanding** clean water scarcity impact and best practices.
- **Namjai Volunteers** will be selected.

Authorities & Community Training

- Users and Namjai Volunteers are **trained** on the usage, procedures and features of Namjai water tank and reporting systems (on webpage and mobile phones).

Maintenance

- Users and Namjai Volunteers are to **maintain water tank and monitoring system every 1 month** for the first year, then **every 3 months for subsequent years.**
- Maintenance tickets are to be recorded.



Namjai Education and Outreach Program helps to onboard local communities and Namjai Volunteers

IMPLEMENTATION

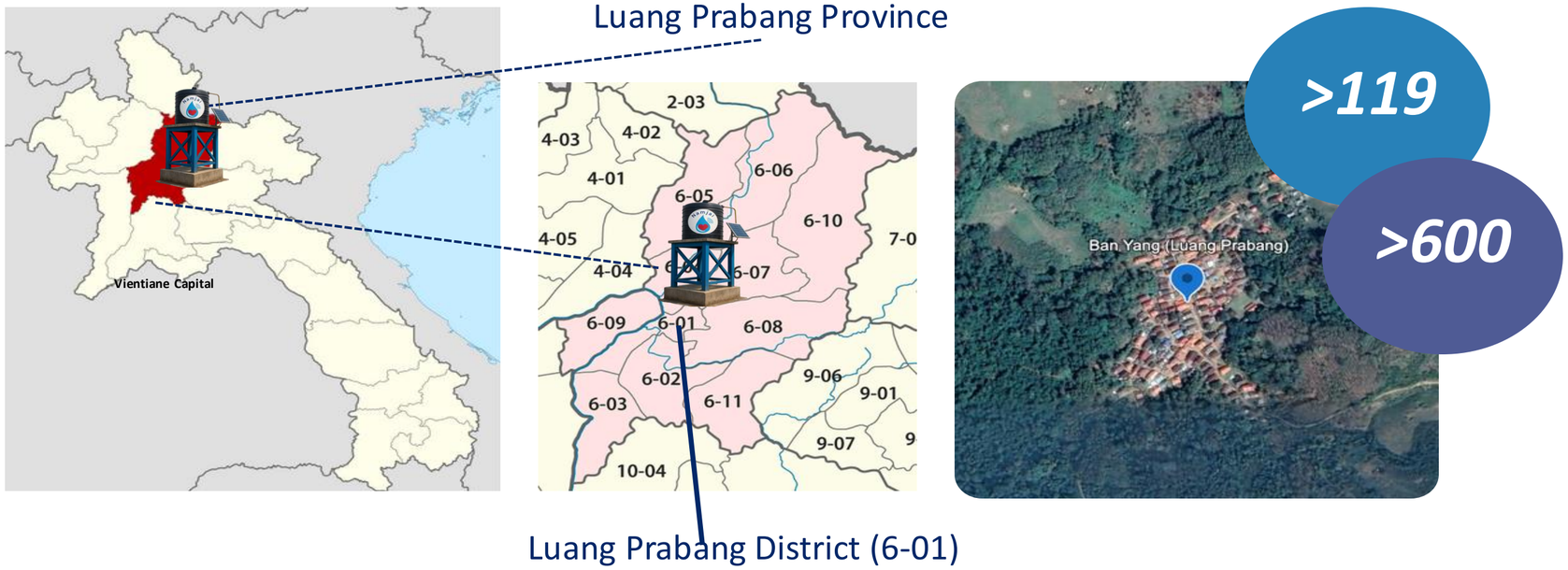
Case Example: Ban Yang (Lao PDR)

Ban Yang Pilot Program

Phase1: Site Evaluation & Data Collection
After getting permission from local authorities, Namjai team will visit Ban Yang to conduct **village mapping and demographic data collection.**

Phase 2: Installation
After securing the location, the smart water tank and other necessary infrastructures will be **installed and integrated** with the online monitoring system.

Phase 3: Solution Validation
Residents will be invited to sign up for the **pilot project and provide constructive feedback** for further improvements.



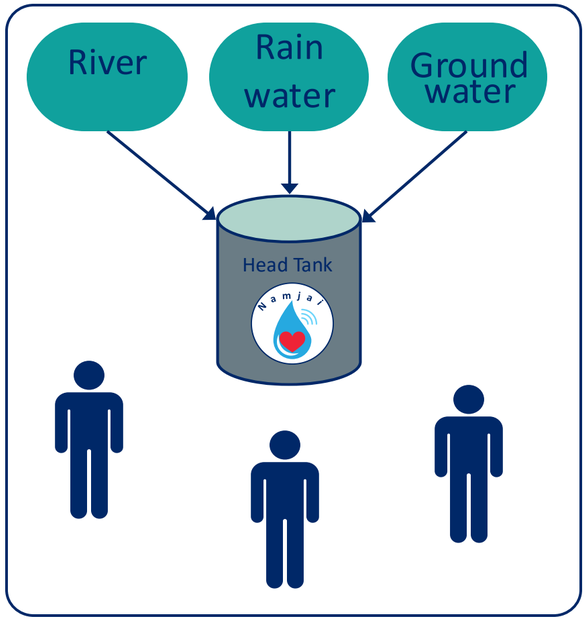
Ban Yang is an ideal pilot for our data-driven monitoring and management system as it **represents a typical rural Lao village** with **merely 600 residents** and has significant challenges with **water accessibility and quality**, compounded by its **reliance on untreated surface water sources** such as nearby streams. Hence, making it suitable for ***tier 3 distribution system***.

Case Example: Ban Yang (Lao PDR)

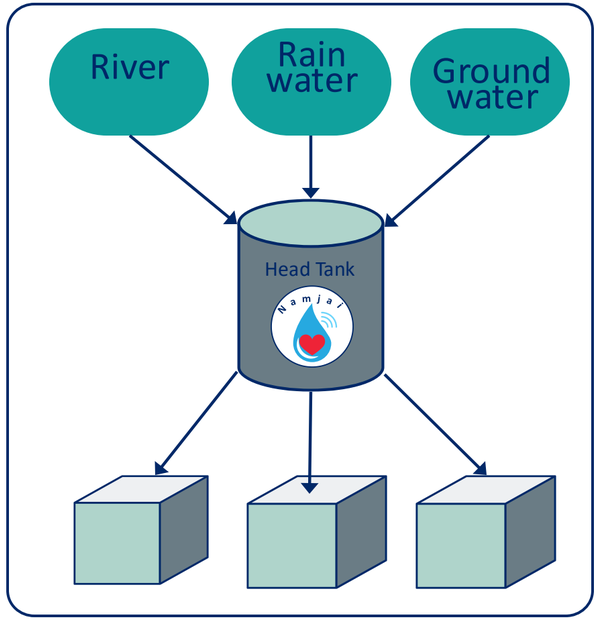
Ban Yang Pilot Program

Head Tank & Scalable Distribution System

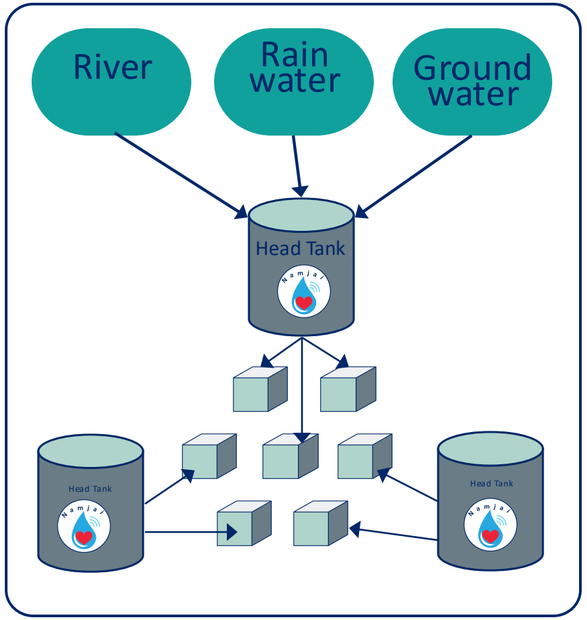
- **Tier 1** - Small village (<150): A single central head tank serves as the communal collection point.
- **Tier 2** - Medium village (150-400): The water from the head tank is distributed to multiple nearby storage units, improving accessibility.
- **Tier 3** - Large village (400- 1000+): A tiered distribution network with satellite tanks ensures efficient water access across zones.



Tier 1



Tier 2



Tier 3

Stakeholders' engagement

Namjai Volunteers, NGOs & Local Community

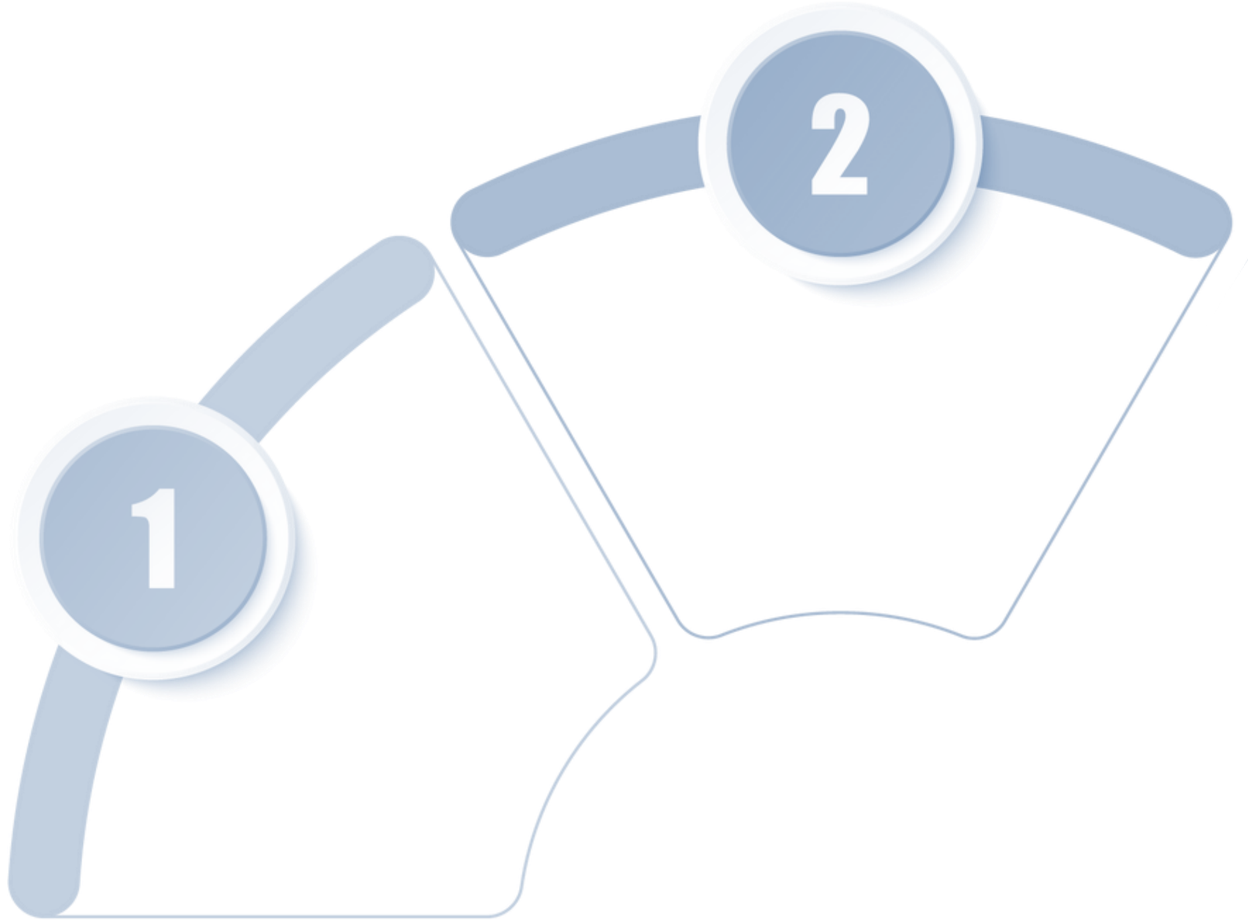
HUMANA
People to People, Laos

Namjai

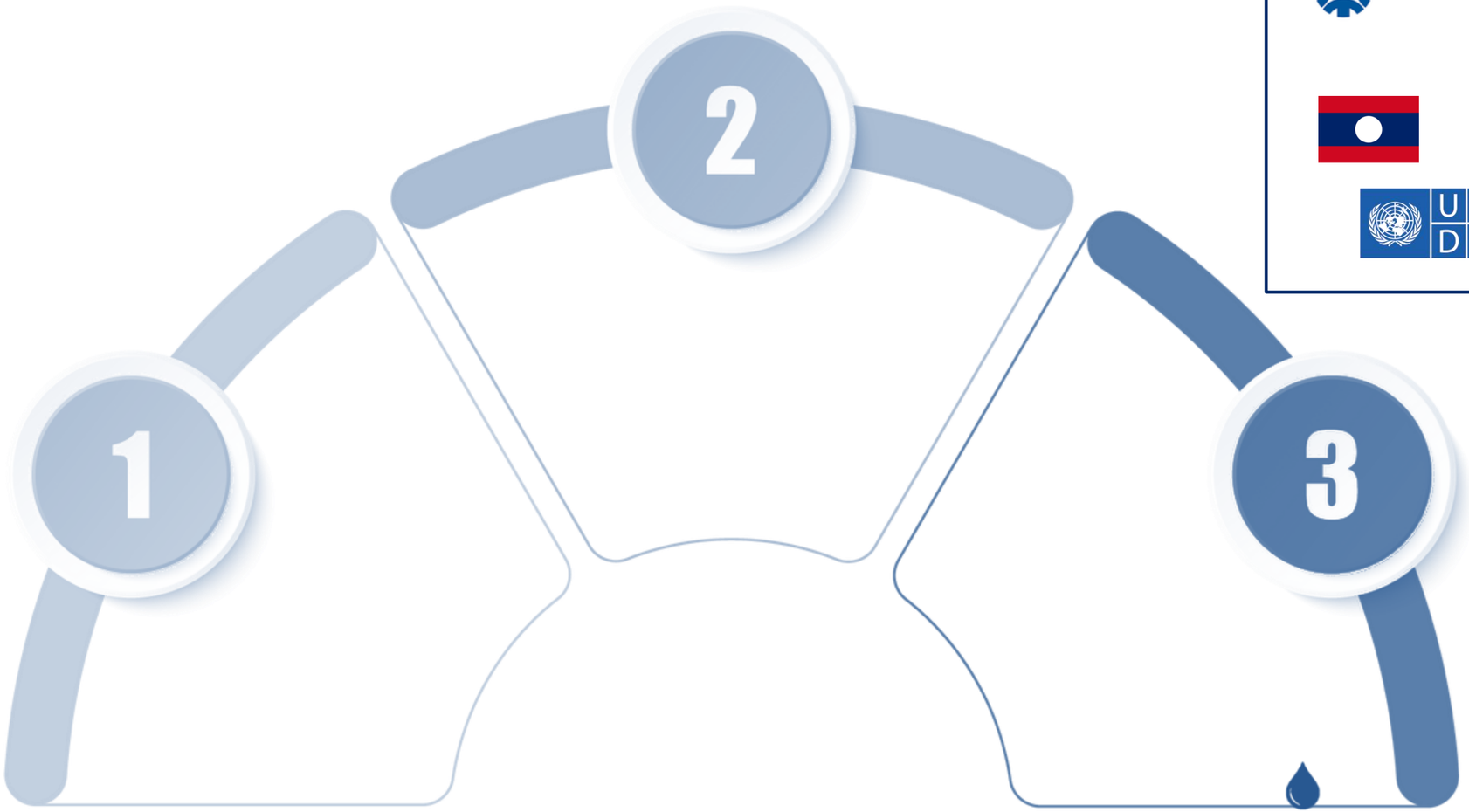
Planet Water Foundation

Stakeholders' engagement

Local Ministries & Corporate Partners



Stakeholders' engagement



Regional & International Organisations

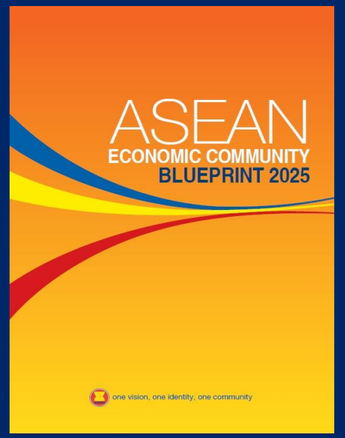
ASEAN FOUNDATION

asean

UNDP

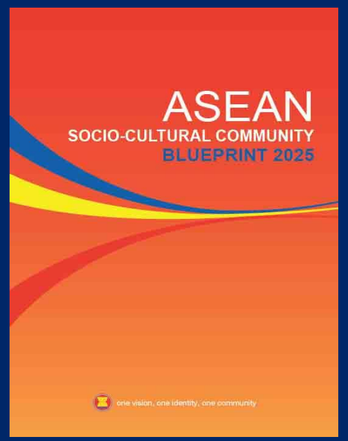
WORLD WATER COUNCIL

Goals alignment



Narrowing the Development Gap

Enhance productivity and competitiveness of rural economies, especially in the newer ASEAN Member States.



Equitable Access for All

Promote a community that is healthy, caring, sustainable and productive, and one that practices healthy lifestyle resilient to health threats and has universal access to healthcare.

Clean Water & Sanitation

Ensure availability and sustainable management of water and sanitation for all.

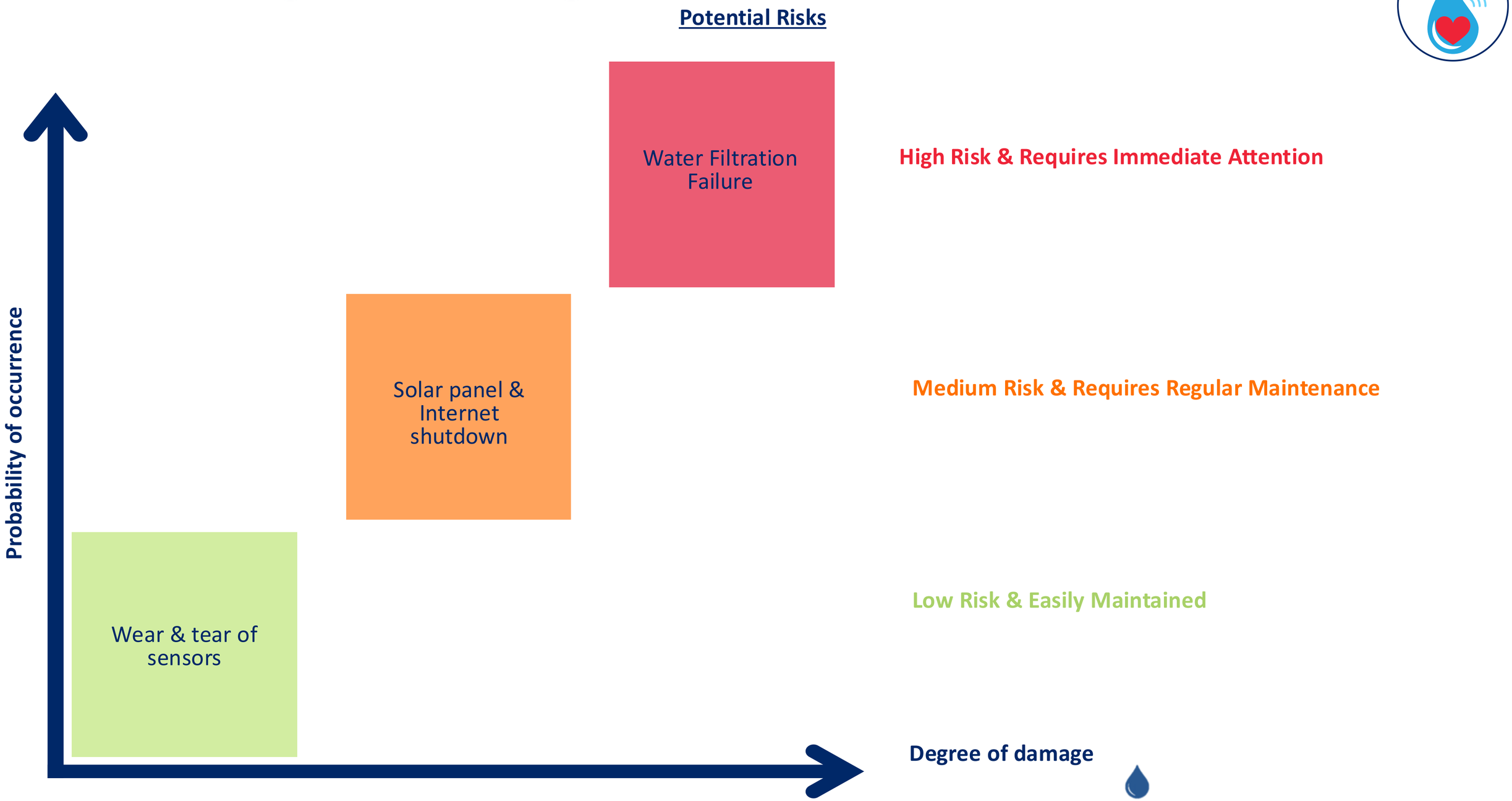
Good Health & Well-being

Ensure healthy lives and promote well-being for all at all ages.

No Poverty

End poverty in all its forms everywhere.

Risks and mitigation strategies



Risks and mitigation strategies

Mitigation Strategies: Regular Maintenance & Training

Year 1: Namjai team and ambassadors to conduct maintenance check up and training every month.

Year 2-Year 4: More training and recruitment of Namjai Ambassadors, regular check up every 3-6 months.

Year 5-Year 10: Namjai Ambassadors to train village chief and local community, then transfer ownership for self-sustainability.

Timeline and scaling plan

1st Year

Phase 1: Targeted Initiation

Villages are selected as small-scale initiation locations to assess the effectiveness of Namjai based on:

1. **Location**
2. **Population size**
3. **Access to water source**

2nd – 4th Year

Phase 2: Purposeful Expansion

Full-scale **launch across the country** involving the ministries and large local corporations, in addition to NGOs and Namjai Volunteers.

5th – 10th Year

Phase 3: Regional Transformation

Regional scaling across ASEAN, involving international organizations and governments, in addition to stakeholders in Phases 1 & 2

To ensure long-term sustainability, Namjai starts small, building a solid foundation

CONCLUSION

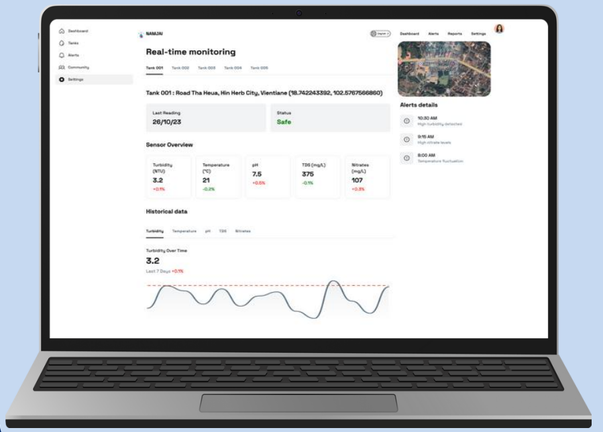
The Namjai Ecosystem

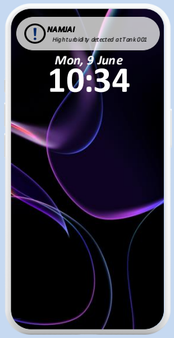
Clean Water
Filtration & Solar
Powered Tank

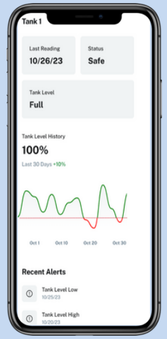
The Namjai Ecosystem

Clean Water Filtration & Solar Powered Tank

Real-time Monitoring & Updates



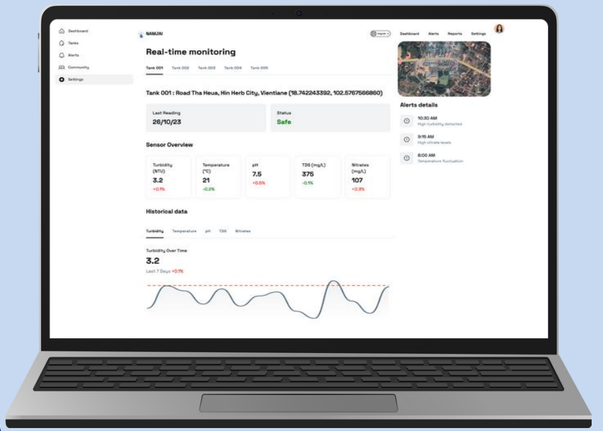


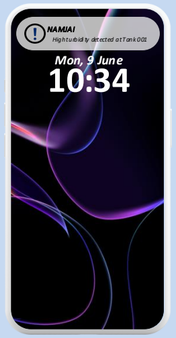


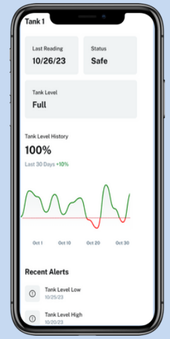
The Namjai Ecosystem

Clean Water Filtration & Solar Powered Tank

Real-time Monitoring & Updates





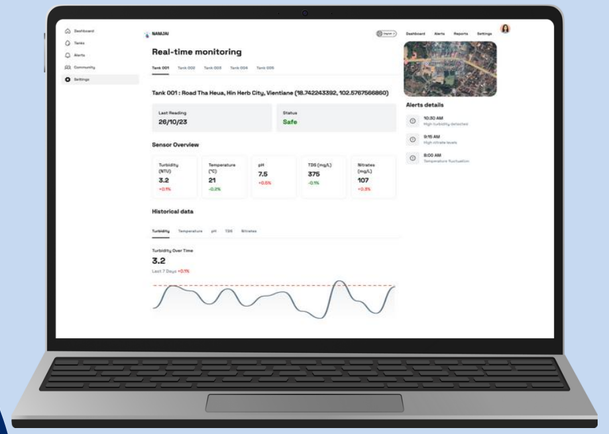


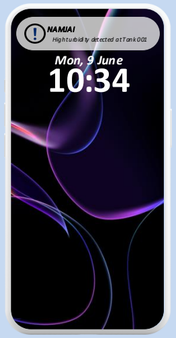
Stakeholder Engagement

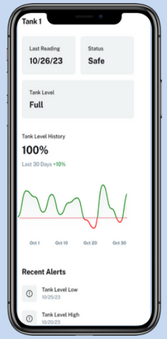
The Namjai Ecosystem

Clean Water Filtration & Solar Powered Tank

Real-time Monitoring & Updates







Community Empowerment

Stakeholder Engagement

0 Deaths from water contamination & Clean and Accessible water for all by 2040 in SEA.

Thank you

Appendix

Frequently Asked Questions

1. Namjai eco-system
2. Namjai distribution system
3. Namjai real-time data monitoring and alert system
4. What are some future plans for Namjai?
5. What are examples of current initiatives?
6. What are some potential problems/risks that Namjai may face and how we plan to mitigate those risks?
7. How feasible it is for Namjai to be used by other countries?
8. How can we make Namjai even more sustainable?
9. Do authorities have the capabilities to use Namjai?
10. What is the project cost estimation and future costs projections?
11. How does Namjai make money?

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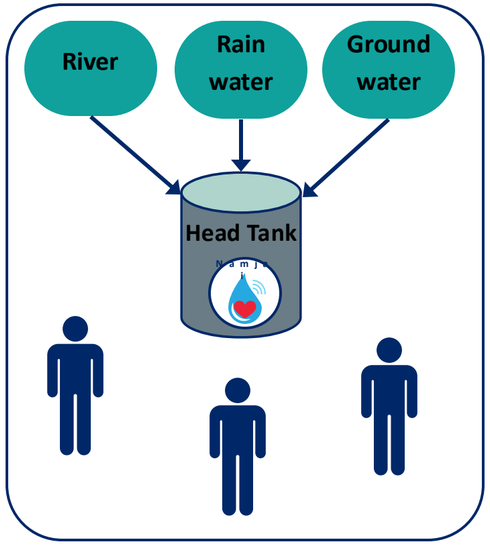
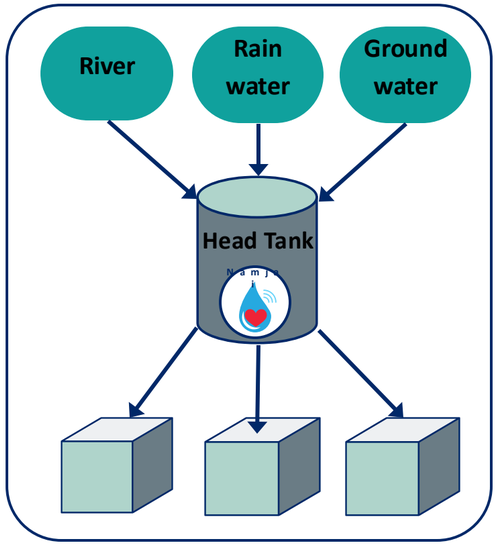
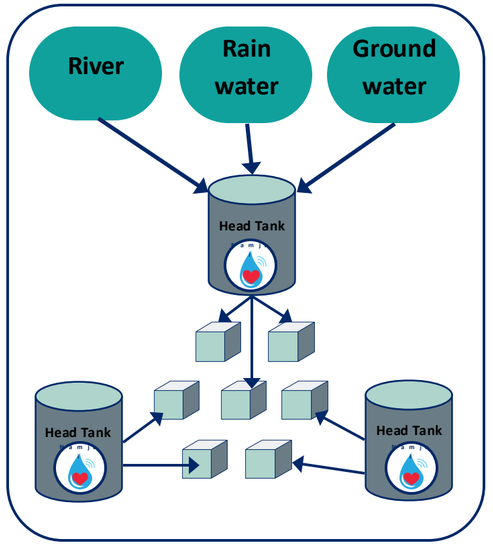
Appendix

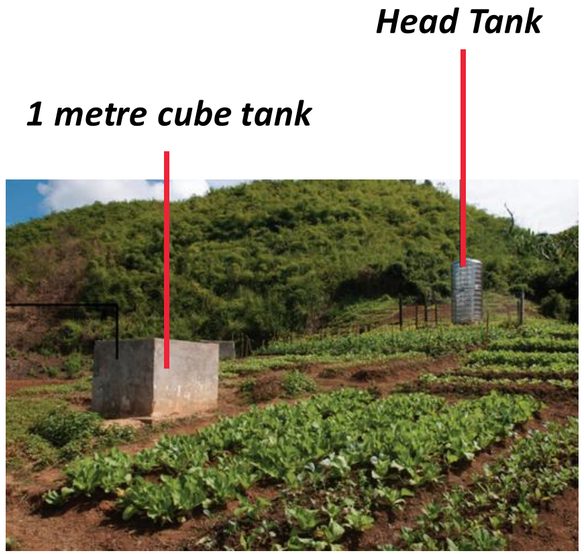
Water distribution network







- *Head Tank*
- *1 metre cube tank*



Tier 1 - Small village (<150)*: A single central head tank serves as the communal collection point.*

Tier 2 - Medium village (150-400)*: The water from the head tank is distributed to multiple nearby storage units, improving accessibility.*

Tier 3 - Large village (400- 1000+)*: A tiered distribution network with satellite tanks ensures efficient water access across zones.*

Appendix

Common water quality metrics

Metrics	Description	Unit	WHO Recommended Safe Level	Feasibility
pH	Electrochemical measurement of hydrogen ion activity.	pH units	6.5 - 8.5	pH level is commonly used as key indicator of water quality
Turbidity	Measures light scattering by suspended particles. High turbidity indicates presence of solid suspensions.	NTU (Nephelometric Turbidity Unit)	≤ 5 NTU (ideal), ≤ 1 NTU for disinfection	Readily available in current market at affordable price, could be use as a proxy tester for colour and presence of suspensions
Total Dissolved Solids (TDS)	Electrical conductivity used to estimate dissolved salts and minerals	mg/L (ppm)	≤ 500 mg/L	Used to test for dissolved chemicals, maintain drinking water safe standard
Dissolved Oxygen (DO)	Essential for aquatic lives. Low DO level indicates pollution.	mg/L (ppm)	> 8 mg/L	Not applicable to the use of drinking water
Colour and Odour	Drinking water should be colourless and odourless.	-	Colourless and Odourless	Only basic indicator of water quality, smaller particles may not be detected
Coliform Bacteria (E. coli)	Presence of E. coli indicates pathogen contamination, causing serious illness.	CFU/100 mL (Colony forming unit)	<1 CFU/ 100 mL	Requires lab testing and field detection, not feasible for real-time detection
Temperature	Direct temperature measurement using thermistors	℃ (Celsius)	< 25℃ preferred (for taste/chemical balance	Readily available, used as proxy testers for potential bacterial growth
Nitrates (NO_3^-)	Colorimetric or ion-selective method	mg/L	≤ 50 mg/L (EU/WHO), ≤ 10 mg/L (as NO_3^--N in US)	Test for toxins concentration, widely-used

Appendix

Water needed for general domestic uses for each distribution tier

Both the head tank and the satellite tanks are used as a buffer during peak times, as the tanks are designed to be continuously refilled.

Label and formula

Persons (P) - ***number of village residents***

Per Capita Per Day Water Consumption (LPCD) - ***water consumed per person per day***

Peak Factor (PF) - ***the ratio between the volume of water required during peak hour and average consumption.***

Total Daily Demand (TDD) ***= P x LPC (litres/day)***

Peak Hourly Demand (PHD) ***= (TDD/24) x PF (litres/hour)***

Storage Hour (SH) ***= the minimum number of hours the tank should be able to supply water during peak hour.***

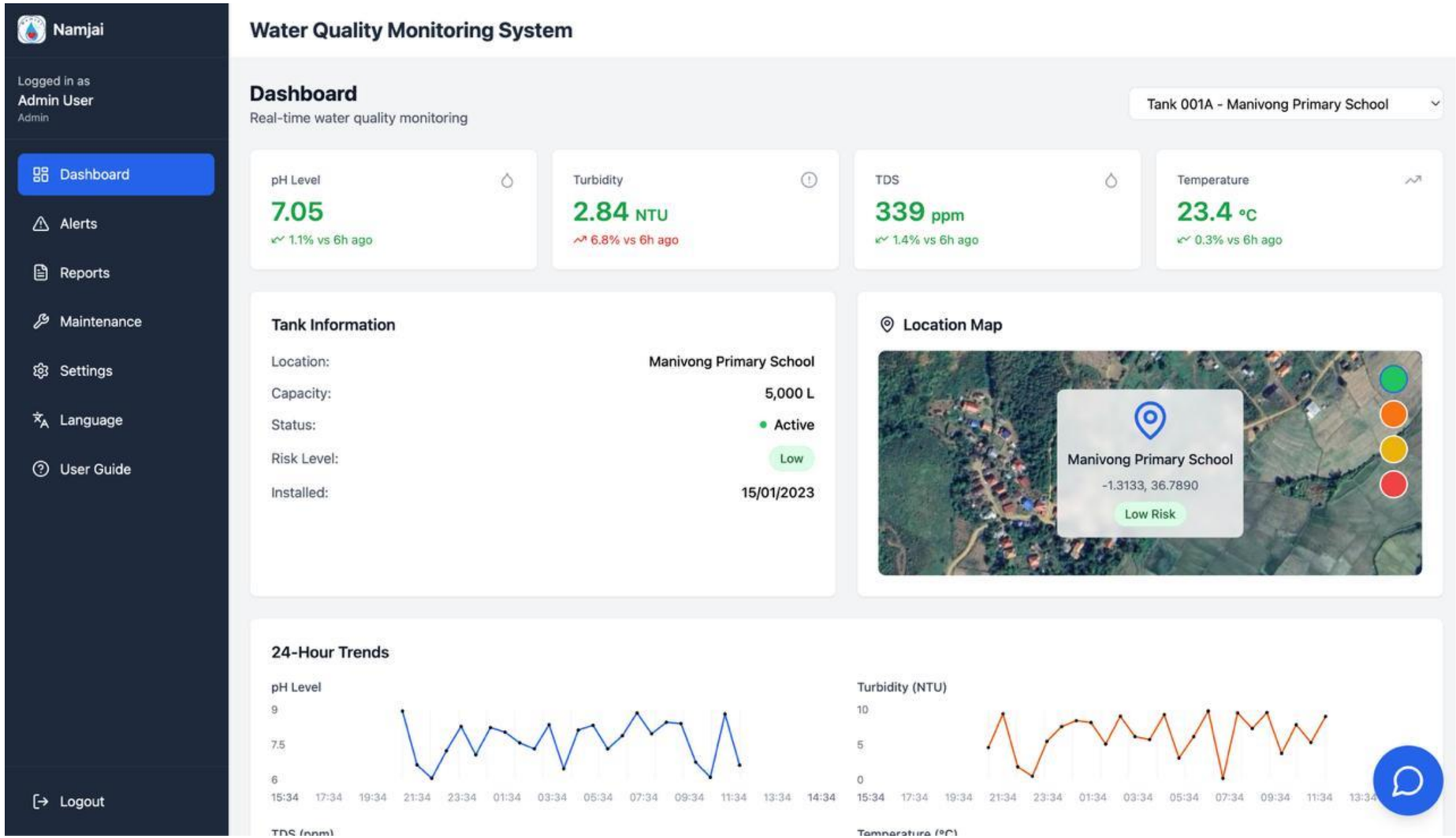
P = 149 people
LPC = 70 litres/person/day
PF = 2.5
TDD = 100 x 50 = 10,430 litres/day
PHD = (5,000/24) x 2.5 = 1086.46 litres/hour
SH = 4 - 6 hours
Total Volume (min) = 1,086 x 4 = 4,345.84 litres
Total Volume (max) = 1,086 x 6 = 6,518.75 litres

P = 400 people
LPC = 70 litres/person/day
PF = 2.5
TDD = 400 x 70 = 28,000 litres/day
PHD = (28,000/24) x 2.5 = 2,916.67 litres/hour
SH = 4 - 6 hours
Total Volume (min) = 2,916.67x 4 = 11,666.67 litres
Total Volume (max) = 2,916.67 x 6 = 17,500.00 litres

P = 800 people
LPC = 70 litres/person/day
PF = 2.5
TDD = 800 x 70 = 56,000 litres/day
PHD = (10,430/24) x 2.5 = 5,8333.33 litres/hour
SH = 4 - 6 hours
Total Volume (min) = 5,8333.33 x 4 = 23,333.33 litres
Total Volume (max) = 5,8333.33 x 6 = 35,000.00 litres

Appendix

Web Application to interact with our water monitoring system

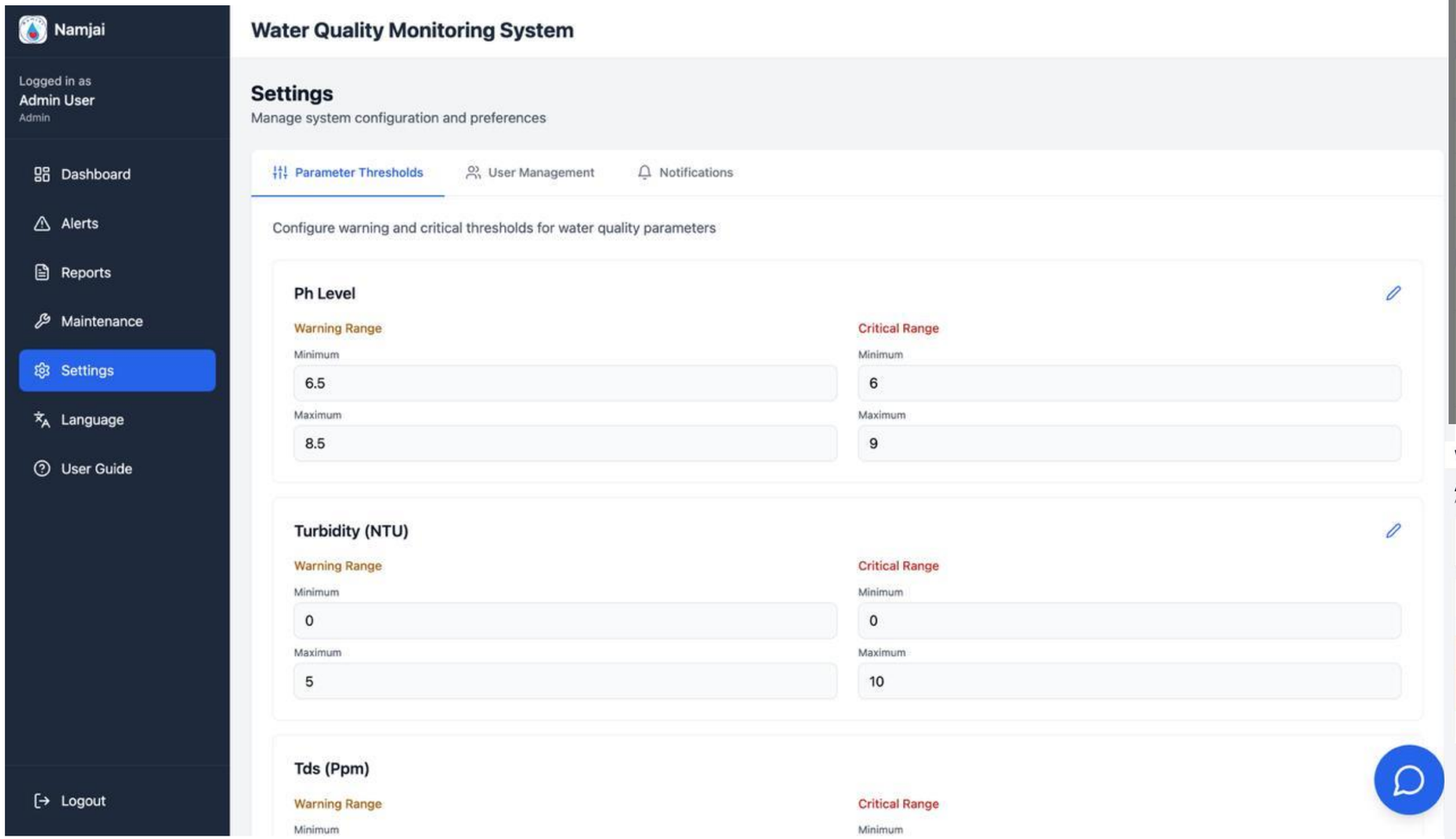


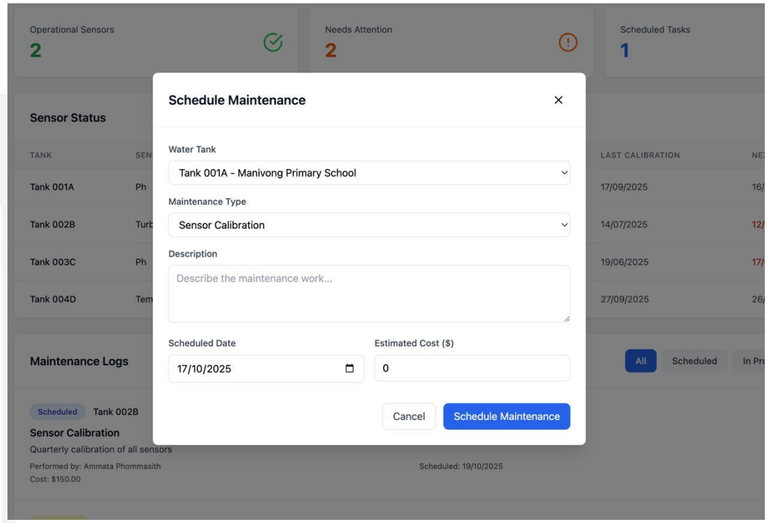
Main Dashboard

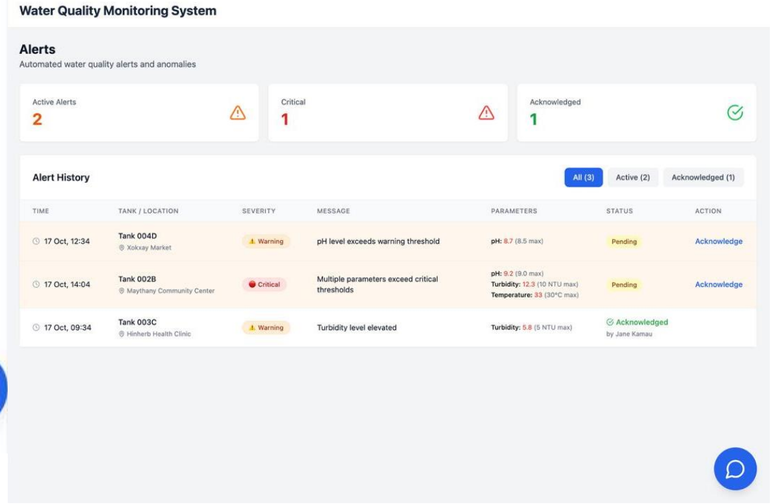
Appendix

Web Application to interact with our water monitoring system

Maintenance Logs







Settings

Alert System

Appendix

Namjai's feasibility in other countries

Only **20%** of households in Indonesia have access to piped water

11 million families lack access to clean water in dry season in the Philippines

Clean water scarcity remains a major concern in SEA

Only **15%** of wastewater in Vietnam is treated

SEA countries similarities

Culture | **Geographic Landscape** | **Economic Strategy** | **Development Goals**

source: Hitoshi, 2025

Appendix

Potential collaboration & improvements

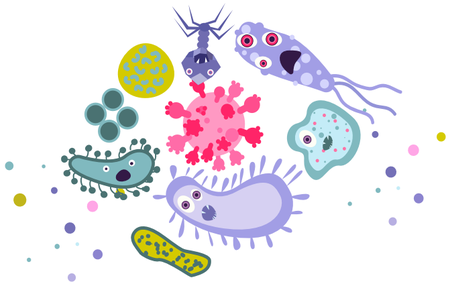
MolluSCAN:

A French start-up that uses a mollusk as a bio-monitoring system to detect water quality in real-time. Mollusks are known to be highly sensitive to water contamination and will completely shut their shells when exposed to contamination.

Bio-monitoring does not require electricity, saving energy costs

Key concerns

Ethical concerns



Hygiene concerns

source: [Water Environment Technology, 2025]

Appendix

Namjai costs estimation & projection (water tank installation and IoT system for Tier 1)

Component	Low End (USD)	High End (USD)
Water Head Tank (10,000L)	***$900.00***	***$1,800.00***
Satellite Tank (1,000L)	$300.00	$600.00
Solar Power System	$220.00	$450.00
Sensor & Monitoring	$230.00	$540.00
Water pump	$350.00	$600.00
Water pipes	$250.00	$400.00
Water Filters	$500.00	$1,000.00
Sub-total (Components)	$1,850.00	$3,590.00
Installation/Labor (Non-local cash cost)	$0.00	$1,000.00
Contigency (10-20%)	$370.00	$918.00
Total Estimated Cost	**$2,220.00**	**$4,508.00**

Appendix

Namjai cost estimation & projection (Software development and maintenance cost)

Fixed Cost Estimation

Component	Low End (USD)	High End (USD)
Web App Development	***$1,500.00***	***$3,400.00***
Backend API Development and IoT integration setup	$400.00	$1,000.00
Chatbot Integration	$100.00	$250.00
Notification System Tool Subscription (e.g. Twillio, SendGrid, etc)	$100.00	$300.00
Total Estimated Cost	**$2,100.00**	**$4,950.00**

Annual Maintenance Cost Estimation

Component	Low End (USD)	High End (USD)
Domain & SSL	*$20.00*	*$60.00*
Cloud Hosting (AWS EC2, GCP App Engine, Vercel)	$240.00	$700.00
Database Hosting (AWS RDS)	$200.00	$450.00
Sensor Data Ingestion (IoT message broker)	$100.00	$300.00
Maintenance/Support	$1,000.00	$3,000.00
Total Estimated Cost	**$1,560.00**	**$4,510.00**

Appendix

Namjai cost estimation & projection (Total Project)

Component	Low End (USD)	High End (USD)
Physical Hardware (e.g. Tank, Solar, and IoT)	$2,200.00	$4,500.00
Software Solutions (e.g. Full web-app, Cloud Infrastructure, etc)	$3,600.00	$5,000.00
Contigency (10-20%)	$1,160.00	$1,900.00
Initial Installation and Development Cost	**$6,960.00**	**$11,400.00**
Maintenance Cost (Infrastructure + Software Solutions)	$1,700.00	$3,000.00
24/7 Hotline and Technical Support	$1,300.00	$3,000.00
Contigency (10-20%)	$600.00	$1,200.00
Annual Maintenance Cost Afterward	**$3,600.00**	**$7,200.00**

Appendix
Potential Revenue Streams

Commercialized water tank for advertisement purpose to raise fund

Monetizing real-time water quality data by selling data and/or tank to businesses

- Sell quality water information to **Agri-farms**, the farms can use water quality information to gain optimal yields, operational risk-management
- **Beverage and food companies** to receive data from their water source