Low-Cost Large-Scale Rainwater Storage for Rural Cambodian Households - Jumbo Jars

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Engineers Without Borders Australia

Cambodia

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Australian Aid

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Who is EWB?

OUR VISION

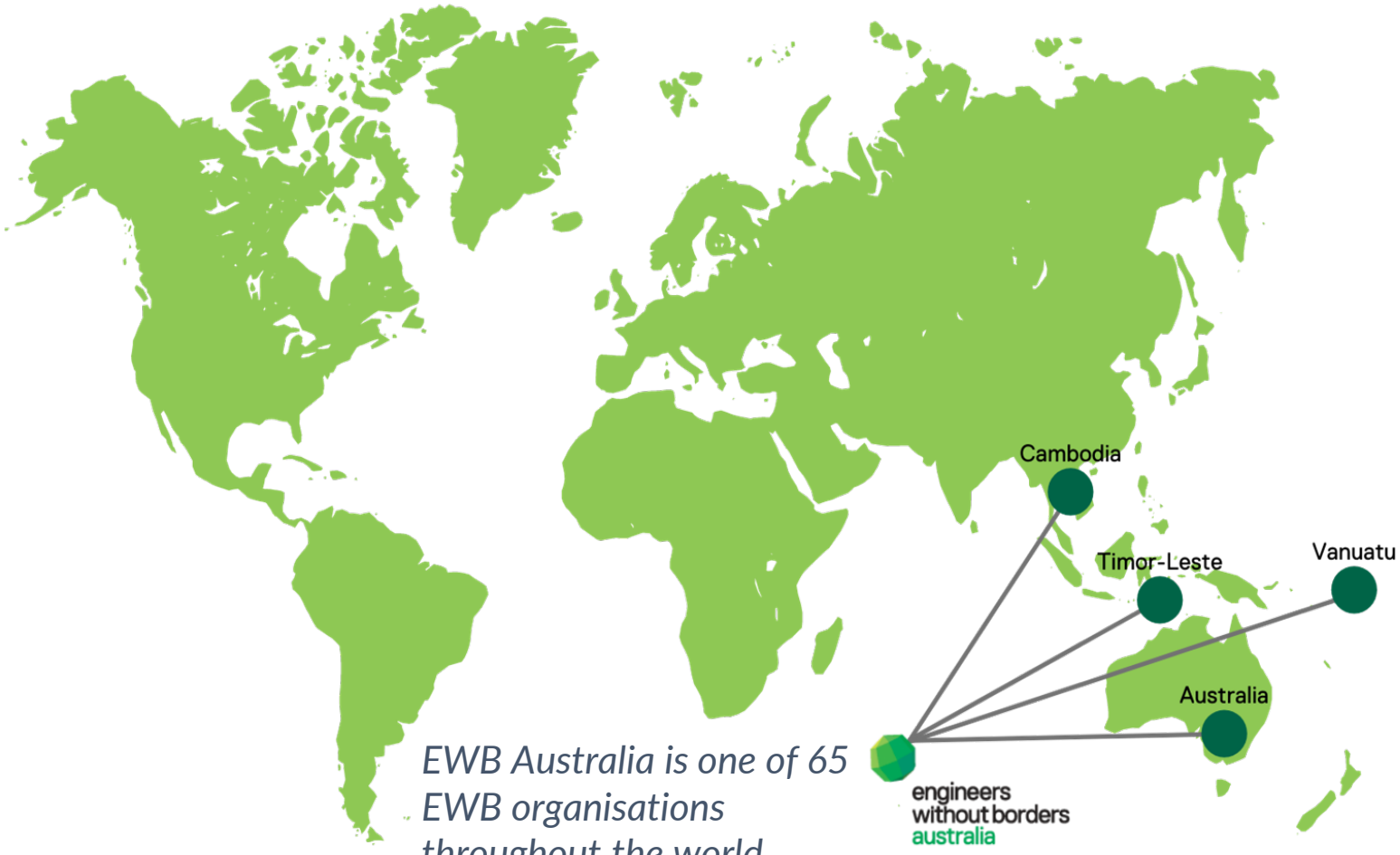
A world where technology benefits all.

OUR MISSION

Redefining the purpose and impact of engineering practice as a critical enabler of sustainable development.

OUR PURPOSE

Harnessing the potential of engineering to create an equitable reality for the planet and its people.



EWB Australia is one of 65 EWB organisations throughout the world

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Our Cambodian WASH Program

Locations

- Kratie Province
- Kampong Cham
- Kampong Chhnang
- Kep Province
- Kandal Province
- Siem Reap Province

Target Population

At least 25,700 people benefit directly in rural and urban areas.

Water in Challenging Environment:
Rehabilitation of Rural Water Supplies, Rainwater Harvesting, School Drinking Water

Sanitation in Challenging Environment:
Hard Ground, Flood Affected, High Groundwater, Water Scarce Sanitation Technologies

Hygiene Technology:
Hand washing station using a foot to respond COVID-19.

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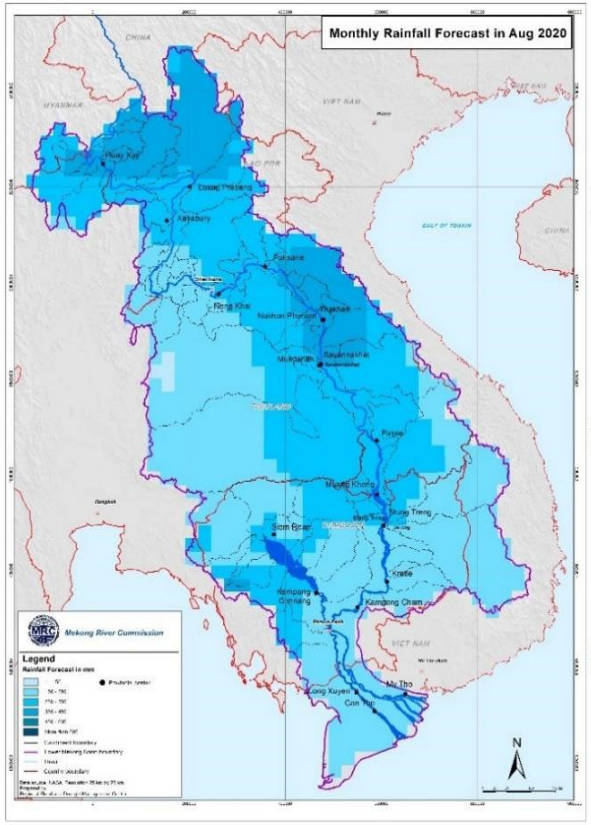
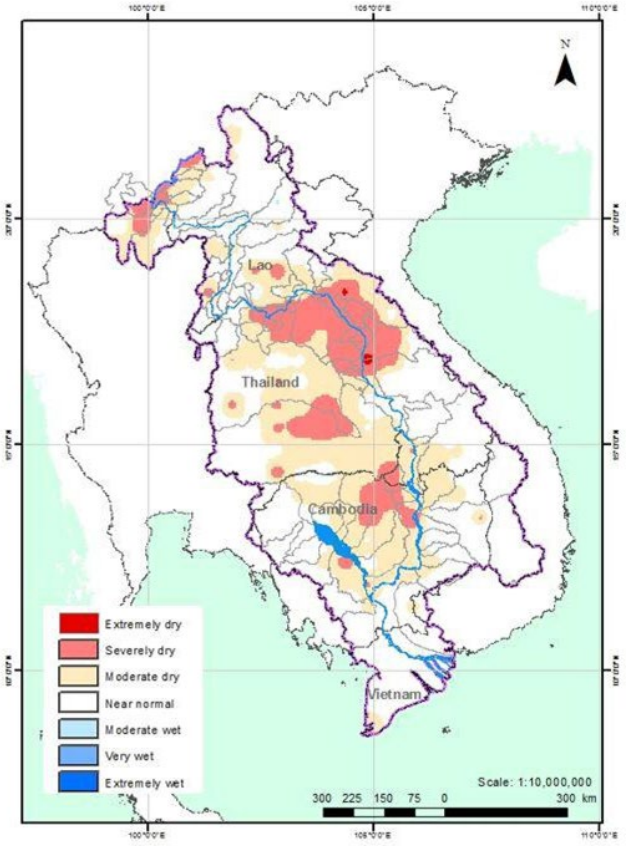
Climate Conditions in Cambodia

Climate in Cambodia is hot all year round
Temperatures range between 21 to 35°C



The Forecasted Rainfall in Aug-Sept 2020 in the LMB.
(MRD, 2020)



Standardised Precipitation Index from January-July 2020.
(MRC, 2020)

Cambodia is considered Southeast Asia's **most vulnerable country to the effects of climate change**, alongside the Philippines.

Climate change has had a major impact on clean water shortages in dry season, and extreme flooding in wet season.

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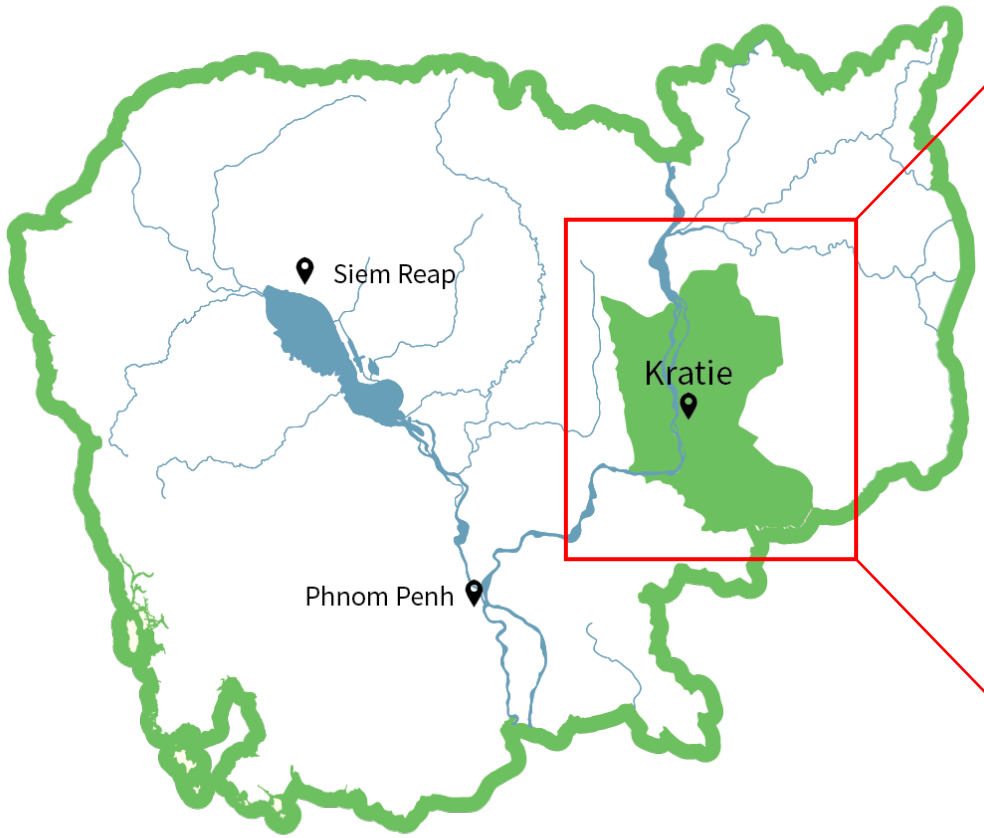
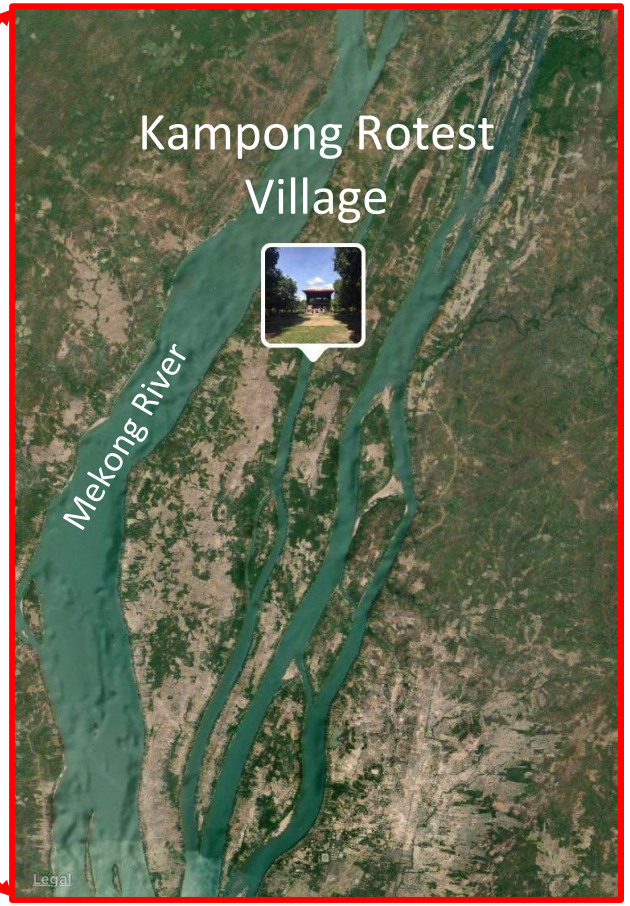
Piloted Location

Cambodia Map



Koh Tnoat Island



- *This village is an island surrounded by tributaries of the Mekong River and several other islands.*
- *The island's total population as of 2022 is 230 families, 866 people (432 females) and 220 households*

WATER WASH FUTURES 2023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Water and Sanitation Challenges in Community

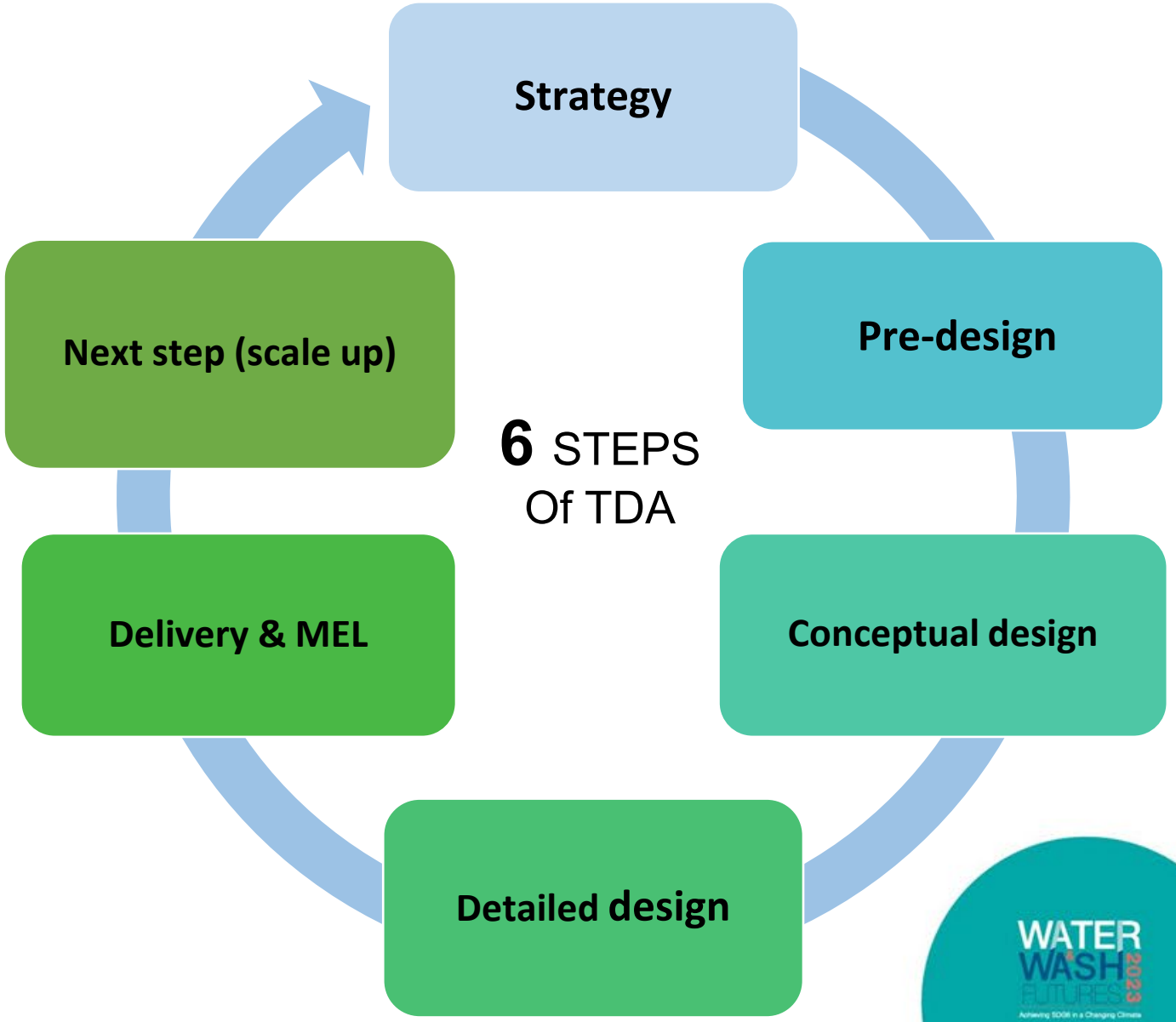
Two women were fetching water from the Mekong River in the mid-Rainy Season for home consumption

ក្របី
(Krabei) = Buffalo

This is the same river that is also used for livestock

- For the project of Jumbo Jar Rainwater Harvesting, EWB team has applied our Technology Development Approach (TDA) for the project cycle.

The Technology Development Approach



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Solutions

- Provide **sustainable** and **low-cost** rainwater harvesting systems
- **Increases capacity** of domestic water storage to 24 m^3 to use year-round
- Designed for **vulnerable people** that have difficulty accessing water, and for areas with **water scarcity** challenges.

The first flush system eliminates roof debris/ screens + sealed tanks eliminate bacteria/larvae

Jumbo Jar's lifespan is 20 – 25 years

Capacity Building : Training to Beneficiary and Local Constructors

Training on **operation and maintenance**, and how to install the first flush system with the basic construction process of Jumbo Jar by RWC

Training on **household water treatment** and safe water storage by PDRD-Kratie

Monitoring and Evaluation

Parameters	Unit	Guideline (RDWQG-MRD 2022)	River water	Jumbo Jar (Jan 2021)	Jumbo Jar (Jan 2022)
E.coli	CFU/100mL	**0**	**101**	**0**	**0**
Other coliforms	CFU/100mL	**-**	**Present**	**Present**	**Present**
AS	mg/L	**0.05**	**0**	**0**	**0**
Cl	mg/L	**0.2-0.5**	**0**	**0**	**0**
F	mg/L	**1.5**	**0.06**	**0**	**0**
Fe	mg/L	**0.3**	**0.06**	**0**	**0**
$CaCO_3$	mg/L	**500**	**75**	**25**	**30**
Mn	mg/L	**0.4**	**0.16**	**0**	**0**
TDS	mg/L	**800**	**125**	**67.22**	**110**
pH	-	**6.5-8.5**	**6.45**	**7.5**	**8.1**
Turbidity	NTU	**10**	**11.1**	**0.52**	**0.10**

Based on the physical and chemical parameters, the water quality is good: **transparent, odorless, tasteless**, and acceptable range of chemical substances. However, the **high value of total coliform** present means **filtration or disinfection is necessary before drinking**.

Sampling water from Jar for quality check

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Results

Compare to Market

Tank Types:	Plastic Tank	Concrete Tank
Capacity:	3,000L	3,000L
Cost:	US$350	US$180
Durability:	5-10 Years	20-25 Years

100% satisfied

Durable

Affordable

US$1,444/one system (24m³)

Easy to use

Easy to repair

Acceptable Water quality

Success indicators

We can verify the system is sustainable if we can ensure:

- **Technology sustainability** – should be cleaned/maintained
- **Governance Structures** – governance through the water management committee
- **Contextual relevance** – maintain good practice when using water from the system

As long as we can manage these factors then we can consider our system successful and appropriate for scale-up

Thanks For Your Attention

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Achieving SDG6 in a Changing Climate

"Clean Water, Good Health – Better Life"