water.org®

ATHENA INFONOMICS

Water and Sanitation Vulnerability Mapping for Southeast Asia

Learning Brief Indonesia



Brief Overview

Southeast Asia's efforts to achieve universal access to safe water and sanitation face persistent service gaps in vulnerable communities, **insufficient funding**, and a **lack of adaptation and mitigation strategies** to address escalating climate risks. Despite incremental progress, millions in rural and low-income areas remain underserved. Women are disproportionately affected as they shoulder the burden of household water collection and sanitation management. **Fragmented service delivery**, outdated infrastructure, and **under performing service providers** further compound these challenges, further impeding efforts to build resilient WSS systems.

The Water and Sanitation Vulnerability Mapping study, led by Athena Infonomics in partnership with Water.org, highlights the critical need for **financial investment in adaptation strategies and technological upgrades** to address climate risks and service gaps across Cambodia, Indonesia, and the Philippines. By assessing systemic vulnerabilities in service delivery and policy frameworks, the study demonstrates that funding constraints and fragmented service provision perpetuate inequities, limiting the sector's capacity to adapt to climate risks. This learning brief, **focusing on Indonesia**, presents targeted recommendations to close service gaps, strengthen financial mechanisms, and advance technological solutions to improve sector performance and broaden access. The following summarizes key recommendations for addressing identified vulnerabilities in Indonesia's WSS sector:

The document presents key recommendations to strengthen access to WSS services through Water.org's WaterCredit program, which provides microloans to low-income households and small enterprises. Targeted interventions include microfinance support for services such as desludging and decentralized water treatment systems.

Proposed national-level reforms include developing standard operating procedures (SOPs) for public-private partnerships, fast-track licensing for WSS enterprises, and incentives for utilities to access private capital. Additional measures include climate-resilient WaterCredit programs, concessional loans for electric-powered desludging trucks, performance-based grants for rural water services, blended financing models, and a centralized database of certified technology suppliers.

Lastly, the document outlines funding requirements for West Java, South Sulawesi, and North Sumatera, to support the implementation of technologies such as piped water supply, shallow protected tubewells, household rainwater harvesting systems, single and twin-pit latrines, adaptive septic tanks, and handwashing stations.

Local Context

In **Indonesia**, water and sanitation services are **regulated** by **PUPR** and the **Ministry of Health**, with the **management** and **delivery** are split across **urban and rural areas**. In urban areas, **PDAMs** manage piped water under the PUPR oversight, while in rural areas, **BPSPAMS** operate community based systems under the **PAMSIMAS** program. The **private sector** is active in urban water services through **bottled water**, **refill stations**, and **tankers**, and in rural areas, through **small-scale supply**. Sanitation is managed by **UPTD IPLT** and local governments in urban areas, and delivered via the **STBM** program through local health offices and communities in rural.



92.64% of dwellings have access to adequate drinking water.

82.36% of dwellings have access to adequate sanitation.
However, only **10.25%** of households have access to safely managed sanitation.

3.20% of the population still practices open defecation.

The private supports **desludging**, **latrine construction**, and **product supply**.

Key findings

The following section presents key findings from the province-level analysis of Indonesia, with West Java, North Sumatra, and South Sulawesi identified as priority provinces for in-depth study. Insights are organized thematically across critical dimensions, including **Service Preferences and Coverage, Climate Vulnerability, Gender-Specific Challenges, Household Financial Challenges, and Private Sector Constraints**. Each theme captures the on-ground realities revealed through the primary survey, focusing on prevailing service access patterns, user preferences, and challenges faced by households and service providers.



Figure 1: Household Toilet

For drinking water

14% of households (HHs) rely on public piped water supply

67% prefer private vendors supplying bottled or canned water

14% uses self-owned systems

4% use community-managed systems

1% rely on neighbors

Among private toilets

74% are connected to septic tanks

3% to are connected to sewer systems

23% directly dispose the fecal waste to water bodies

54% of these septic tanks are never emptied

57% of surveyed households affected by climate-related events.



Service Preferences and Coverage

Public utilities are valued for their **stable supply**, whereas private vendors are preferred for **better quality and affordability**.

In sanitation, **91% of HHs have Private Household toilets**, **8% use community toilets,** and **1% practice open defecation**.

For desludging services, only **3% of HHs use government-operated vacuum trucks**, while **82% rely on private providers** and **15% engage informal workers**.

Climate vulnerability

Climate-related events significantly impact WSS services, with **57% of surveyed households affected** by **floods (61%), droughts (37%) and landslides (2%)**. As a result, **44% of households report reduced clean water availability**, **21% report contamination of water sources**, **15% lose access to clean water entirely**, **10% suffer infrastructure damage, 7% suffered from increased time to travel to clean water and 3% other challenges**. In sanitation, **37% of households face increased exposure to unhygienic conditions**, **23% report damaged sanitation infrastructure**, **23% cannot use sanitary facilities due to water shortages**, and **17% experience overflowing fecal reservoirs**. Despite these challenges, external support remains minimal, with only **11% of households receiving assistance for clean water**—through distribution or subsidies—and just **3% receiving temporary sanitation facilities**. **Seasonal disruptions and weak climate resilience planning leave communities vulnerable to water scarcity and infrastructure failures**.

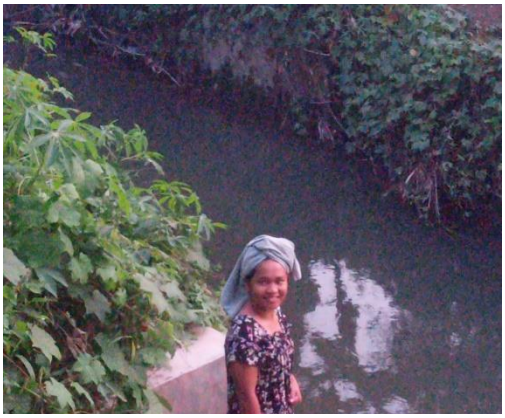


Figure 2: Female using water from river stream

28% report a lack of adequate sanitation facilities, and toilet cleaning remains a gendered burden

22% of HHs rely solely on women, compared to

17% where only men are responsible, while

61% share the task.

89% of households spend an average of

10 USD

per month on water services, while 92% spend

2.5 USD

monthly on sanitation services, all of which contribute to exceeding the 3% threshold.

Gender-Specific Challenges

Women face disproportionate challenges in accessing **WSS** services. The **burden** disrupts daily life, with **28%** of women spending considerable time managing sanitation needs, **7%** crossing dangerous terrain, and **4–10%** facing interruptions to school/work. **Menstrual hygiene management** remains difficult, with **30%** citing **inadequate water** and another **30%** facing **sanitation-related challenges**. As a result, **30%** of women report **increased health risks due to poor sanitation** and **28%** due to **unsafe water**.

Household Financial Challenges

The study found that Indonesian households **spend an average of 5.6% of their income on WSS services**, surpassing the affordability threshold of 3% set by the World Bank.

This high expenditure is compounded by **limited access to financial support mechanisms**. While **64% of households expect subsidies or financial assistance** for WASH services, awareness and access to such products remain low—only 27% are aware of financial products, including loans, grants, and crowdfunding platforms. Barriers to financial access persist: **16%** of households lack information on available financial products, **15%** struggle with loan accessibility and absence of financial assistance, **14%** cite administrative burdens and high interest rates, and **12%** point to the unavailability of adequate financial instruments tailored to water and sanitation.

Although **government policies and private sector initiatives** exist to support vulnerable populations, their **implementation remains weak**. For **clean water services**, only **22% of households** receive external support—**9% from the government** and **13% from private**. In the case of **sanitation**, **13%** receive external assistance, entirely from government sources.

Private Sector Challenges and Financing Constraints

The private sector plays a significant role in Indonesia's water supply and sanitation landscape, with approximately **68% of household water supply spending** directed toward private providers. **Despite this substantial engagement**, several structural and financial challenges hinder the sustainability and expansion of private WSS services.



Figure 1: Private water supply tanker

Regulatory complexities, **fragmented oversight**, and **weak quality monitoring** create challenges for private providers. In addition, **market competition** from PDAMs and large suppliers limits small businesses, while a **high reliance on intermediaries** inflates costs. These issues are further **exacerbated by climate-driven water scarcity and over-extraction**, coupled with **weak public-private collaboration**.

On the financial front, private operators rely on **user fees, refill depots, maintenance contracts, and emergency services**, but **high operational costs** in underserved areas often **exceed revenue** due to **low population density** and **limited customer affordability**. Many small operators **struggle to secure financing**, as financial institutions consider them **high-risk borrowers**, restricting access to **low-interest loans and investment opportunities**. Furthermore, **complex permit processes**, **compliance costs**, and **lack of financial incentives** place additional strain on businesses.

Microfinance Institutions (MFIs)

To understand the landscape of water and sanitation financing in Indonesia, interviews were conducted with five MFIs: **ASBANDA/BPD (Regional Development Bank), KOMIDA, PNM (Mekaar), HIK Parahyangan, and PERBAMIDA BPRs**.

Aspect	Details
Operational Areas	Java, Sulawesi, NTT, and Kalimantan (urban and rural areas)
Financing Models	Group-based lending, Sharia-compliant contracts, CSR-linked schemes
WASH Loan Portfolios	Toilets, septic tanks, piped water connections, water storage units, desludging services (household and community level)
Household Loans	IDR 500,000 – IDR 7 million (mostly between IDR 1–4 million); 6–24 months tenure; 1% – 25% annual interest depending on model, risk, and subsidies

Aspect	Details
Enterprise Loans	IDR 5 million – IDR 100 million; up to 3 years tenure; 1% – 14% annual interest; supports water treatment systems, decentralized supply, PDAM expansion
Critical Challenges	High interest, low borrower literacy, income instability, high defaults, low uptake, weak utility coordination, CSR dependence, manual processes.
Financial/Regulatory Barriers	Strict collateral norms, limited capital, provincial limits, no direct WASH funding, poor policy enforcement, merger compliance, Sharia constraints, bundling requirements, and no green incentives.
Recommended market enabling forces by MFIs	Strengthen partnerships and education, lower interest, digitize repayments, train builders, expand desludging, integrate with Mekaar Digital, green loans, and use blended finance with PDAMs.

Bridging the Gaps by Water.org

Amidst the challenges faced by households and private operators in Indonesia's WSS sector, Water.org has been actively working to bridge financial and service delivery gaps. Partnering with **regional banks, cooperatives, venture capital firms, and associations** as financial intermediaries, the organization supports access to finance for **PDAMs and community associations**. These efforts have **reached 5.8 million people**, **mobilized $170 million in capital**, and **enabled 585,000 loans** — with **90% directed to women**, **78% to rural households**, and **85% to those earning under $6.85 per capita per day**. To better understand persistent vulnerabilities and identify pathways for strengthening WSS services, Water.org conducted this study, with key recommendations to address the identified challenges outlined in the final section.

Vulnerability

While the preceding section outlines critical insights from primary surveys and stakeholder consultations, it is important to place these findings in a spatial context to identify areas of heightened risk.

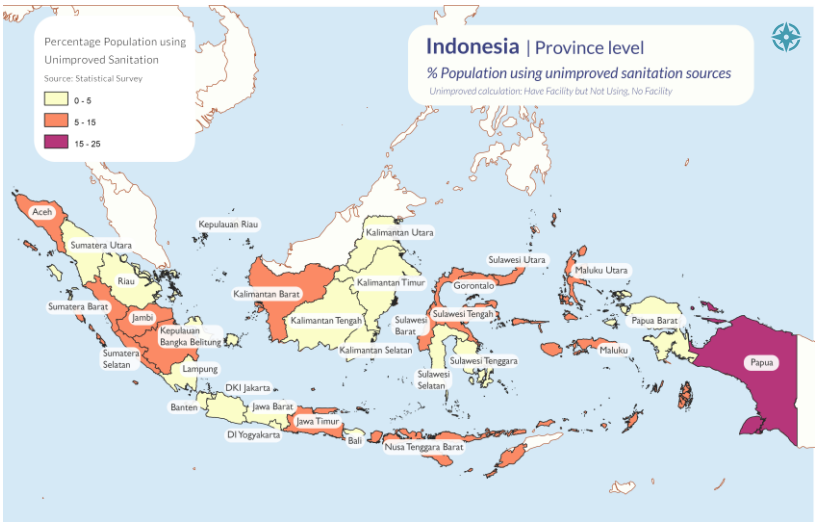


Figure 3: Province-level access to unimproved water sources

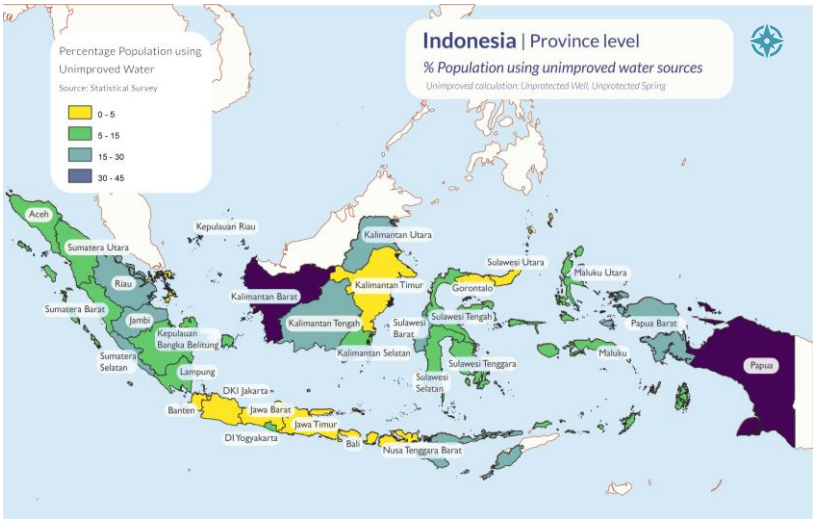


Figure 4: Province-level access to unimproved sanitation

Accordingly, a **nationwide spatial vulnerability assessment** was conducted to delineate the provinces in Indonesia where these challenges are most pronounced, based on composite indicators such as coping capacity, socio-economic conditions, and demographic vulnerability.

Based on this mapping, coupled with **stakeholder consultations and secondary data**, the provinces of **West Java**, **South Sulawesi**, and **North Sumatra** were identified as relatively more vulnerable. These provinces were selected for deeper spatial analysis to determine localized vulnerabilities and guide the identification of **priority intervention areas** for WaterCredit.

Province-Level Spatial Assessment:

For the three priority provinces, a granular district-level assessment was conducted using geospatial layers and demand estimation.

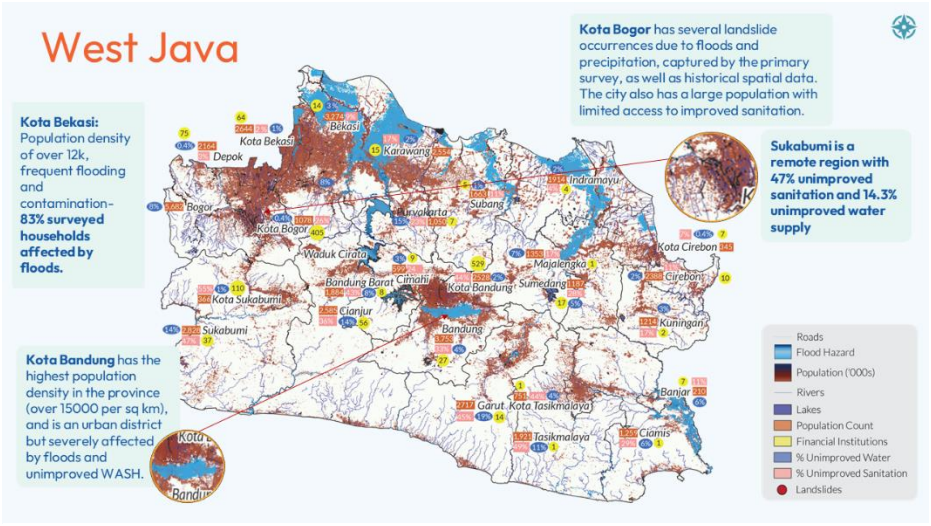


Figure 5: District-level WASH vulnerability mapping in West Java

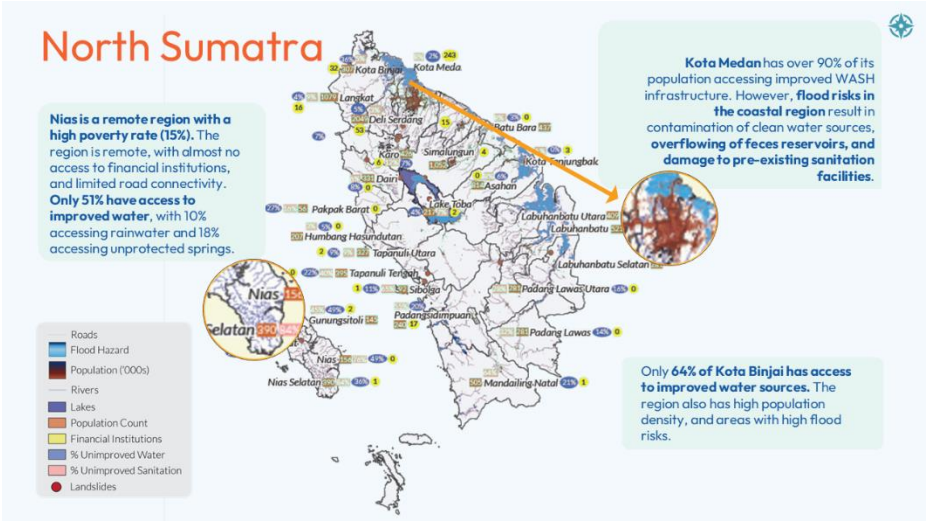


Figure 6: District-level WASH vulnerability mapping in North Sumatra

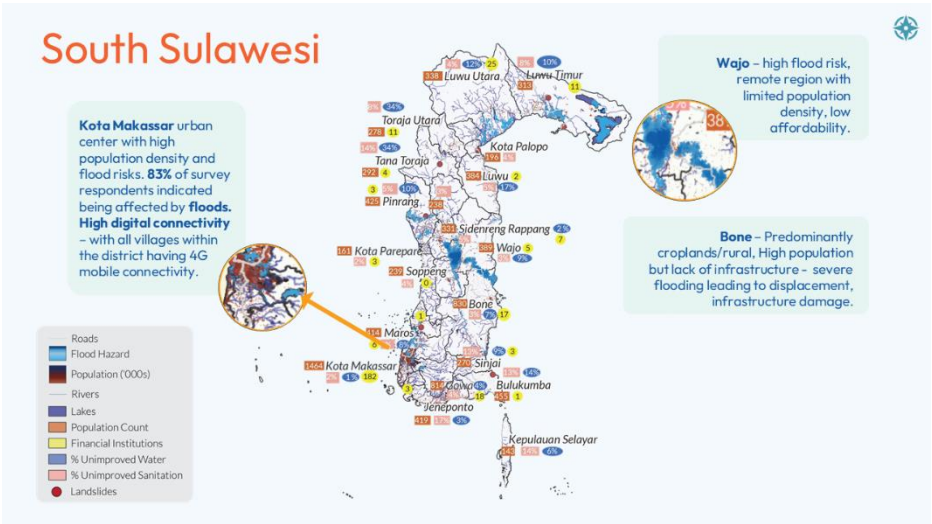
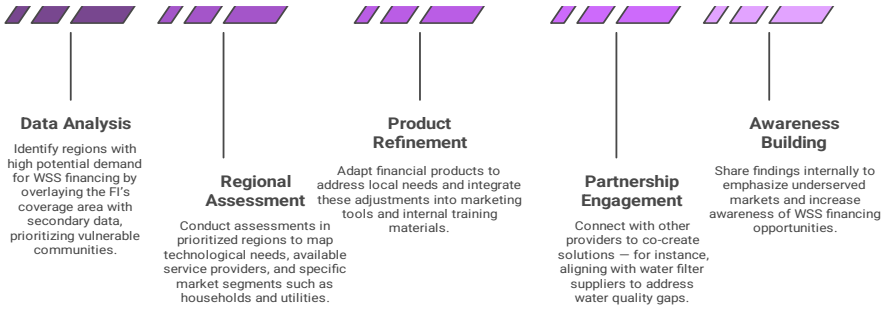


Figure 7: District-level WASH vulnerability mapping in South Sulawesi

Recommendations

Bridging the WSS infrastructure gap requires substantial investment, with Indonesia alone requiring $75 billion. Water.org's WaterCredit program has emerged as a critical initiative to facilitate microloans for low-income households and small enterprises to improve WSS access. For effective implementation of WaterCredit, the following actionable steps are suggested for the financial institutions:



Further, based on the learnings, the recommendations are structured into two categories:

Targeted Interventions for Vulnerable Districts:

For the 10 most vulnerable districts, interventions focus on financing mechanisms tailored to local needs. In **Kota Bandung, West Java**, where 147,102 households lack improved sanitation and the district faces frequent flooding and groundwater contamination, the following interventions are recommended:

1. **WaterCredit for Sanitation Services** – Provide microloans to construct terrain-friendly sanitation facilities, addressing financial and geographical barriers for 90% of households.
2. **WaterCredit for Private Enterprises** – Support financing for decentralized water treatment points to reduce groundwater contamination.
3. **Awareness Programs on Financial Products** – Increase financial product awareness through targeted campaigns, addressing the low 4% awareness rate.
4. **Capacity Building for Financial Management** – Provide financial literacy programs for 32% of households unable to afford WSS services.

National-Level Interventions

To ensure the long-term viability of WaterCredit and strengthen the overall WSS financing ecosystem, the following national-level interventions are recommended

1

Standard Operating Protocols (SOPs) for PPPs
Develop SOPs to streamline private sector participation in WSS service delivery, defining financing structures, risk-sharing mechanisms, and performance benchmarks. Example: Dhaka WASA's PPP initiatives in bulk water supply and NRW reduction

2

WSS Enterprise Accreditation & Fast-Track Licensing

- Establish a regulatory framework for expedited permits, accreditation, and financial incentives to encourage SME participation in WSS services. Example: India's SBM facilitated fast-track approvals for desludging operators
- Additionally, incentivize utilities to access non-public capital through deregulation or eased borrowing requirements.

3

Climate-Resilient WaterCredit Program
Introduce targeted microfinance for enterprises investing in climate-adaptive infrastructure, risk-mitigation mechanisms, and technical assistance for integrating climate risk assessments. Example: Indonesia Raykat Bank's Climate Strategy.

4

Electric Vehicle Financing for WSS Operations
Launch concessional loans and carbon credit incentives for enterprises adopting electric desludging trucks and water tankers to reduce fuel dependency. Example: South Korea's Green Bonds for low-cost financing.

5

Performance-Based Grants for Rural Water Infrastructure
Implement grants linked to service benchmarks, co-funding mechanisms, and capacity-building to enhance rural water operators' efficiency. Example: Ethiopia's One WASH National Program

6

Blended Financing for Infrastructure Expansion
Identify blended financing models by partnering with financial institutions to de-risk investments through

credit guarantees, interest rate subsidies, or loan amount grants. Leverage pooled funds from donors, governments, and private investors. Example: Kenya Pooled Water Fund

7 **Develop Technology Supplier Database**
Establish and maintain an updated database of quality service providers for targeted WSS technologies, accessible to financial institutions to facilitate supplier identification.



Figure 8: Images from household field survey

Funding Requirement:

Estimated Total Funding Requirement for Water Supply, Sanitation, and Hygiene under Scenario-Based Modeling for Each Identified Vulnerable Province

Province		West Java	South Sulawesi	North Sumatera
Estimated Demand (HH)		**289106**	**47153**	**82357**
Funding Requirement for Water Supply	Scenario 1: All Urban households to be connected to Municipal Piped Water Supply + All Rural households to be connected to Protected Shallow Tubewells	$68,439,393	$11,162,377	$19,496,189
	Scenario 2: Household Rain Water Harvesting System for Medium, Fourth and Highest Quintile + Protected Shallow Tubewell for Lowest and Second Lowest Quintile	$87,909,974	$16,128,633	$27,334,319
Funding Requirement for Sanitation	Scenario 1: Single Pit with Offset and FilTo for Lowest and Second Lowest Quintile + Twin Pits for Medium Quintile + Adaptive Septic Tank considering Flood Resilience for Fourth and Highest Quintile	$77,841,850	$10,444,357	$14,622,502
	Scenario 2: Single Pit with Offset and FilTo for Lowest and Second Lowest Quintile + Twin Pits for Medium Quintile + Septic Tank with Soak Pit without consideration of flood for Fourth and Highest Quintile	$57,156,300	$8,421,499	$12,275,325
Funding Requirement for Hygiene	Installation of Handwashing Station (Basin)	$21,682,967	$3,536,464	$5,355,270

**Both twin-pit and single-pit latrines are recommended to be constructed with a raised platform and a secure lid to enhance climate resilience.*

MFI Funding Requirement

- **Fourth and Highest Quintiles**: Excluded — can afford services without support.
- **Lowest and Second Quintiles**: Not suitable for MFIs — better targeted by DFIs and subsidies.
- **Middle Quintile**: Ideal target for MFIs — capable of borrowing and repaying.

Funding Requirement for Medium Quintile		West Java	South Sulawesi	North Sumatera
Water Supply Technology	MPWS, If available	$6,186,873	$886,474	$1,721,263
	Household Rain Water Harvesting System, if MPWS not available	$15,467,183	$2,216,184	$4,303,158
Sanitation Technology	Twin Pits	$9,280,310	$1,329,710	$2,581,895
Hygiene Technology	Handwashing Stations	$4,640,155	$664,855	$1,290,947
Total		**$35,574,520**	**$5,097,223**	**$9,897,264**

