

Resilience in a Changing Climate: Advancing Research on Groundwater for Equity

Urban Indonesia

Groundwater Profile

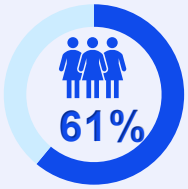
February 2025

60% of population of Indonesia resides in urban areas.

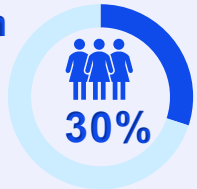
35% of urban households have access to safely managed drinking water services.

62% of urban groundwater sources used for drinking are drilled wells.

Urban water service coverage



99.16 million urban population uses **wells or boreholes** for **domestic purposes**.



48.8 million urban population uses **wells or boreholes** for **drinking**.

The data on the percentage of urban piped schemes using groundwater sources is not known.

Drinking water sources in urban areas in 2020

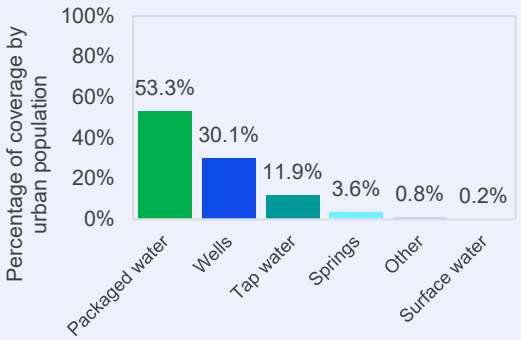


Fig. 1 – Percentage of urban household coverage for primary drinking water sources (SUSENAS, 2020).

Urban drinking water sources: 1980 - 2020

Over the years, the use of **packaged water services** has **grown**, while dependence on **point groundwater sources** and **piped water services** has decreased, although these sources still account for over **one-third of total usage**.

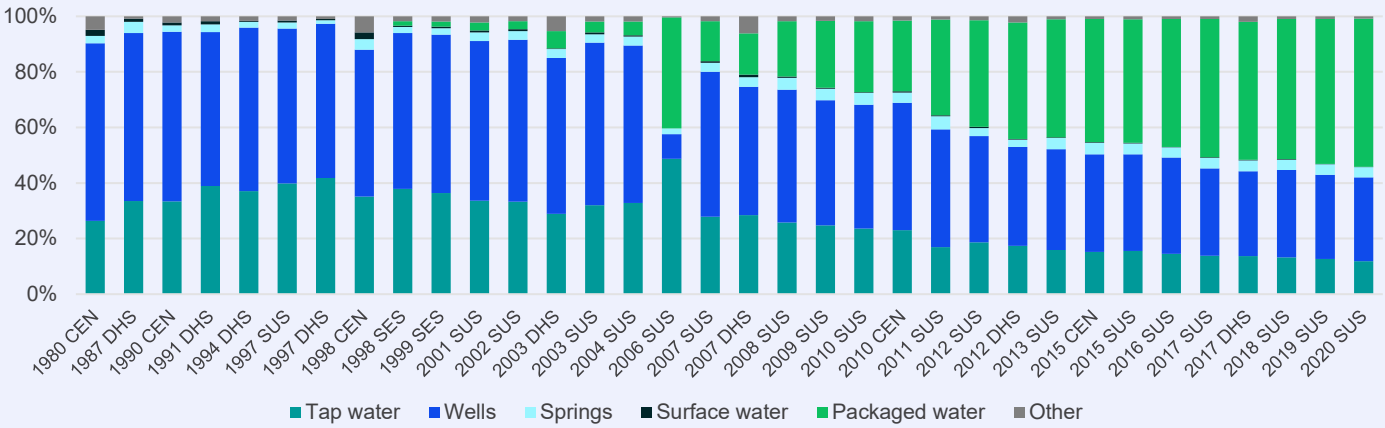


Fig. 2 – Percentage of urban household coverage for primary drinking water sources by years (UNICEF and WHO, 2023).

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Urban Indonesia groundwater profile

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Groundwater access by wealth quintile

Middle to richest income households use boreholes more frequently, while poorer and poorest households rely more on groundwater sources like dug wells.

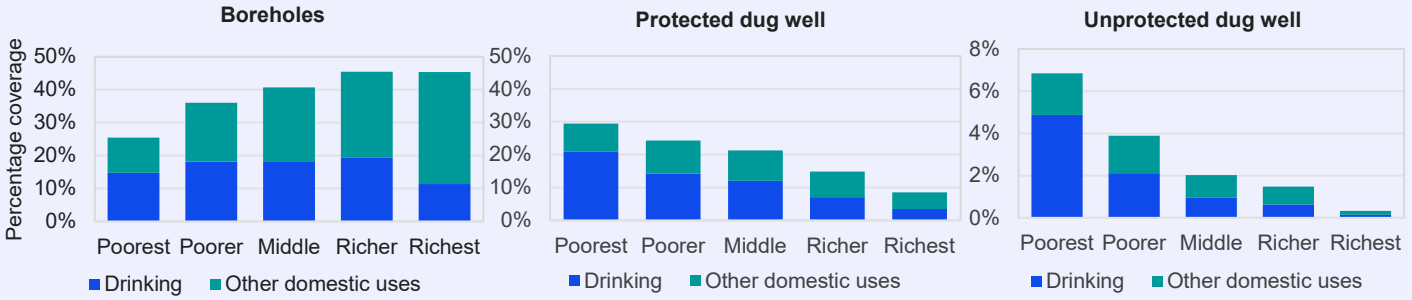


Fig. 3 – Use of groundwater sources for drinking and other domestic uses by wealth quintiles (DHS, 2017).

Water quality

Water quality is a concern across various groundwater sources, with unprotected and protected wells have the highest levels of *E. coli* contamination.

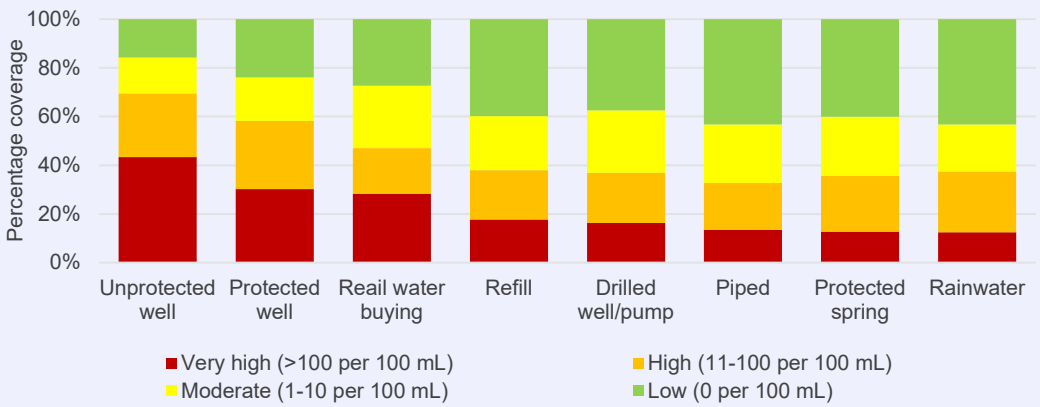
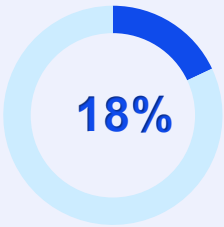


Fig. 4 – *E. coli* concentration in urban water sources (SKAM-RT, 2020).



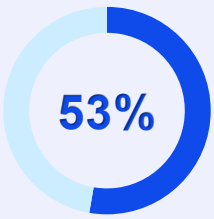
Wells in urban areas were **within 5 m of an on-site sanitation system.**

7 million



People in urban Indonesia **drink water from a well** that is within 5 m of an on-site sanitation facility and is likely to be **contaminated**.

Wells or Boreholes with sanitary risks



Wells in urban areas had **one or more sanitary risks**.

The risks included infrastructural faults such as cracks or damages. It does not take into account the proximity of a toilet or the presence of potential nearby contamination sources

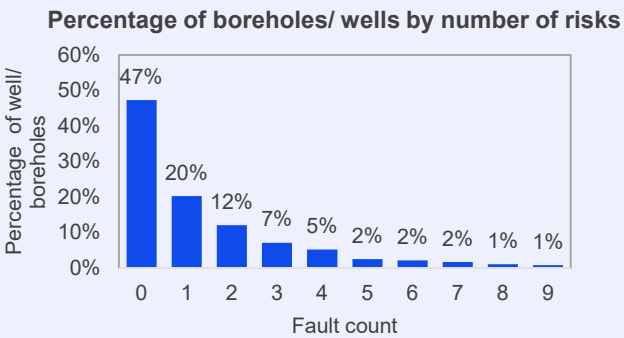


Fig. 5 – Percentage of groundwater sources (wells or boreholes) in urban Indonesia with sanitary risks (SKAM-RT, 2020).

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Groundwater usage by provinces

Groundwater usage is **predominant** in provinces like **Riau and Lampung**. In contrast, densely populated provinces such as **West Java, Central Java, East Java, Jakarta, and Bali** show **moderate reliance** on groundwater.

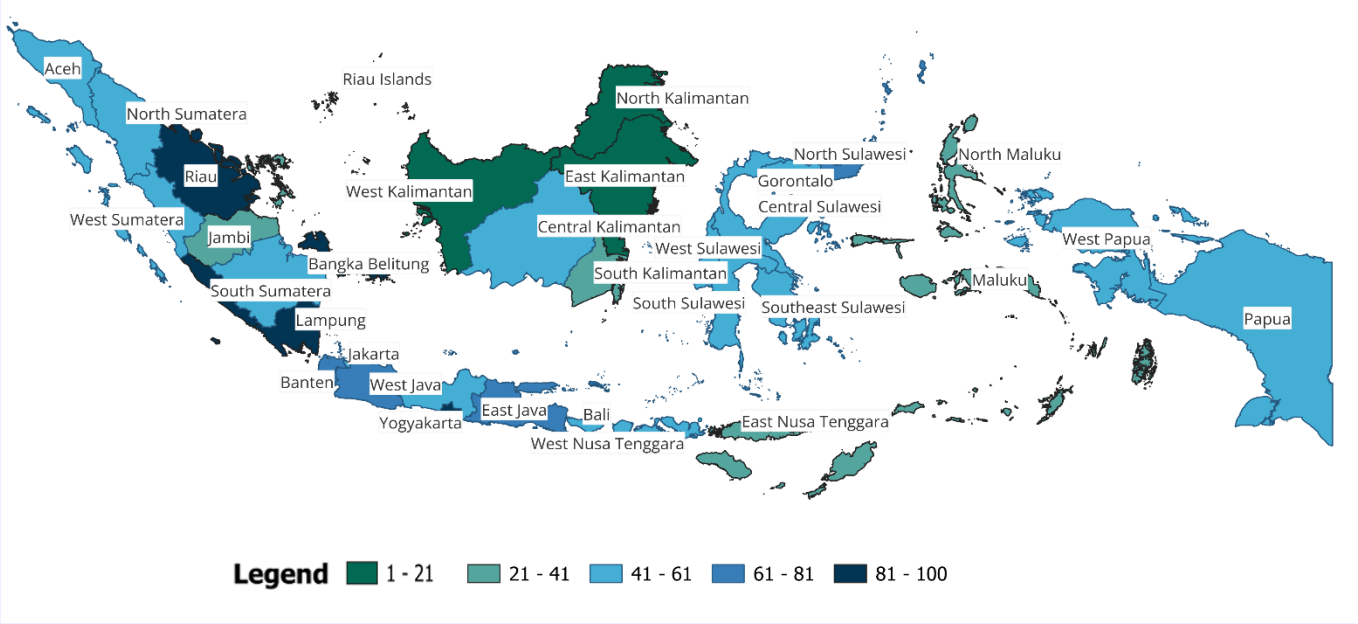


Fig. 6 – Percentage of urban population using groundwater sources (wells or boreholes) for drinking and domestic purposes (DHS, 2017).

Boreholes for water supply across Indonesia

Distribution of boreholes across Indonesia showed a **high concentration along the Java-Bali-Lombok corridor and in Sumatra**, reflecting the dense population and higher water demand in these regions. In contrast, Eastern Indonesia, including Maluku, Papua, and parts of Sulawesi, have relatively fewer boreholes, indicating less intense groundwater development.



Fig. 7 – Distribution of boreholes for water supply across Indonesia (Badan Geologi, 2025).

Hydrogeology of Indonesia

High groundwater potential is found in **coastal and lowland areas of Sumatra, Java, and Papua**, indicating high aquifer productivity and reliable groundwater sources.

520 billion m³/year of groundwater potential in Indonesia

155 billion m³/year of safe yield

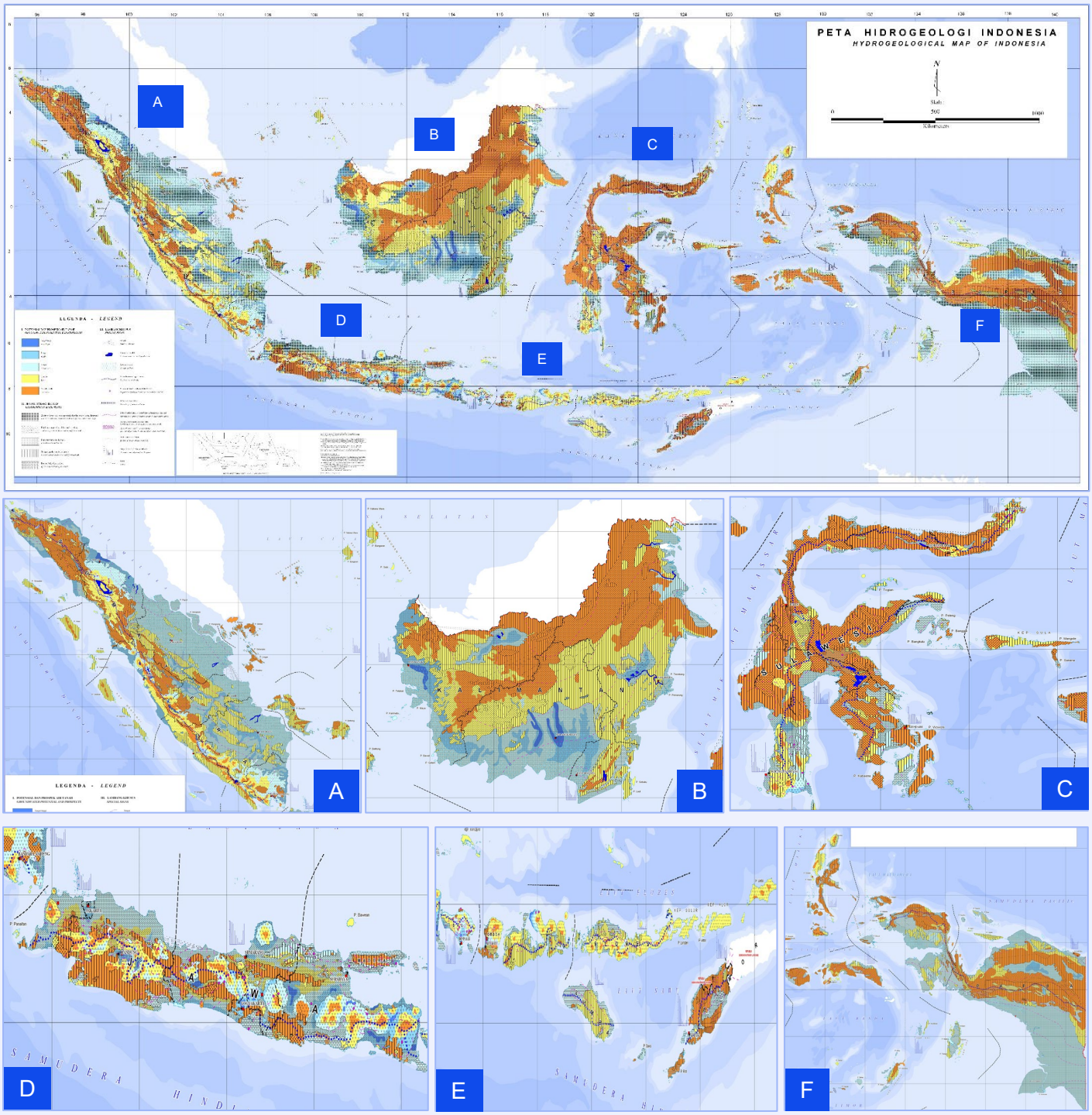


Fig. 8 – Groundwater potential across Indonesia (ADB, 2016).

Urban Indonesia groundwater profile

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Groundwater challenges

Overabstraction of groundwater has led to significant land subsidence, especially in densely populated urban areas across Indonesia.

3.5 m

of land subsidence since **1980 in the densely populated city of Jakarta** due to the overabstraction of groundwater.

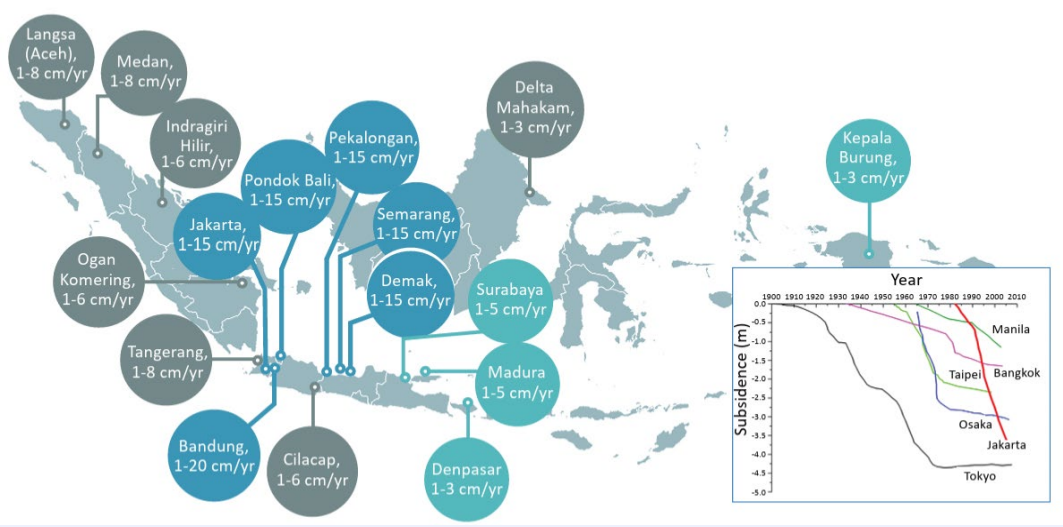


Fig. 9 – Comparative land subsidence rates across Indonesia (Khalil et al., 2021).

Groundwater management

To mitigate the decline in groundwater quality, the following actions are recommended (ADB, 2016):

- **Reduce groundwater abstraction** in accordance with PP 48 of 2008 on groundwater.
- **Implement regulations** across all local governments to control groundwater abstraction.
- **Strengthen** the requirements for obtaining **groundwater licences**.
- **Close** all **unlicensed wells**.

Groundwater in Indonesia is managed by the **Ministry of Mines and Energy**.

1. Management and monitoring
2. Licensing of groundwater drilling and use
3. Maintaining groundwater database

References

ADB 2016. Asian Water Development Outlook 2013: Measuring Water Security in Asia and the Pacific: Indonesia country Water assessment. Manila, Philippines. pp. 10–12.

DHS 2017. National Population and Family Planning Board (BKKBN), Statistics Indonesia (BPS), Ministry of Health (Kemenkes), and ICF. 2018. Indonesia Demographic and Health Survey 2017. Jakarta, Indonesia: BKKBN, BPS, Kemenkes, and ICF.

Badan Geologi. 2025. Ministry of Energy and Mineral Resources [Online]. Available: https://geologi.esdm.go.id/airtanah/geoportal/ [Accessed].

Khalil, A., Moeller-Gulland, J., Ward, C., Al'Afghani, M.M., Perwitasari, T., Octaviani, K., Riani, E., Liao, X. & Khan, A.M. 2021. Towards Water Security. Water Security Diagnostic. World Bank, Washington, DC.

SKAM-RT 2020. Laporan Akhir Penelitian 2020, Studi Kualitas Air Minum Rumah Tangga di Indonesia.

SUSENAS 2020. National Socioeconomic Survey Indonesia.

UNICEF and WHO 2023. Progress on household drinking water, sanitation and hygiene 2000–2022: special focus on gender, New York: United Nations Children's Fund (UNICEF) and World Health Organization (WHO), ISBN (UNICEF): 978-92-806-5476-9, ISBN (WHO) 978-92-4-007692-1. New York.



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