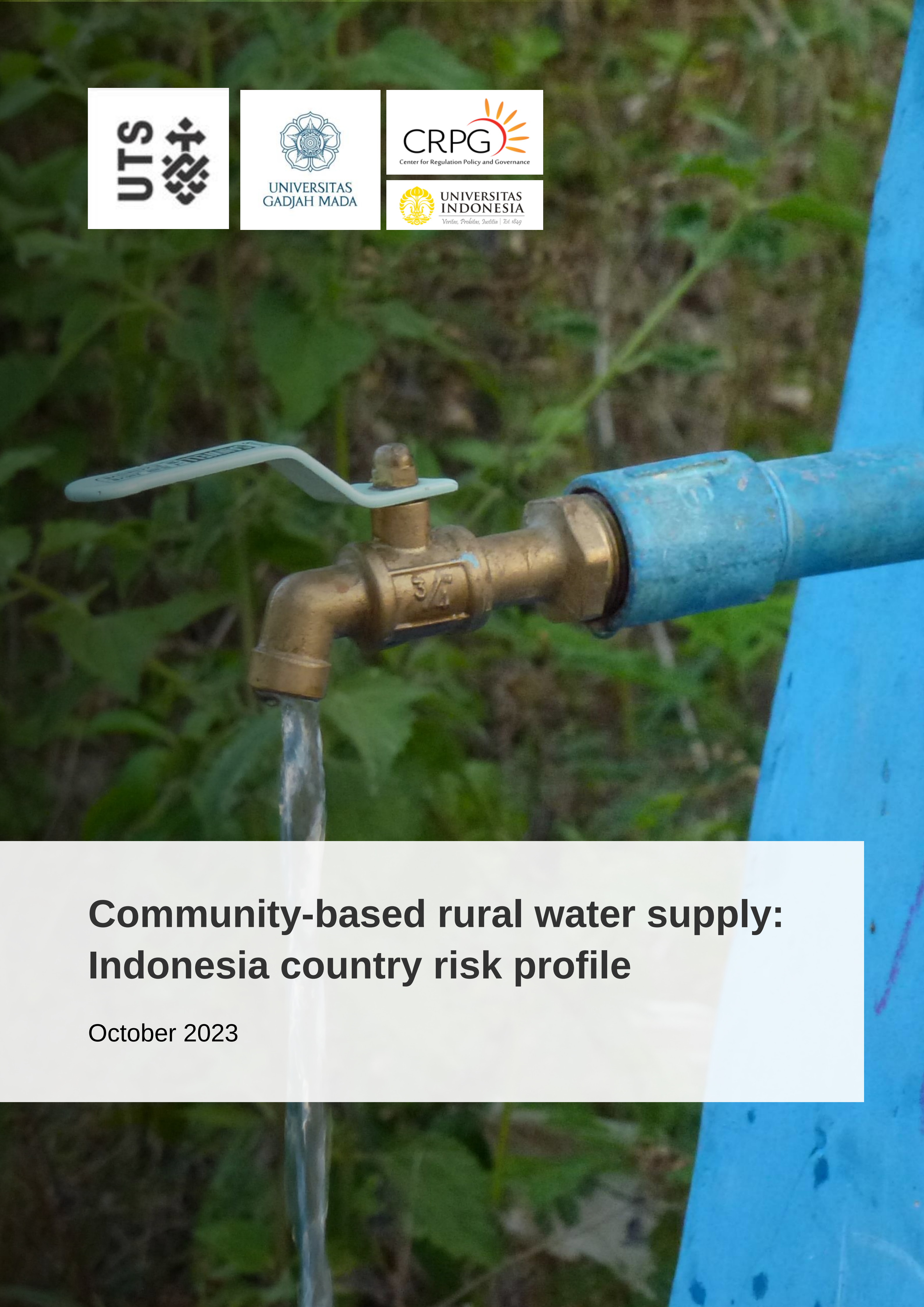

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Community-based rural water supply: Indonesia country risk profile

October 2023

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Photos

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Executive summary

Community-managed rural water supply services in Indonesia are at risk from climate change hazards, such as drought and sea level rise. These hazards may affect water availability, water quality, and also damage infrastructure. The community-managed systems will be more vulnerable to loss of services if there is insufficient budget and expertise for mitigating climate change impacts or if systems are poorly managed in the first place.

In this report, we provide an overview of selected climate change risks to community-based rural water supply in Indonesia. The focus is on the National Rural Water Supply and Sanitation Project or Penyediaan Air Minum dan Sanitasi Berbasis Masyarakat (PAMSIMAS) program (Community-Based Drinking Water and Sanitation Program), one of the largest community-based rural water supply programs in the world.

We develop provincial level risk maps of five hazard-related dimensions (rainfall, sea level rise, drought, flood, and water availability in the watershed), and three vulnerability dimensions including, functionality of rural water supply, financial condition of the water board, and women's involvement in management at the province level. We also provide provincial level risk maps for the current state of two important service outcomes (household water availability and water source quality). Publicly available data were used to develop the maps.

The potential PAMSIMAS system and rural population affected were also estimated. Considering the number of affected provinces and PAMSIMAS systems, we included decreased rainfall, followed by drought and sea level rise, as the most prominent climate hazards. Each of those climate hazard hazards may affect 67-79 million of the rural population and 12,000 to 14,000 (34-46%) of total PAMSIMAS systems across the whole country). Comparing all provinces, Yogyakarta, North Maluku and North Sulawesi are considered potentially the most susceptible due to having a high risk of at least three climate hazards.

This report may inform policymakers and relevant stakeholders and raise awareness of the significant threat of climate change to rural water supply services in Indonesia. Relevant actions should be taken to mitigate the climate change impact, especially when designing the upcoming new phase of the PAMSIMAS program.

Contents

1 Introduction

1.1 Background and aims

Rural water supply systems in low- and middle- income countries, including Indonesia, are threatened by climate change effects, such as extreme weather events and long-term impacts on water resources. To date, little research has been done on potential climate effects on the rural water supply system in Indonesia, relevant water resources, scheme management resilience, and mitigation actions.

This document was developed as part of a research project conducted by the University of Technology Sydney – Institute for Sustainable Futures (UTS-ISF) in Australia and three research institutions from Indonesia, i.e., Universitas Indonesia (UI), Center for Regulation Policy and Governance (CRPG), Universitas Gadjah Mada (UGM), in partnership with Bappenas (national planning ministry), as a representative of the Indonesian government. The project is named: "Future proofing a basic social service: climate-resilient community-based rural water supply" and is funded through the Australian Department of Foreign Affairs and Trade's Australia-Indonesia Knowledge Partnership Platform, KONEKSI.

The overall objective of the project is to provide innovative tools, capacity, and policy recommendations to improve the climate resilience and gender equality, disability and social inclusion (GEDSI) responsiveness of rural water systems and their related water resources. Specifically, the research aims to:

a) Produce a country climate risk profile for rural water supply to inform national-level vulnerability assessment of this sector

b) Pilot a GEDSI-responsive, climate-resilient rural water supply monitoring and assessment procedure and test its feasibility for large-scale deployment by the national government/PAMSIMAS

c) Assess the vulnerability of PAMSIMAS rural water schemes in studied areas, with a focus on GEDSI dynamics in water management and people served, and building local capacity for response as well as mechanisms for vulnerabilities to be addressed at higher levels of governance

d) Review and provide recommendations for how local and national regulations and institutions can support sustained, inclusive, resilient rural water supply systems and respective water resources.

The overall research methodology is transdisciplinary, including co-design with key research users and stakeholders and a robust pilot and validation approach.

This document is an output focused on the first of these aims, using multiple publicly available online data sources to reflect the threat of climate change on the rural water supply system in Indonesia. It provides a preliminary assessment of the risk of rural water supply community-based services to climate change. This country level analysis can support risk management actions and prioritisation of provinces with the highest levels of risk to rural water supply services.

1.2 Rural water supply and community-based services

A 2019 report by the WHO-UNICEF's Joint Monitoring Program (JMP) suggests that 82% of households in rural areas had access to basic water services, whereas 85% have these services in urban areas, highlighting the need to increase the water supply services in rural areas. Beyond basic services, according to JMP, 'safely managed' services also include criteria on water quality (free from contamination), availability (available when needed) and on-premises (available at the household premises), According to the national survey on water quality (Studi Kualitas Air Minum Rumah Tangga, SKAM-RT (Household Water Quality Study) by Indonesia Ministry of Health in 2020, only 8.3% of household water sources in rural areas are categorised as safe, compared to 15.1% in urban areas and 11.9% at the national level. This situation underlines the necessity to provide improved safely managed water services in rural areas.

The Indonesian government with support from World Bank launched the community-based rural water supply and sanitation program, called "Program Penyediaan Air Minum dan Sanitasi Berbasis Masyarakat (PAMSIMAS)", in 2006 to increase the water and sanitation access in peri-urban and rural areas.

PAMSIMAS has benefited about 25.6 million people in more than 37,000 villages in 37 provinces throughout Indonesia until December 2022. The PAMSIMAS project is implemented at the village level and services are then managed by a village water board committee, called “KPSPAMS or BPSPAMS” in Bahasa. The KPSPAMS consists of several members from the community and is responsible for planning, operationalizing, and maintaining the water system. Such village water groups take different forms, and also include BUMDes, a village owned enterprise. There have been three periods of the PAMSIMAS program: PAMSIMAS I (2008–2012), PAMSIMAS II (2013–2015), and PAMSIMAS III (2016–2022) (Daniel et al., 2022). The national government is currently formulating the “new generation” PAMSIMAS which will start in 2024.

1.3 Climate change in Indonesia

Like other regions around the world, Indonesia is already, and will continue to be impacted by climate change. The climate of Indonesia is characterized as tropical, with the most precipitation seen in regions with lower elevations. The hilly areas tend to have lower temperatures. The rainy season occurs between November and April, leaving May through October normally dry. The temperature exhibits little seasonal fluctuations and has limited change with respect to elevation, with average temperatures of 23°C in higher regions and 28°C in coastal areas (USAID, 2015). There exists a greater degree of variability in precipitation patterns based on differences in elevation. Specifically, the lowlands have an average annual rainfall ranging from 1,800 millimetres (mm) to 3,200 mm, whilst the mountainous areas exhibit much higher levels of precipitation, reaching up to 6,000 mm (USAID, 2015).

Climate models project an increase in the frequency of intense precipitation in the region. Progressively heavier rainfall will have important consequences for Indonesia because flooding and landslides are the two most frequent and widespread natural disasters experienced in the country (World Bank, 2021). Climate change will not only increase rainfall intensities but will also worsen extremes of flooding and drought, creating recurrent cycles of too much and too little water.

Climate change is significantly impacting rural water supply in developing countries, exacerbating existing challenges and creating new ones. Extreme weather events, such as intense storms and floods, are damaging water infrastructure (Luh et al., 2017), and contaminating water sources (Andrade et al., 2018; Kostyla et al., 2015). These events often result in a heightened risk of waterborne diseases, affecting the health of rural populations. Meanwhile, longer periods of drought and hot temperatures lead to decreased stream flow that elevates the concentration of pollutants (Wright et al., 2014). The unpredictability of weather patterns also makes it difficult for communities to plan and manage their water resources effectively. Sea level rise can also increase salt water intrusion into fresh water and damage drinking water supply systems located in coastal areas.

Addressing climate change impacts on rural water supply requires a multifaceted approach, including improved water management practices, resilient infrastructure, community education and participation, and global efforts to mitigate climate change and promote sustainable water usage. One of the key steps in mitigating or reducing the effect of climate change on the PAMSIMAS system is understanding the potential hazards, exposure, and vulnerability of the PAMSIMAS system.

2 Methods

In this report, climate risk is understood to relate to the interaction between climate hazards, exposure and vulnerability, following the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report conception of risk (2014). The combination of these dimensions results in certain outcomes in relation to rural water supply service quality, including water availability and water quality.

The work presented in this report is focused on the current state of climate-related hazards, and does not include future scenarios or projections, as the intent was to understand the current level of potential risk and such projections into the future include a high degree of uncertainty. For example, it is projected that average annual rainfall in Indonesia may increase, but there is a high variation and uncertainty in geographical and temporal distribution, while other reports note decreasing of rainfall across the country (World Bank Group and Asian Development Bank, 2021).

Below we clarify key terminology as applied in this report, drawing on IPCC (2014, 2021) and UNICEF and GWP (2022):

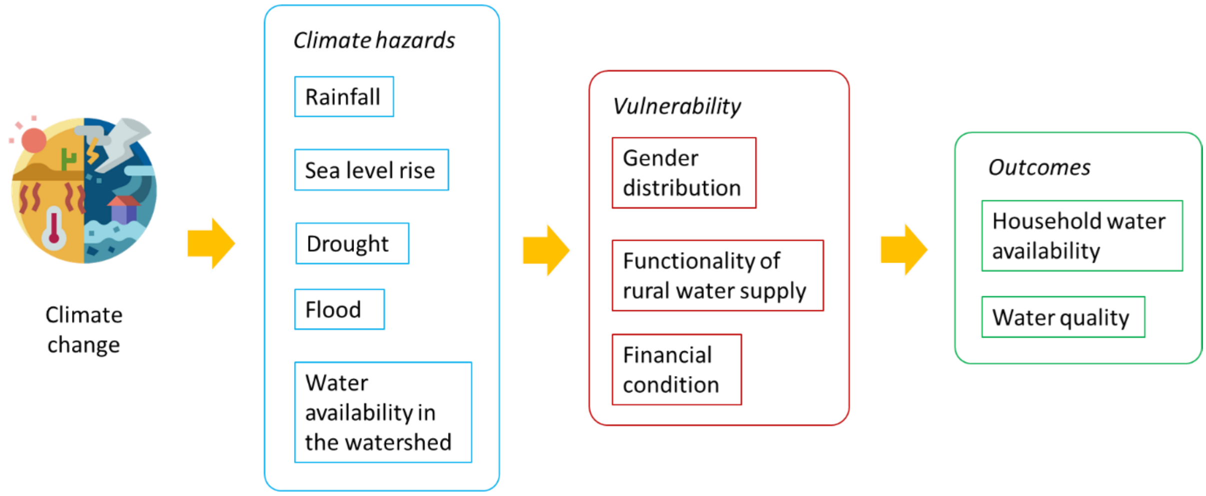
Climate hazards: In this report, a climate hazard is a driver that may cause damage to or reduce the functionality of a PAMSIMAS system, e.g., low or high rainfall, flooding, drought, sea level rise, etc.

Exposure: Exposure is the extent of people or community or property that may be adversely affected by hazards. In this report, we indicate the potential rural population and the number of PAMSIMAS systems in a province potentially exposed.

Vulnerability: Vulnerability refers to the characteristics of the system that make it susceptible to the damaging effects of a hazard. In this report, variables related to vulnerability are: (1) financial conditions or tariff system of the PAMSIMAS system, (2) percentage of women in the KPSPAMS, and (3) functionality of the PAMSIMAS system.

Service outcomes: In this report, we include the current level of water availability in rural water supply systems and current water quality as service outcomes.

2.1 Relevance of the variables to climate change



Climate change will have an impact on sea level rise. Higher sea-levels in turn can increase the chance of coastal flooding or saltwater intrusion that can damage the PAMSIMAS system, i.e., the functionality of the system. On the other hand, climate change results in extreme weather and changes the rainfall pattern, i.e., can increase or decrease the rainfall. Decreased rainfall may come in the form of droughts or longer dry seasons, with potential to reduce the water availability in the watershed or the quantity and quality of water in the PAMSIMAS' water source, particularly for those supplied by surface water. On the other hand, increased rainfall intensity may result in an increasing number of floods that can affect the water quality and also damage the PAMSIMAS infrastructure.

Furthermore, some factors may make the PAMSIMAS system more susceptible to loss of water supply services due to these climate hazards, e.g., financial conditions, gender distribution in management, and the functionality status of the system itself. We assume that good financial conditions will enable KPSPAMS to properly conduct any activities to mitigate the climate risks to the system or repair any damage. Additionally, recent research shows that women's involvement in PAMSIMAS management is associated with greater sustainability of the service (Thapa, Willetts and Prevost, 2022), and hence we assume that a high percentage of women in the KPSPAMS could contribute to making KPSPAMS better prepared to face the issue of climate change. Furthermore, we may assume that the status of a fully functioning system represents a well-managed system which is prepared for any climate mitigation strategies. Finally, we assume a fully functioning system is more likely to be robust to climate change impacts compared to one that is partially or not functioning.

2.2 Data sources

In this report, secondary data collection was used. Table 1 provides a summary of the data sources.

Table 1: Variables and relevant data sources

	Variables	**Data / Definition**	**Source**
Climate hazards	Rainfall	Average annual rainfall data on a province level	Climate Hazard Center, California University (2022)
	Sea level rise	The percentage of the population expected to be affected by coastal flooding in an average year, accounting for existing flood protection standards.	Aqueduct, WRI (2023)
	Drought	Average drought risk index on a province level. The index in the original data considers three aspects: Level of loss, level of threat and level of capacity to respond to droughts	INARISK, BNPB (2022)
	Flood	Average flood risk index on a province level. SIDIK data uses climate risk classes which are determined based on the value of the probability of rain exceeding a certain predetermined limit, however, there is no information on this particular value limit.	SIDIK, Ministry of Environment and Forestry (2023)
	Water availability in the watershed	How much (surface) water is available in a watershed compared to the population	SIGI, Ministry of Public Works of Republic Indonesia (2021)
Vulnerability	Gender contribution	Average percentage of women in the KPSPAMS	PAMSIMAS MIS (2021)
	Functionality	Percentage of fully functioning facility on a level province	PAMSIMAS MIS (2022)
	Financial condition	% villages in a province that are have the total tariff that more than covers O&M costs or recovery costs. If the village is categorized as “total tariff bigger than recovery costs”, it means that the total collected water fees in the period of the lifespan of the infrastructure, i.e., usually 15 years, are bigger than the total estimated O&M costs and recovery costs in that period.	PAMSIMAS MIS (2022)
Service outcome	Household water availability	The percentage of a household (HH) that experienced water scarcity for a maximum of 24 hrs in the last year (percentage of HH in that province)	SUSENAS (2022)
	Water source quality	Percentage of domestic water source (point of collection, not only pipe system) that is free from fecal contamination	SKAM-RT, Ministry of Health (2020)

Data on the number of rural population per province was obtained from Ministry of Home Affairs. Meanwhile, data on the number of Pamsimas systems was obtained from the PAMSIMAS Monitoring Information System (MIS) that was updated on December 2022.

2.3 Categorization

Original data can be continuous data or a classification with several levels. However, to simplify the analysis, we created three classifications in the final provincial risk maps: low, medium, and high risk. The classification of each variable into three levels of risk is explained in the section below.

Annual rainfall

The source data contains the estimated rainfall in a year (mm/year). Since there is a variation of rainfall in a province, we then averaged the rainfall, considering the rainfall variations in different areas within a province.

For example, there are two values of rainfall in Province A: (1) 1000 mm/year and covers 40% of the province area, and (2) 500 mm/year and covers 60% of the province area. The average rainfall is:

(2000 * 0.4) + (3500*0.6) = 2,900 mm/year

This number is then categorised as “medium” risk. We adapted the classification of rainfall from the Indonesian Ministry of Forestry. However, there are 5 levels in the classification. For simplicity, we reduced it into 3 levels: low risk (>3000 mm/year), medium (2500-3000 mm/year), and high (<2500 mm/year).

Sea level rise

The original data from coastal flood risk by Aqueduct categorizes the risk into 5 levels: low, low-medium, medium-high, high, and extremely high. For simplicity, we then reduced it into 3 levels: low as a low risk, low-medium, and medium-high as medium risk, and the rest as high risk.

Drought

The source data contains the estimated drought risk ranging from 0-1. We then divided the score into three levels of risk equally: 0 - 0.3 as low risk, 0.3 – 0.6 as medium risk, and > 0.6 as high risk. Since there is a variation of drought in a province, we then averaged the drought risk by considering the variation of drought value in a given province and the proportion of the area ascribed a particular drought value. The calculation is similar to rainfall calculation.

Flood risk

The source data contains the estimated flood risk from 1-9. We then divided the score into three levels of risk equally: 1 - 3 as low risk, 3 – 6 as medium risk, and 6 - 9 as high risk. Since there is a variation of flood risk in a province, we then averaged the flood risk by considering the variation of flood risk value and the proportion of the area ascribed a given value. The calculation is similar to rainfall calculation.

Water availability in the watershed

The original data contains the estimated water availability (m^3 per capita). Since there is a variation of water availability in the watershed in a province, we then averaged the water availability considering the variation of water availability value and the proportion of the area. The calculation is similar to rainfall calculation. Afterwards, we categorized the values following the international standard of water scarcity: low risk (<1700 m^3 per capita or usually called no water stress), medium risk (1000 – 1700 m^3/per capita or water stress), and high risk (<1000 m^3 per capita or water scarcity).

Gender distribution

We first calculated the proportion of women in the KPSPAMS in each province in the whole country and obtained an average of 25%. Furthermore, since the PAMSIMAS guidelines require at least 40% of women in the KPSPAMS, we set this 40% as a threshold for the low risk, the below 40% until average, i.e., 25% as medium risk, and below the average as the high risk.

Functionality of the PAMSIMAS

We first calculated the average fully functioning system in each province and obtained an average of 87%, ranging from 71 – 100%. We then classified the low risk province if the percentage of fully functioning systems in a province is 100%, medium risk if the percentage is between 100% and the average value, i.e., 87%. Finally, the high-risk province is below 87%.

Financial conditions of the KPSPAMS

We first calculated the average system in each province that has good financial conditions and obtained an average of 62%, ranging from 13 – 97%. The good financial condition is defined as percentage of villages in a province that are have the total tariff designed to more than cover O&M costs. We then classified the high-risk province if the percentage of the PAMSIMAS system with good financial conditions is lower than the average value, medium risk if the percentage is between 62 and 84%, and low risk if the percentage is above 84%.

Household water availability

We first calculated the average household water availability in each province and obtained an average of 6.3%, ranging from 0.15 to 18.7%. We then classified the high-risk province if the percentage of households who experience water scarcity for more than 24 hours in a year is above 10%. The medium risk if the percentage is between the average value and 10% and the low risk is below the average value of 6.3%.

Water source quality

We first calculated the average water sources that are free from faecal contamination in each province and obtained an average of 33.4%, ranging from 17 to 51%. We then classified the high risk province if the percentage of water sources that are free from faecal contamination is above the average value, i.e., 33.4%. The medium risk if the percentage is between the average value and 25% and the low risk is below 25%, i.e., meaning that a high percentage of contaminated water sources.

Estimation of number of rural population and PAMSIMAS systems affected by climate change

An estimate of the number of rural populations affected by the potential climate risks is obtained by adding up the number of village populations in provinces that are at high risk. In this calculation, we not only estimate the number of PAMSIMAS beneficiaries, but also the entire rural population in the province. Meanwhile, the data for estimating the number of PAMSIMAS programs/villages that may be affected by climate change is by adding up the total number of PAMSIMAS villages in provinces that are at high risk.

2.4 Limitations of the study

This profile does not give sufficient depth for making final decisions on risk management investment and planning local scale mitigation actions due to limitations in the content and quality of publicly accessible data utilized in this study. Furthermore, the data used for each hazard come from various openly public data, which may result in contradictions between one hazard and another closely related hazard, e.g., between rainfall, drought, and flood. Lastly, we did not take the analysis a further step to combine the different variables into one single risk variable.

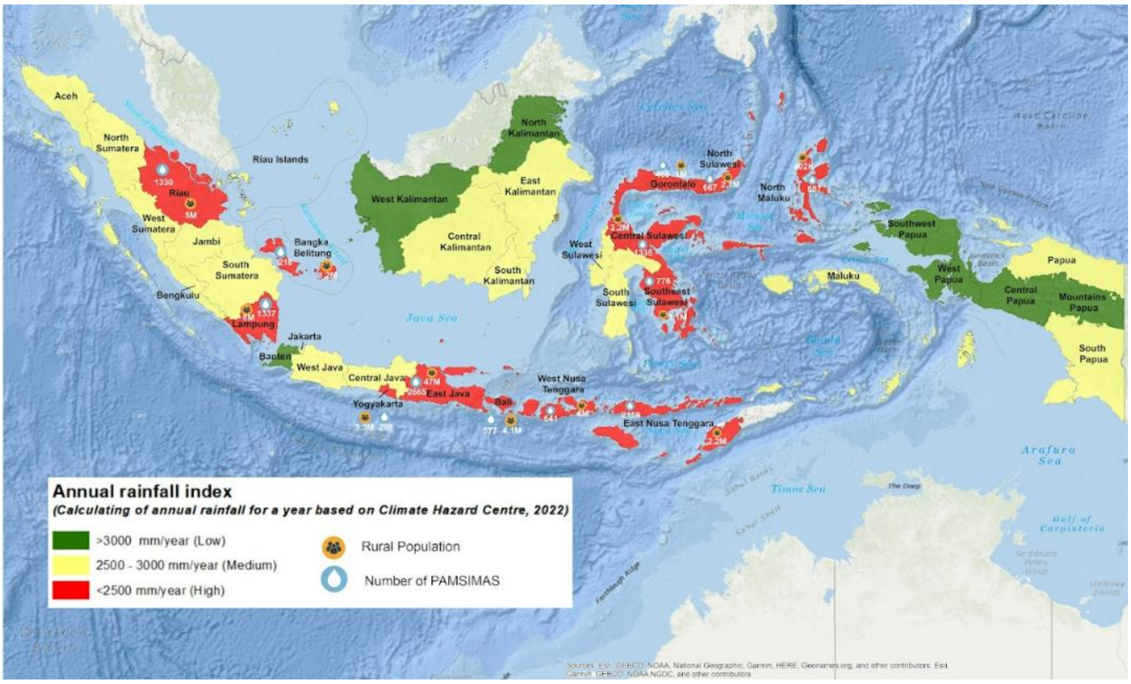
3 Results

3.1 Hazards impacting rural water supply

3.1.1 Annual Rainfall

We used the rainfall information provided by the Climate Hazard Center to estimate the annual rainfall index in Indonesia. For this variable, we categorized the high-risk area if the annual rainfall is relatively low with an estimation that the number will decrease due to climate change and result in a drought or reduction of the water availability in the watershed. In total, 13 of Indonesia's 38 provinces are categorised as high-risk areas spread across main islands in Indonesia. There are more than 12,500 PAMSIMAS systems may be affected and estimation of 79 million rural population in those 13 provinces. Amongst those PAMSIMAS systems, not all may be immediately affected by reduced rainfall, however there are 1,673 PAMSIMAS systems in those 13 provinces that use surface water and rainfall as their water source that could be expected to be directly affected by the decreased rainfall.

Figure 1: Annual rainfall index

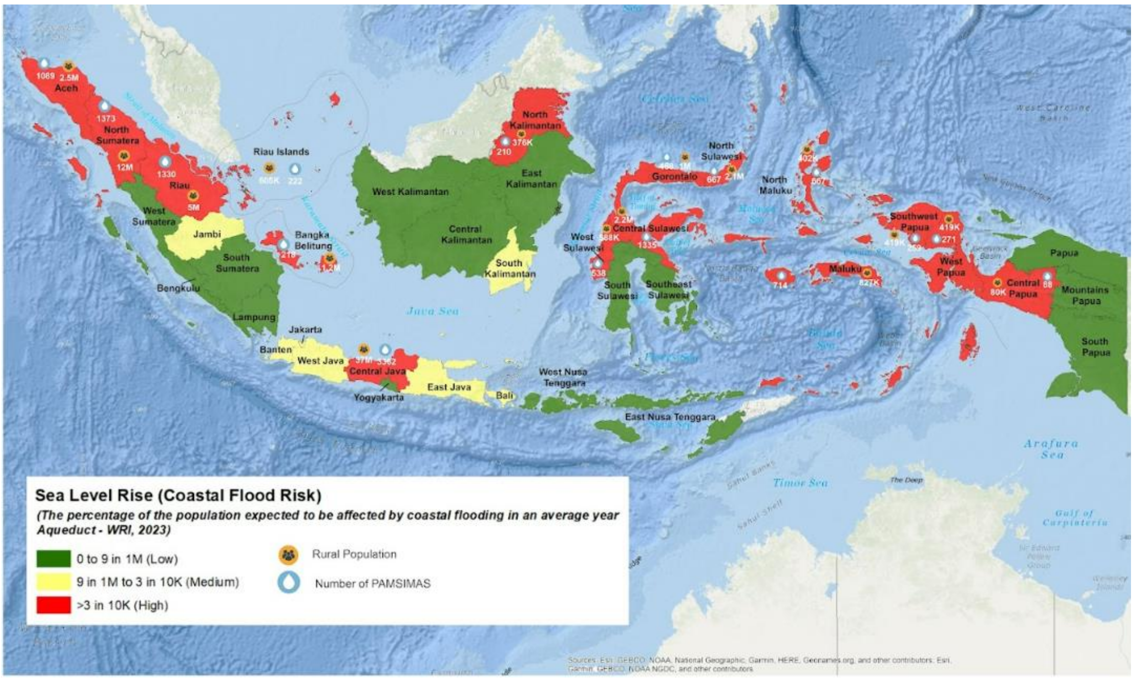


Sources: Esri, GEBCO, NOAA, National Geographic, Garmin, HERE, Geonames.org, and other contributors. Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

3.1.2 Sea level rise

The sea level rise is expected to increase the chance of coastal flood risks. The flood risk data that is used in this report includes a combination of the inundation caused by storm surge, population in the flood zone, and the existing level of flood protection. Amongst all 38 provinces, 15 provinces are categorised as high-risk areas, spread across all five main islands in Indonesia. There are more than 14,500 PAMSIMAS systems in those provinces and more than 67 million rural population that are exposed to these coastal flood risks.

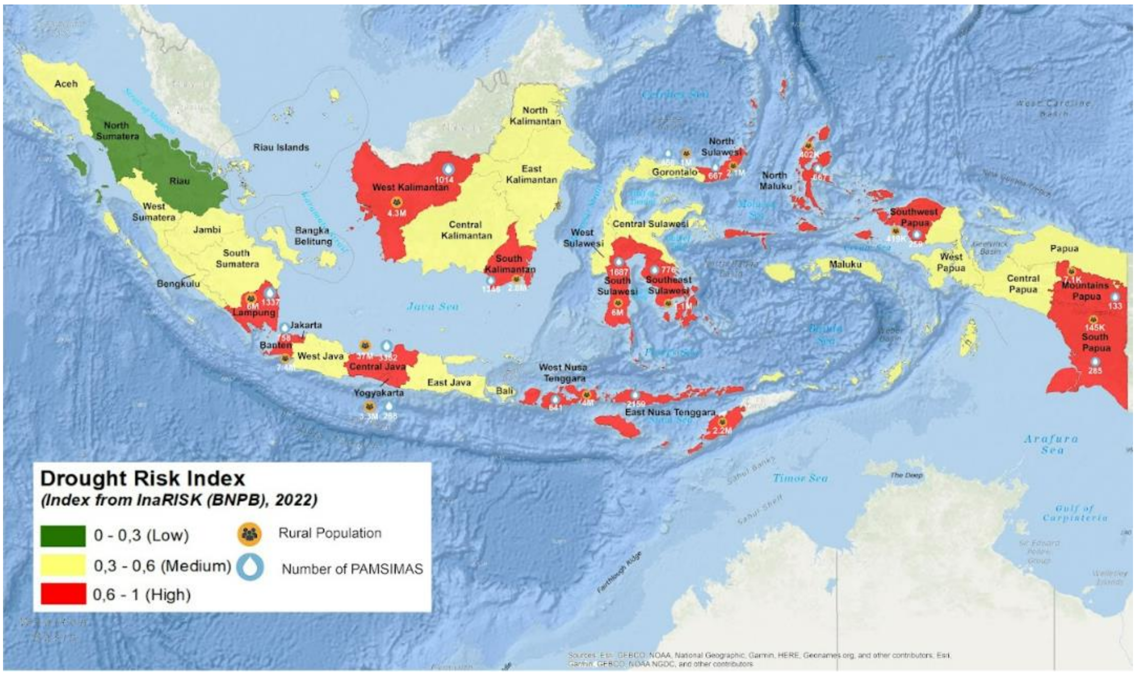
Figure 2: Risk of sea level rise (Coastal flood risk)



3.1.3 Drought

According to the data source used, of 38 provinces, 14 provinces in Indonesia are prone to drought. This is the most significant climate hazard compared to others, i.e., the estimated exposed PAMSIMAS systems and rural population are 17,145 systems and 76 million people, respectively. The results may appear different as compared to rainfall information because the original drought risk information provided by the BNPB is built by considering not only environmental factors, e.g., rainfall data, but also socio-economic data related to the area. Thus, the original map is more complex than considering a rainfall pattern only.

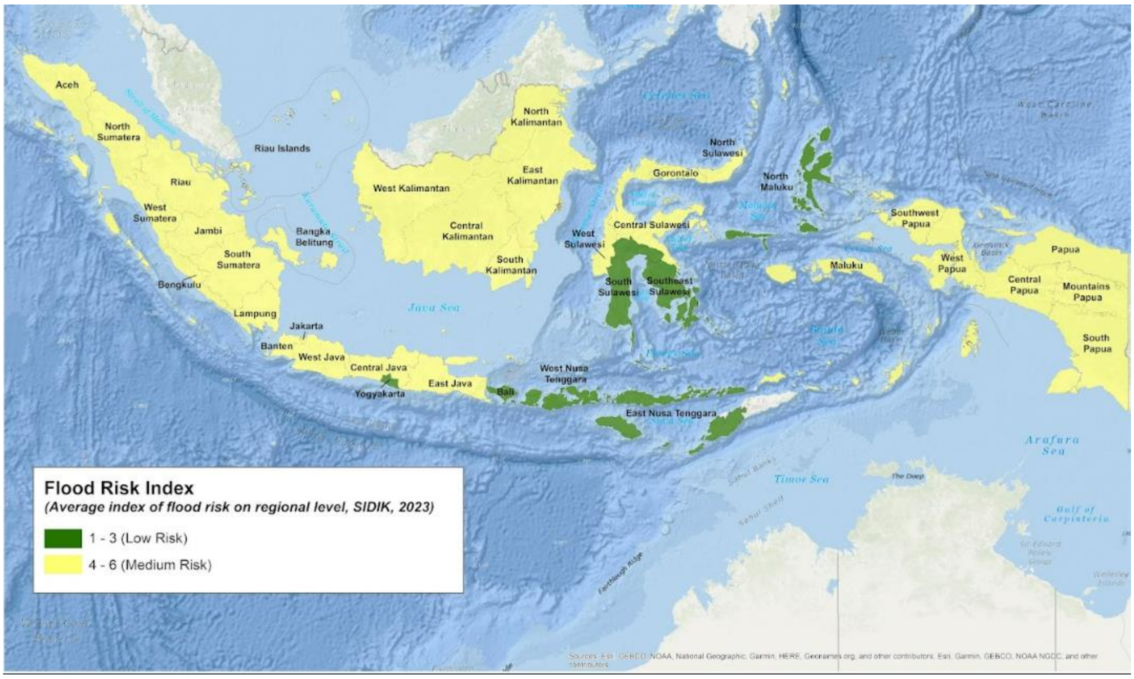
Figure 3: Drought risk index



3.1.4 Flood risk

Based on SIDIK data, only 7 provinces of 38 provinces are categorised as a low risk of flooding in Indonesia. The majority of provinces are in a medium risk and no province is categorised as a high risk. This does not, however mean that all rural water supply systems are free from flood risks, as if such analysis were to be done at the district level, then it is likely that some districts in the vicinity of major waterways considered high risk.

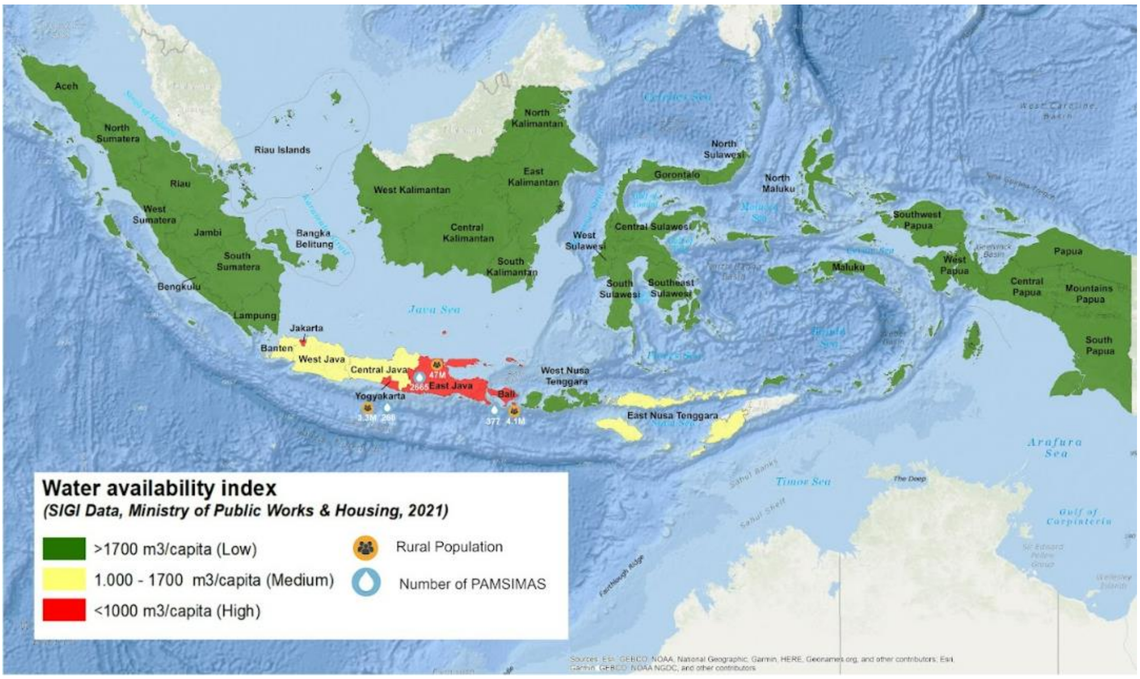
Figure 4: Flood risk index



3.1.5 Water availability in the watershed

All provinces in Java island are categorised as medium or high-risk with regards to water availability per capita in the watershed. This is likely driven by the high population on Java island as compared with other islands. Another important observation is that East Nusa Tenggara province has a relatively large area and is ranked with only medium risk, and yet based on other variables receives low rainfall and has a high-risk drought throughout the year. Even though the number of PAMSIMAS systems in those high-risk areas are only about 3,000 systems, but the number of estimated rural population affected is still large, I.e., 54 million people. That is due to the high populations in East Java, Bali, and Yogyakarta provinces.

Figure 5: Water availability index

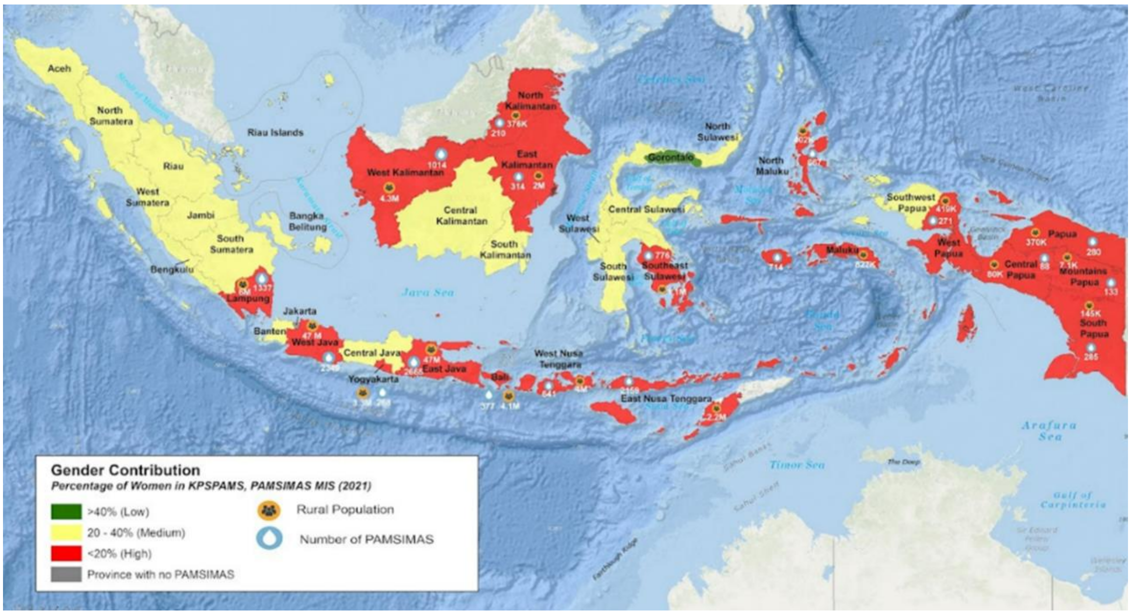


3.2 Vulnerability dimensions of rural water supply

3.2.1 Gender distribution

PAMSIMAS guideline requires to have at least 40% of women in the KPSPAMS. However, based on data, only one province has an average of at least 40% of women in all KPSPAMS in a province. More than half of the provinces in Indonesia have an average of below 40%, with an average of about 25%. This analysis suggests that just over 14,000 PAMSIMAS systems are considered more vulnerable, given lower participation of women in their management.

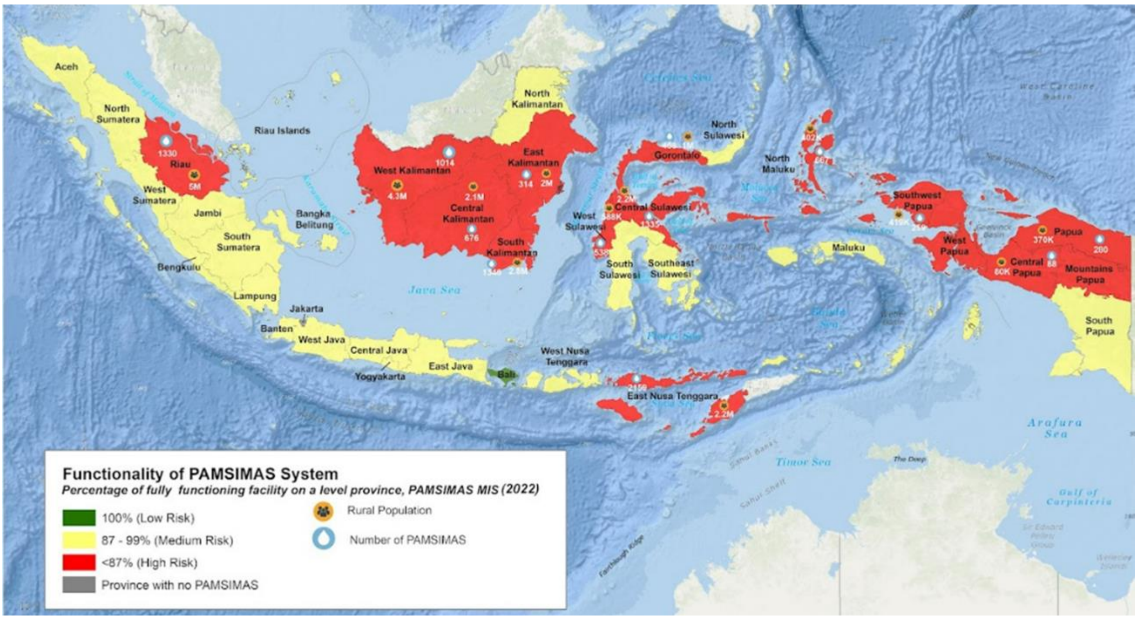
Figure 6: Gender distribution: Percentage of women in KPSPAMS



3.2.2 Functionality of PAMSIMAS system

Bali province is the only province where all the PAMSIMAS systems are fully functioning. Amongst other provinces, 15 provinces have a proportion of fully functioning systems that is below 87%, which could be areas considered more vulnerable to climate change impacts. There are 10,664 Pamsimas systems in those 15 provinces.

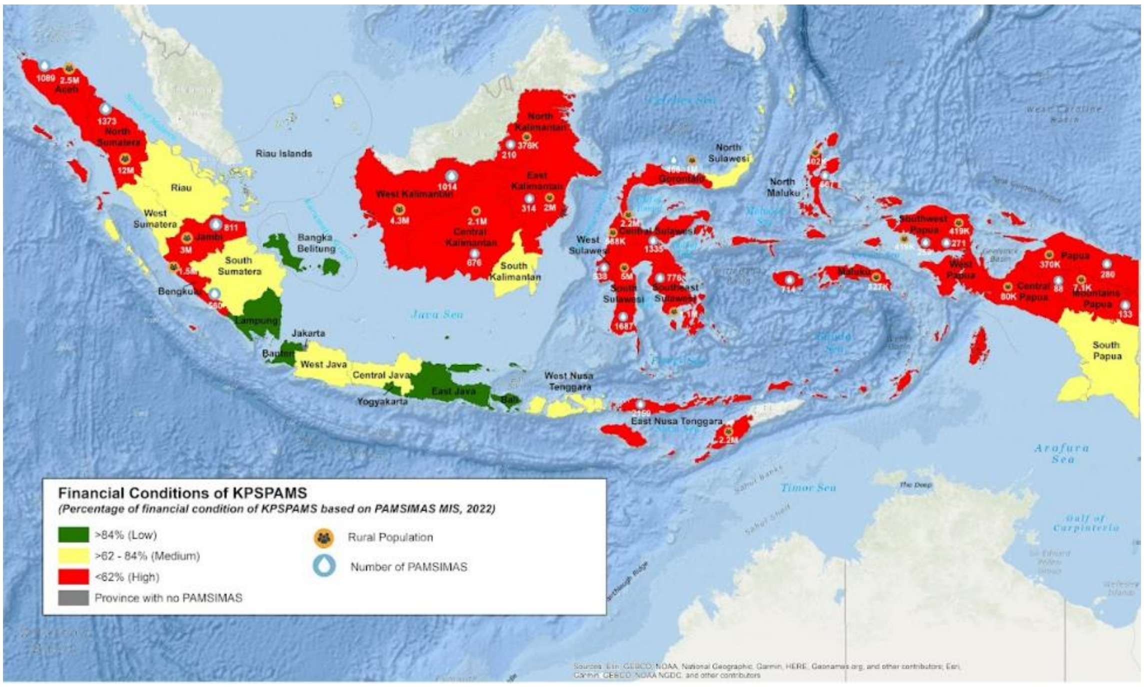
Figure 7: Functionality of PAMSIMAS systems



3.2.3 Financial conditions of the KPSPAMS

The average percentage of healthy financial conditions in provinces in Indonesia is 62%, which is then used to distinguish a high-risk province. Using the MIS PAMSIMAS data, we categorised healthy financial situations in only 6 provinces, while most provinces are in a high-risk category. There are just over 15,000 PAMSIMAS systems in the high-risk areas serving an estimation of 43 million rural population. There is no high-risk province in Java island, suggesting that most PAMSIMAS systems in this location can manage their finances well.

Figure 8: Financial condition of KPSPAMS

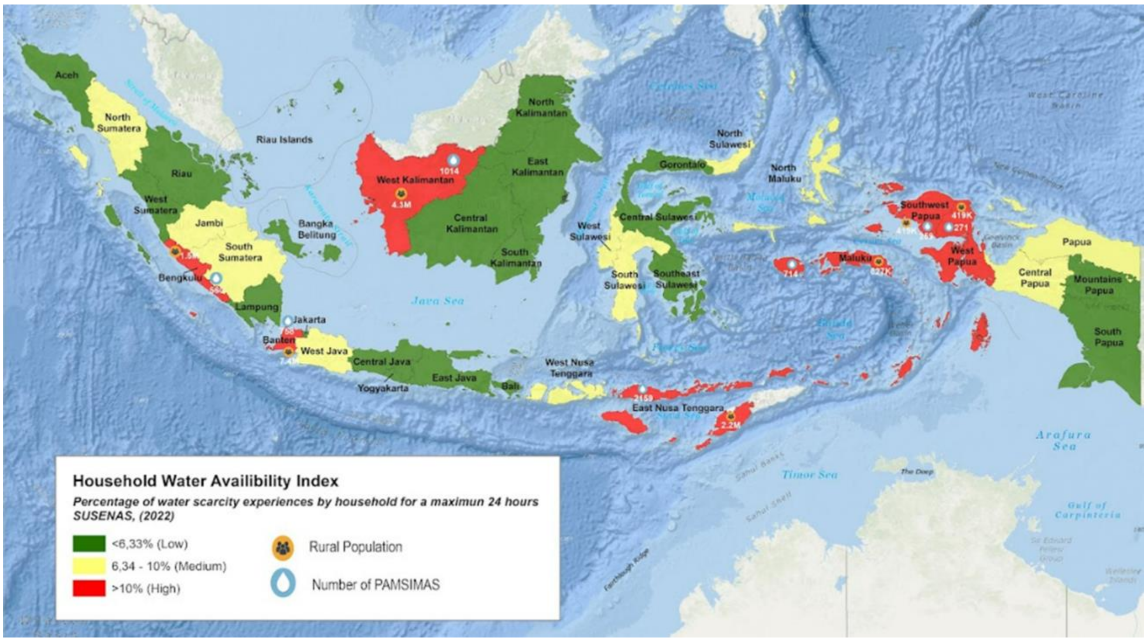


3.3 Current outcomes in rural water supply

3.3.1 Household water availability

Of Indonesia's 38 provinces, there are 7 provinces where more than 10% of the population has ever experienced water scarcity for more than 24 hours in the last year. That could be due to multiple possible causes, including extreme drought, damage to the piped distribution system, dried-up water source, etc. The estimated rural population in those high-risk provinces are 17 million people, and there are some 5,700 PAMSIMAS systems in these high-risk provinces.

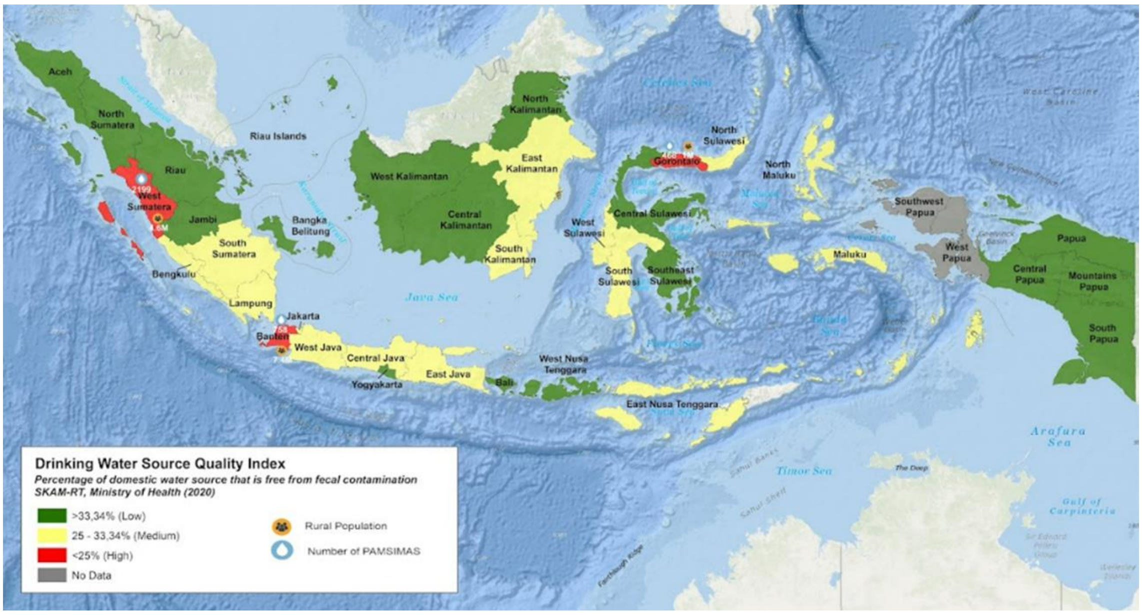
Figure 9: Household water availability index



3.3.2 Water source quality

If we examine the drinking water source quality in rural areas in Indonesia in 2020, five provinces have a low percentage (<25%) of water sources that are free from faecal contamination, i.e., the presence of E. coli in the water source. This drinking water source can be from tap, spring, well, etc. The number of PAMSIMAS systems and estimated rural population in those high-risk areas are approximately 6,200 systems and 23 million people, respectively.

Figure 10: Drinking water source quality index



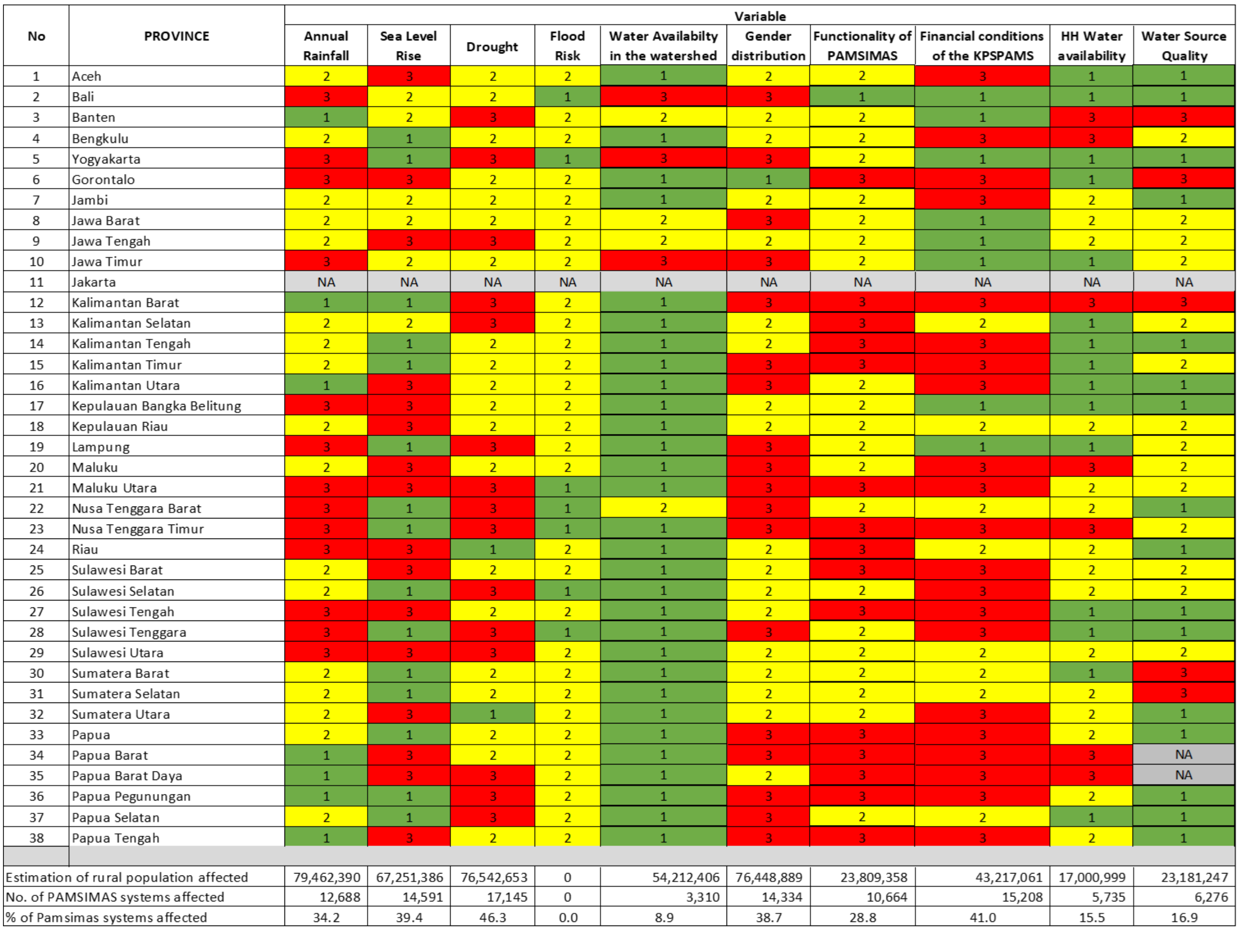
3.4 Risk summary and affected populations

We compiled a national risk profile for rural water supply influenced by climate risk by analysing variables utilizing secondary data from government agencies and research institutes. Evaluation was conducted on the PAMSIMAS data from 1,767 localities in 38 provinces. Even in current conditions, where climate impacts are just beginning, there are some 5,700 PAMSIMAS systems in provinces where rural populations experience interruptions in their domestic water availability, and many more PAMSIMAS systems are at risk from increasing climate hazards.

Based on the evaluation of ten variables and relevant data sources, it appears that the impact of flooding on the community-based water supply system in Indonesia is not significant, however this may be due to analysis at provincial level, with localised flooding still a potential issue for some systems. With the exception of Bali, Yogyakarta, East Java, and Jakarta, the per capita water availability shows that sufficient quantities of water should be accessible for human consumption. On the other hand, the most dominant hazards are drought and sea level rise in terms of the scale of exposure of PAMSIMAS systems and related rural populations. The dominant hazards are defined as hazards that affect the rural water supply system at the high levels (category 3). These dominant hazards affect 16 provinces out of 38 provinces in this study.

East Indonesian provinces face the greatest climatic risk, with North Maluku and East Nusa Tenggara being the most susceptible due to the impact of climate change on community-based rural water supplies, based on a combination of hazards, exposure and vulnerability. This was the result of inadequate funding, gender representation, system functionality, and low annual rainfall and high drought risk. Please note that the calculations for these results are based on provincial levels, and there is a high likelihood of variation amongst specific districts and localities.

The findings presented in this report may serve as an initial guide for the national government to prioritize efforts at the provincial level. Further evaluation is needed for more targeted interventions based on specific locations and the climate risks they face.



No	PROVINCE	Variable									
		Annual Rainfall	Sea Level Rise	Drought	Flood Risk	Water Availabilty in the watershed	Gender distribution	Functionality of PAMSIMAS	Financial conditions of the KPSPAMS	HH Water availability	Water Source Quality
1	Aceh	2	3	2	2	1	2	2	3	1	1
2	Bali	3	2	2	1	3	3	1	1	1	1
3	Banten	1	2	3	2	2	2	2	1	3	3
4	Bengkulu	2	1	2	2	1	2	2	3	3	2
5	Yogyakarta	3	1	3	1	3	3	2	1	1	1
6	Gorontalo	3	3	2	2	1	1	3	3	1	3
7	Jambi	2	2	2	2	1	2	2	3	2	1
8	Jawa Barat	2	2	2	2	2	3	2	1	2	2
9	Jawa Tengah	2	3	3	2	2	2	2	1	2	2
10	Jawa Timur	3	2	2	2	3	3	2	1	1	2
11	Jakarta	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
12	Kalimantan Barat	1	1	3	2	1	3	3	3	3	3
13	Kalimantan Selatan	2	2	3	2	1	2	3	2	1	2
14	Kalimantan Tengah	2	1	2	2	1	2	3	3	1	1
15	Kalimantan Timur	2	1	2	2	1	3	3	3	1	2
16	Kalimantan Utara	1	3	2	2	1	3	2	3	1	1
17	Kepulauan Bangka Belitung	3	3	2	2	1	2	2	1	1	1
18	Kepulauan Riau	2	3	2	2	1	2	2	2	2	2
19	Lampung	3	1	3	2	1	3	2	1	1	2
20	Maluku	2	3	2	2	1	3	2	3	3	2
21	Maluku Utara	3	3	3	1	1	3	3	3	2	2
22	Nusa Tenggara Barat	3	1	3	1	2	3	2	2	2	1
23	Nusa Tenggara Timur	3	1	3	1	1	3	3	3	3	2
24	Riau	3	3	1	2	1	2	3	2	2	1
25	Sulawesi Barat	2	3	2	2	1	2	3	3	2	2
26	Sulawesi Selatan	2	1	3	1	1	2	2	3	2	2
27	Sulawesi Tengah	3	3	2	2	1	2	3	3	1	1
28	Sulawesi Tenggara	3	1	3	1	1	3	2	3	1	1
29	Sulawesi Utara	3	3	3	2	1	2	2	2	2	2
30	Sumatera Barat	2	1	2	2	1	2	2	2	1	3
31	Sumatera Selatan	2	1	2	2	1	2	2	2	2	3
32	Sumatera Utara	2	3	1	2	1	2	2	3	2	1
33	Papua	2	1	2	2	1	3	3	3	2	1
34	Papua Barat	1	3	2	2	1	3	3	3	3	NA
35	Papua Barat Daya	1	3	3	2	1	2	3	3	3	NA
36	Papua Pegunungan	1	1	3	2	1	3	3	3	2	1
37	Papua Selatan	2	1	3	2	1	3	2	2	1	1
38	Papua Tengah	1	3	2	2	1	3	3	3	2	1
Estimation of rural population affected		79,462,390	67,251,386	76,542,653	0	54,212,406	76,448,889	23,809,358	43,217,061	17,000,999	23,181,247
No. of PAMSIMAS systems affected		12,688	14,591	17,145	0	3,310	14,334	10,664	15,208	5,735	6,276
% of Pamsimas systems affected		34.2	39.4	46.3	0.0	8.9	38.7	28.8	41.0	15.5	16.9

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