

"The potential for climate change hazards in the water sector has an impact on multi-sector development, such as agriculture, settlements, cities and health"

Context and Issues

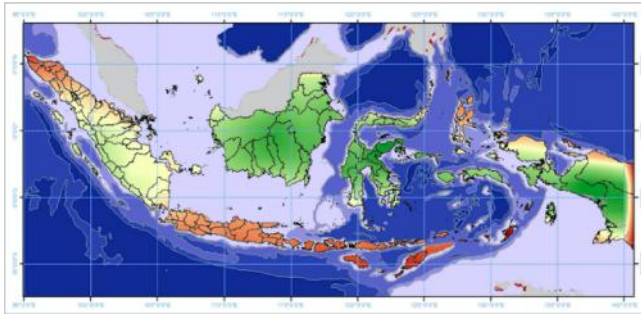
Water is a basic need for human life and determinants of people's welfare in Indonesia. Along with planning to increase economic growth, water demand is increasing and endangering sustainable development. The Masterplan for Acceleration and Expansion of Indonesia's Economic Development (abbreviated MP3EI) promotes food security and strengthens water and energy policies as a prerequisite for its implementation.

Development planning that takes into account climate change in water sector can be achieved through water security as it can assist in making the basis for policy planning, management and development of water resources including investment in economic value in the future.

According to ADB (2016), communities or communities experience water security when they are able to manage and use water for (a) clean water needs for households and sanitation, (b) support economic productivity for agriculture, industry and energy, (c) cities and villages that are comfortable for life, (d) healthy ecosystems and (e) communities that are resistant to change. These five things can be described in 5 dimensions of resilience, namely (a) household resilience, (b) economic resilience, (c) urban resilience, (d) environmental resilience and (e) water resistance to disasters.

Disasters in the water sector consist of decrease in water shortage, drought and flood which can affect the achievement of water security with the scope of study being an island region consisting of several provinces. The analytical framework to explain the three disasters, among others, by using the water balance balance (water balance) which provides an overview of (a) climate influences such as rainfall and temperature both at baseline conditions (1995-2010) and projections (2020-2034 and 2030- 2045) and (b) non-climate influences such as conditions of land use, geology and DEM (Digital Elevation Model). The two factors that provide this influence are used to calculate the direct run-off base flow and total run off using a statistical approach.

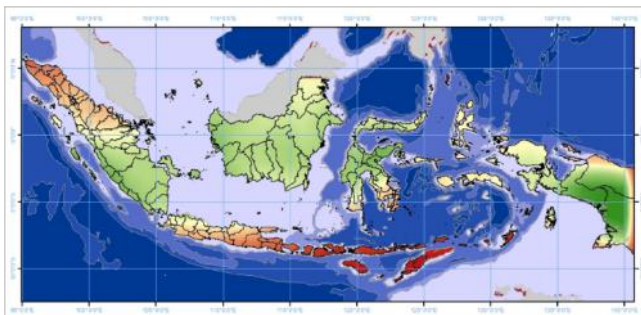
Disasters in the water sector can affect national water security. Decrease in water availability can interfere with the achievement of targets for household water security. Therefore, the use of climate data provides a disaster forecast related to the water sector in the future with a statistical approach which is able to describe disturbances. In modeling the decrease in water availability, annual rainfall data is used.



Water Availability Hazard Potential Map for 2020-2034

Potential Hazard on Water Availability

Changes in rainfall have a significant impact on the danger of decreasing water availability in several island regions in Indonesia. The decrease in rainfall on the island of Sumatra has a significant impact on the reduction of water availability in the northern Sumatra region, especially in Aceh Province. The same thing happened in Java, northern Maluku and Nusa Tenggara which showed a very significant decrease in water availability. Although Papua experienced a decrease in rainfall in the period 2020-2034, only the coastal areas experienced a decrease in water availability, especially in areas that are currently residential areas.



Drought Hazard Potential Map for 2020-2034

Drought Hazard Potential

The potential for drought occurs in almost all parts of Indonesia as a result of the variability of 3-month rainfall. This drought will have an effect on water security for households due to reduced water supply and economic resilience which can lead to potential water conflicts due to water needs for agriculture, industry and energy. Based on the rainfall analysis of the 3 (three) driest months, for example in the East Nusa Tenggara region, although the decrease in annual rainfall in the Nusa Tenggara region was not significant (2%) in the projection period of 2020-2034 but the difference in rainfall at 3 (three) wet months and 3 (three) dry months are very significant so it provides an overview of the potential drought that occurs.



Flood Hazard Potential Map for 2020-2034

Flood Hazard Potential

The increase in the monthly maximum rainfall potential occurs in almost all regions of Indonesia. To provide a more comprehensive picture, more detailed information is needed such as daily extreme rainfall, so that it can provide information not only about the location of the floods, but also the magnitude, extent and opportunities for flood events during the projection period. The potential for flood disasters with reference to the ICCSR in 2010 did not experience many changes as shown in the picture on the side. The analysis uses monthly maximum rainfall data both in the 2020-2034 projection period and the 2031-2045 forecast period. For example in Java, changes in extreme rainfall are quite significant in September to December both in the 2020-2034 and 2031-2045 projections. This shows that the potential for flooding on the island of Java will increase in this period which will affect water security in urban areas and flood disasters in some river areas.

Policy Recommendations

In detail, the main dimensions of water security are the extent to which the government can manage and provide water for 5 sub-sectors of resilience as shown in the following table

Key Dimension Index What the index measures	Key Dimension Index What the index measures	Key Dimension Index What the index measures
National Water Security	National water security	How far countries have progressed toward national water security. The index combines the five dimensions of water security, measured by key dimensions 1 to 5
Key Dimension 1	Household water security	To what extent countries are satisfying their household water and sanitation needs and improving hygiene for public health.
Key Dimension 2	Economic water security	The productive use of water to sustain economic growth in food production, industry, and energy.
Key Dimension 3	Urban water security	Progress toward better urban water services and management to develop vibrant, livable cities and towns.
Key Dimension 4	Environmental water security	How well river basins are being developed and managed to sustain ecosystem services.
Key Dimension 5	Resilience to water-related disasters	The capacity to cope with and recover from the impacts of water-related disasters.

Based on the National Water Security issued by ADB (2016), Indonesia has an NSW Index 2 (of a scale of 5) namely ENGAGED, which means that already more than half of the population has access to simple drinking water and sanitation facilities, the provision of clean water services begins to develop, sources water power supporting economic activities has begun to improve the quality of drinking water and several efforts to overcome disasters related to drinking water. With reference to the table, the management of water sector hazards can be grouped into:

- Management of water resources to increase water availability in meeting water needs for households and the economy (agriculture, industry and energy). In fulfilling water needs for households, for example, the Ministry of Public Works and Housing through the Directorate General of Human Settlements has issued Norms, Standards, Procedures and Criteria for the Development of a Master Plan for Drinking Water Supply Systems which derived from Government Regulation Number 16 Year 2005 concerning Development of Drinking Water Supply Systems which are the responsibility of the Regional Government. However, due to limited human resources in the local government, technical assistance from the Central Government is still needed in the Preparation of Investment Feasibility of the Drinking Water Supply System in its region. The provision of clean water needs in Indonesia generally comes from shallow wells (29.2%), deep wells (24.1%) and clean water piping (PDAM) (19.7%). For urban areas, in general households use deep ground water (32.9%) and PDAM (28.6%), while in rural areas generally use shallow wells (32.7%) (ADB, 2016).
- Management of water resources for disaster risk reduction related to the climate in both urban water security and community resilience in dealing with water sector hazards (resilience to water related-disaster).
- Management of water resources to improve environmental quality through environmental water security mechanisms.

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