

## Review of Drought Assessment and Mitigation in Indonesia

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### Abstract

Drought as an annual disaster that happens in Indonesia every year should be mitigated to lessen the impact to human life. Drought assessment is one of the most important steps before taking the drought mitigation action. The drought assessment that has been conducted in Indonesia mostly focuses on the meteorological drought type. The assessment was conducted by using the drought indices, such as SPI. Drought mitigation then is conducted by utilizing drought early warning system that has been developed by Indonesia Agency of Meteorological Climatological and Geophysical Agency (BMKG).

**Keywords:** drought assessment, drought mitigation, Indonesia

### 1. Introduction

Drought is an annual disaster that happens almost every year in Indonesia in the dry seasons. Lacking of rainfall is the main cause of the disaster. Besides that, El Nino that is affected by the Pacific Ocean also makes the disaster become more severe.

Drought is one of the slow onset disasters that give large impact to people life. Drought brings impact to every sector of life, such as agriculture, economic and health. The impact that happens in Indonesia usually is the crop failure in the agriculture sector. This happens because the plant in the farm cannot have sufficient water for growing making the crop failure becomes severe.

To mitigate the drought disaster, people must understand the mechanism and characteristic of the disaster itself. The drought assessment could be done

by using several methods. The method used for analysis depends on the type of the drought itself.

There four types of drought that been widely introduce by the scientist including meteorological drought, hydrological drought, agricultural drought, and socio-economic drought. Meteorological drought usually is the condition in which lack of rainfall in the atmosphere. Hydrological drought is the condition where the amount of water in reservoir or groundwater could not sufficiently meet people's need. Meanwhile, agricultural drought is the condition where there is not enough moisture in the soil that can be used for the plant to grow. As for socio-economic drought, the amount of available water is not enough for economic production or meet the social demand.

In this paper, the drought assessment in Indonesia will be reviewed to understand the current status of the drought in Indonesia. The method being used for drought assessment will also be reviewed to understand the current method that has been developed to assess drought in Indonesia. The mitigation activity for drought events in Indonesia will also be discussed to gain the understanding about the proper mitigation action should be taken for future development.

### 2. Drought assessment

Drought assessment in Indonesia has been carried out by several researchers and also by the government. Some example of drought assessment that have already been conducted in Indonesia are meteorological drought by Rodysill et al, 2013; Nurhayati et al, 2014; Van Nieuwstadt et al, 2005; D'Arrigo et al, 2008; Harger, 1993; hydrological drought by Hatmoko et al, 2015; agricultural drought

by Keil et al, 2007; and socio-economic drought by Pattanayak et al, 2001. Among all of the research, the number of the meteorological drought assessment still dominate the drought assessment in Indonesia. The government assessment of drought basically also focus on meteorological drought.

Meteorological drought assessment is basically using rainfall as the main input. BMKG establish drought mapping report every year. The assessment of the drought is mainly by using Standardized Precipitation Index (SPI) that is only using rainfall as the input. From the report of 2015, the drought occurred from May to November. It becomes more severe because of the El Nino that occurred on that year.

Hydrological drought assessment in Indonesia has been carried out by Waluyo et al, 2015. They assessed the drought monitoring and prediction drought by utilizing a Drought Early Warning System (DEWS) based on Delft-FEWS software. They also applied the Standardized Runoff Index for the assessment by using river discharge data as the input. They applied the model in Pemali-Comal River Basin. The extreme drought happened in 1991, 1994, and 2003. The result shows that the simulation could be used for hydrological drought forecasting with the lead time of 6 months.

### **3. Drought mitigation**

Mitigation action for drought should be done in both prevention and response phases. For the prevention action, BMKG developed the drought early warning that has been disseminated to the related stakeholders which are Ministry of Agriculture, Directorate of Water Resources, Local authorities, and the National Board for Disaster Management. The information could be accessed online via: [cews.bmkg.go.id](http://cews.bmkg.go.id). The early warning is based on the meteorological drought. Another committee that is also a concern in the drought mitigation is national committee of water and river basin management which is consists of Directorate General for Water resources, National Met

Service, Directorate of Groundwater and Earth and related NGOs. They make the formulation for fulfilling water consumption in Indonesia. The objective of the committee is for giving suggestion and information for water resources management and allocation (Nurhayati et al, 2014).

### **4. Conclusion**

Drought assessment in Indonesia have been conducted mainly for meteorological drought type. Only few research about others type of drought assessment have been done in Indonesia. The drought mitigation action is done by considering the drought type by integrating between government and also the community as the stakeholder.

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