

DROUGHT CONDITIONS AND MANAGEMENT STRATEGIES IN INDONESIA

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BACKGROUND

Meteorological drought occurs when there is a prolonged period of below average precipitation, which creates a natural shortage of available water. Indonesia has two seasons namely rainy season which is likely to relate with floods, and the dry season which in most cases attribute to drought. Drought frequently occurs in concurrence with El Nino phenomenon, but it did not always lead to a severe drought, since there were other factors triggering drought in Indonesia such as land cover change, land clearing, and climate anomaly.

Severe drought events happened in Indonesia during dry season period when moderate to strong El Nino occurred such as in the case of 1997, that was when severe forest fire evident was found in Sumatra and Kalimantan. The monthly rainfall distribution of Indonesia for June July and August 1997 showed very few rainfall and dry conditions over South Sumatra, Java and central Kalimantan. In the last 10 years droughts have occurred in Indonesia, for instance the 2002 drought resulted in dryness in rice field area, up to 350,000 acre farm land suffered for crop loss, and it repeatedly happened in 2007. Land degradation and forest fires in Indonesia have also contributed to hydrometeorological disasters such as floods, droughts, landslides – all that result in great loss in agriculture and farming which in turn became threat to the national food security. The 2007 drought event caused over 20,000 acre of paddy fields experienced crops failure. Accordingly, preservation of forest is trivial in managing its hydrological role to captive, reserve, produce and distribute waters.

Drought monitoring and early warning system

The Indonesia Agency for Meteorology, Climatology and Geophysics (BMKG) has issued meteorological drought information on a regular basis using Standardized Precipitation Index (SPI) method. It was a WMO- recommended tool showing an index calculated based on the probability of the recorded amount of rainfall; negative index values for drought, and positive for wet conditions. SPI can be used to monitor climate condition on a range of time interval (monthly, three monthly, seasonal, annual) that can be utilized for agricultural and hydrological applications.

In addition to its routine products one of which is averaging one-month and three-month standardized precipitation index (SPI) and monthly percentage of soil moisture content , BMKG has released a climate early warning system consisting of drought monitoring and prediction, which are dry season onset, consecutive dry days (CDD, updated every 10 days), and one-month SPI analysis.

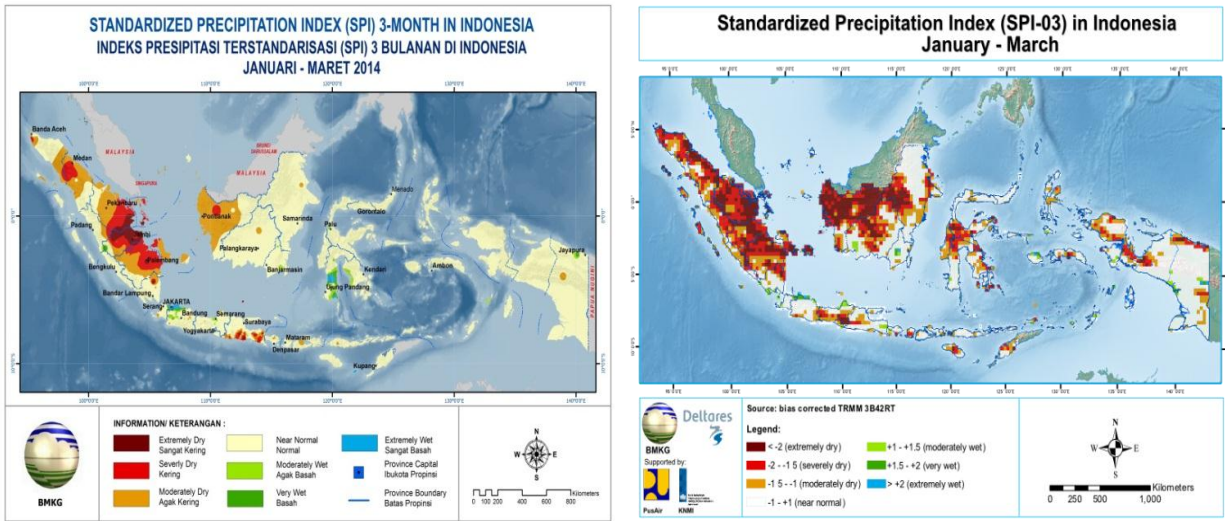


Figure 1. Samples of drought monitoring using SPI based on rainfall observation data (left) and RMM satellite data (right).



Figure 2. Information on (monthly) soil moisture content

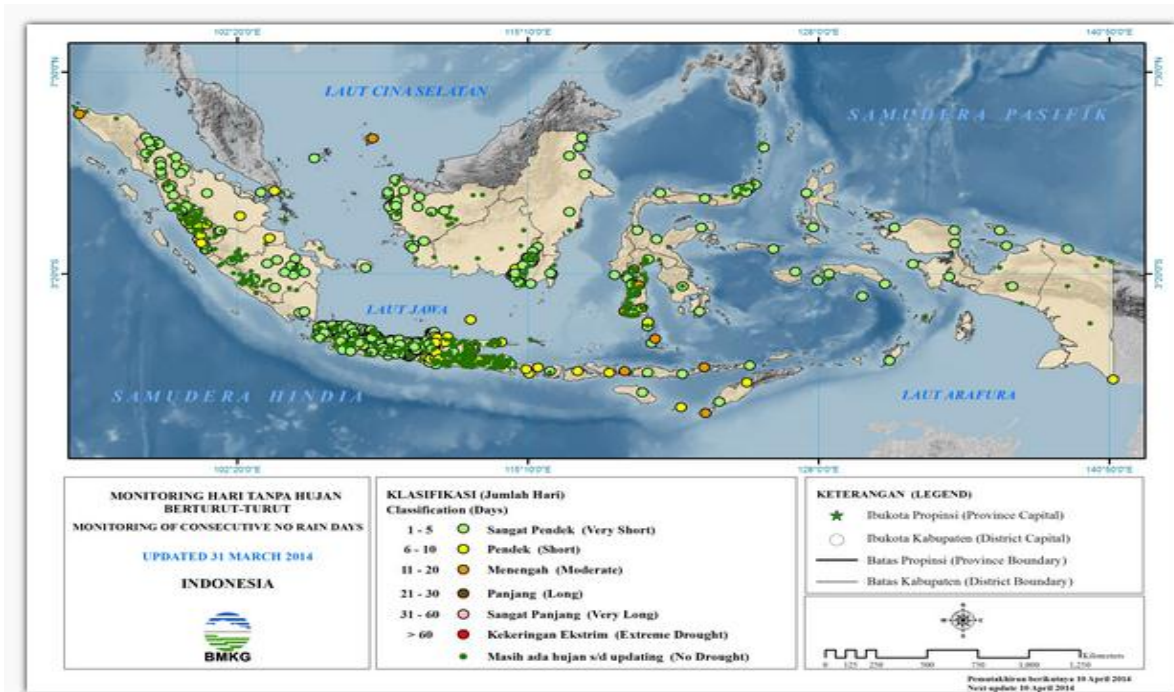


Figure 3. Consecutive Dry Days (CDD) information, updated every 10 days.

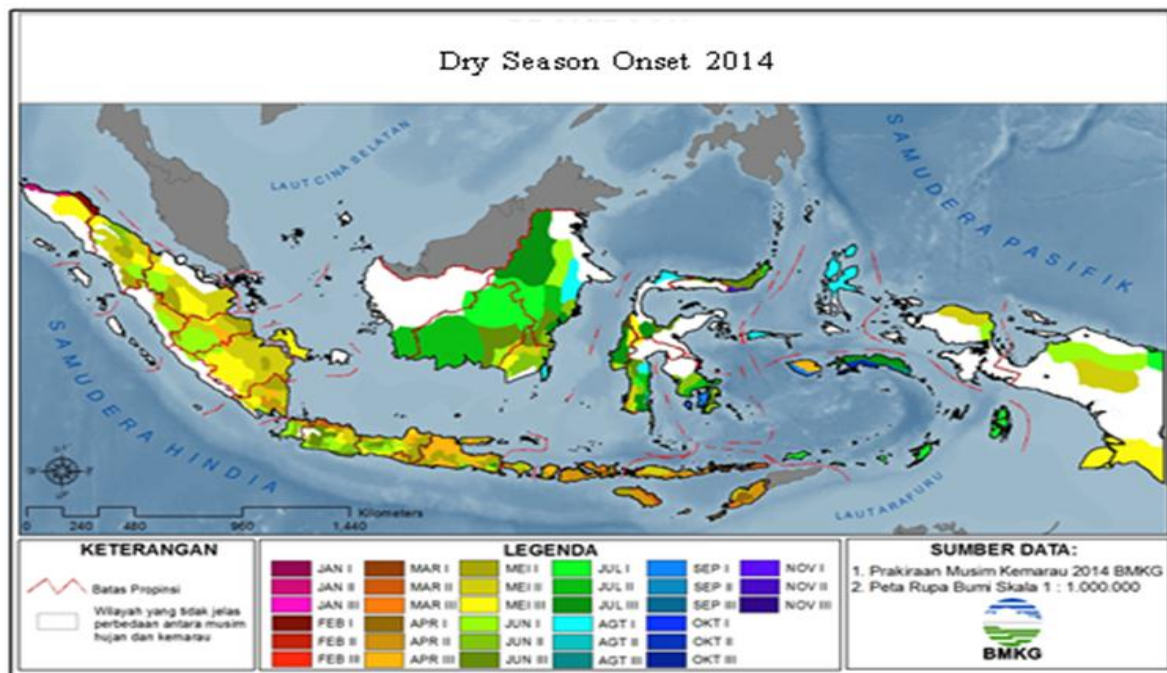


Figure 4. Prediction of dry season onset 2014

The drought early warning information 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 can also be accessed through the following website: cews.bmkg.go.id. There is another national

committee of water and river basin management including the function of making formulation for fulfilling water consumption in Indonesia. This committee consists of Directorate General for Water resources, National Met Service, Directorate of Groundwater and Earth and related NGOs who meet on regular basis as a task team to make recommendations for the policy makers at national level on appropriate actions/ programs to be undertaken in water resources issues including drought. It was the Directorate General of Water Resources who issued the early warning system containing level of alert based on water level height (this however more about flood warning).

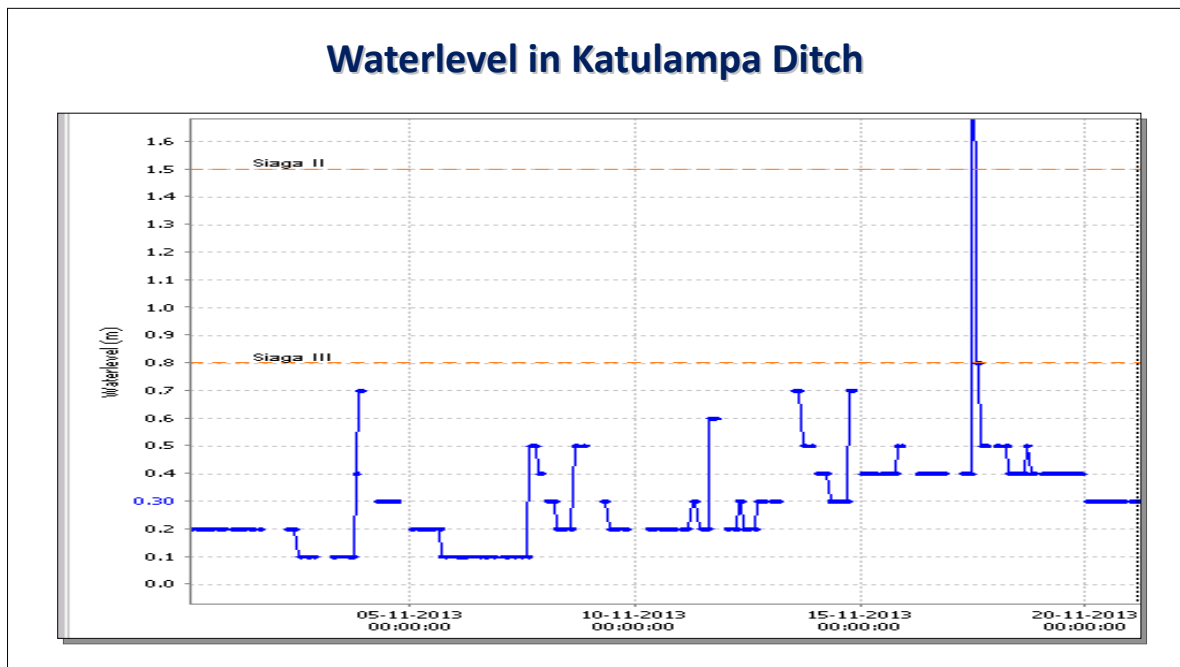


Figure 5. Waterlevel in Katulampa Ditch

Practices to alleviate drought impacts.

So far, the Government has taken some actions in coping with drought impacts for instance, in agriculture by providing drought tolerance seeds, water pumps, and covering the climate index insurance premium. More practice in agriculture was providing guidance for farmers and extension workers through crop calendar system on when to start sowing, what selection of crops to be planted and apply proper treatment during the growing phases of plants. For domestic water supply there has been effort in building 'embung', that is small reservoir/artificial well during wet period for anticipating water shortage problem in dry season period. Accordingly, accurate and timely seasonal prediction is critically required by agriculture and water sectors, as well as the local authorities.

In coping with annual forest and bush fires evidences in part of Eastern Sumatra and Kalimantan regions, at the national level the Indonesia Government issued President Decree No 45 on Forest Protection in 2004. Moreover, at the provincial level, there was several Governor acts on forest fire control applied as instruments in which decree of alert was defined by several drought trigger parameters such as rainfall, temperature and SPI. At the field level, Fire Danger Rating Index (FDRS) delivered as an early warning information valid for one week forecast. FDRS contains of fire weather index and flammable level forecast based on meteorological condition (air temperature, relative humidity, and rainfall amount). It was as a join product of three national agencies i.e. Ministry of Forestry, National Space Agency (LAPAN) and the Meteorological Agency (BMKG).

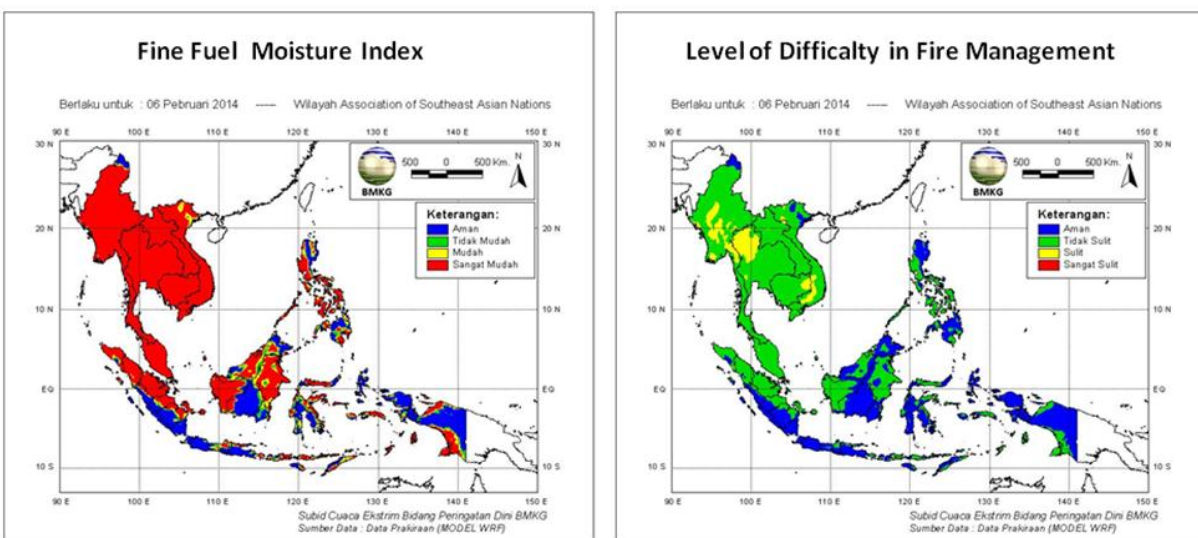


Figure 6. Sample of FDRS February 2014 (prediction)

At the national level, there is “National Board for Disasters Management”, functioning mainly on emergency response, but not particularly designated for drought management and preparedness.

The need for knowledge and skills on drought management:

Producing a better seasonal climate prediction is an essential need for Indonesia to meet the requirement of climate sensitive sectors such as agriculture, water, health and forestry. Improvement of forecasters’ skill and capacity is trivial to enable them producing more accurate and timely seasonal to sub seasonal prediction for each part of the region with their local characteristics. Frequent climate anomaly evidences such as in 2010 and 2013 made it more difficult to predict the season onset and length for users.

Capacity building on vulnerability, risk and impact assessment are the other most required step to be undertaken for setting up National Drought Policy in the country. While Government's concern and awareness has to be raised, there is a need to enhance science-based analysis on the recurring drought impact, i.e. the need for improving knowledge and skills on drought management and delivery of early warning systems. Equally, campaigns for building public awareness on severe and cumulative drought impact are necessary to be carried out at regional level. Coordination between relevant institutions are critically required towards establishment of National Drought Policy in Indonesia. Legal frameworks would help in fostering national institutions, sectors and NGOs to start their movement and to enable them obtaining national budget for setting up meetings and performing risk and impact assessment analysis as a starting point to establish the policy. Furthermore, top-down initiative would be a recommended approach to commence good coordination among related institutions and local governments toward the establishment of the National Drought Policy in Indonesia.