

Monitoring Bawakaraeng Post-Landslide Using ALOS PALSAR DInSAR and Ground Measurement

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Abstract: Indonesia is undeniably true is one of the most disastrous country in the world when it comes to incidences of natural disaster. Besides its geologic setting of being squeezed by three major tectonic plates (Eurasian, Pacific and Indo-Pacific plates), its location in tropical region makes it also vulnerable in terms weather imposed disaster such as flood, landslides and typhoon. On the other hand, remote sensing technology has been developed intensively and extensively for the use of natural disaster mapping. On March 24, 2004, one of the major landslides occurred at the head of Jeneberang River in Bawakaraeng Mountain inactive volcano complex bringing huge amount of debris flowing to the lower stream of the river which endangered the Bili-Bili Dam in the district of Gowa, South Sulawesi. The Dam is very essential to the city of Makassar for the supply of drinking water and electrical power plant. This study aims to monitor the distribution and the surface displacement of the uncontrolled collapsed material of the previous landslide from the potential of material blockage to the Bili Bili Dam and possibility of future landslide by utilizing the ALOS PALSAR images in the Differential Interferometric of Synthetic Aperture Radar (DInSAR) processing technique in three consecutive years of 2007, 2008 and 2009. With this technique the surface deformation of the landslide area can be measured and validated with ground measurement of Global Positioning System (GPS) and direct ground survey. Landsat images were also used to analyze the spatial extent of the area. The result shows the surface deformation occurred along the path of the collapse material where river discharge becomes an erosive agent that weakened the strength of the material cohesion which in turn creates further landslides. This phenomenon is dangerous to the people, crops and cattle surfacing this area. Therefore this area especially where cracks are found needed to be mapped and monitored and the result of the study must be distributed. In conclusion, this study is able to show that DInSAR technique with ALOS PALSAR image data can be used to monitor the post landslide area and to support the creation of landslide susceptibility map of the area. Small movement of cracks of 5-10 cms can be mapped in some parts of the surface displacement area. Using remote sensing technology this effort is effective and efficient to map such a large area.

Keywords: Post-landslide, ALOS PALSAR, DInSAR, Bawakaraeng, ground measurement.