

STUDY OF FLOOD INUNDATION IN PEKALONGAN CITY, CENTRAL JAVA

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Abstract: Pekalongan city, located in the northern coast of Java island, is currently experiencing coastal erosion and tidal floods (called 'rob'). The tidal floods inundate settlement areas near the coast with a height of 30-50 cm, and the affected area is increasing from year to year. It is estimated that the tidal floods affect a quarter of Pekalongan city at present. The main objectives of this study are: 1) to simulate the flood inundation area using a numerical modeling, and 2) to investigate the possibility of land subsidence that may further aggravate the problem of flooding in Pekalongan city.

In this study, MIKE 11 models were used to simulate and predict the flood inundation area. Tidal data were generated from the Tide Model Drive (TMD). Given the complexity of the problem and non-availability of some of the data necessary for the simulations, the study was restricted to a limited area where most of the population and infrastructures exist. The tidal flood simulations were carried out for three different scenarios of sea level rise: 1) current situation, 2) next 50 years, assuming no sea level rise, and 3) next 50 years, assuming 50 cm of sea level rise. The expected ranges of water level rise in Pekalongan city for each scenario are 0.23-1.27 m, 0.36-1.38 m, and 0.65-1.53 m, respectively.

Ground displacement maps were derived from the ALOS/PALSAR data using Interferometric Synthetic Aperture Radar (InSAR) technique. Twelve Level 1.0 images of ALOS/PALSAR data acquired in ascending mode during 2008 to 2009 were processed. For time-series analysis, 11 pairs of interferogram produce by taking the first image in 2008 as the master image. The results showed that the average of land subsidence rate in Pekalongan city is 3 cm/year, and the subsidence mainly occurred in the western part of the city.