



Spatial Correlation between Land Subsidence and Flooding in Urban Areas of Indonesia

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Land subsidence is a silent hazard affecting three large urban areas in Indonesia, namely Jakarta, Bandung and Semarang. Geodetic based results from Levelling, GPS and InSAR measurement methods, show that land subsidence rates in all three cities generally have spatial and temporal variations, and their magnitude is in average about 5-10 cm/year and can reach up to about 20 cm/year at certain locations and times. In general, the impacts of land subsidence in urban areas can be seen in the forms of cracking of permanent constructions and roads, changes in river canal and drain flow systems, wider expansion of coastal and/or inland flooding areas, and malfunction of drainage system. Several areas along the coast of Jakarta and Semarang already have experienced tidal flooding during high tide periods. These coastal flooding usually occurs in the areas with relatively large subsidence rates. Subsidence in the areas along the rivers which are flowing throughout Jakarta, Semarang and Bandung will also worsen the impacts of riverine flooding. In Bandung, the study shows that 21 % of the total riverine flooded area coincides with area affected by subsidence. The changes in river canal and drain flow systems and malfunction of drainage system due to land subsidence will also aggravate the flooding. Land subsidence will have direct and indirect affects with the flooding in urban areas, both in coastal or inland areas of the cities. This paper analyzes and discusses the characteristics of spatial correlation between land subsidence and flooding phenomena in urban areas of Jakarta, Semarang and Bandung.