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Coastal Flooding of Jakarta (Indonesia): Causes and Impacts

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Jakarta is the capital city of Indonesia and large coastal city located in the northern coast of Java island, with a population of about 9.6 million. Several areas along the coast of Jakarta already have experienced tidal flooding during high tide periods. Coastal flooding usually occurs in the areas with relatively large subsidence rates. In general, based on the Levelling, GPS surveys, and InSAR surveys, conducted since 1982 up to 2011, it is obtained that land subsidence in Jakarta exhibits spatial and temporal variations, with the rates of about 1 to 15 cm/year, and a few locations can have the subsidence rates up to about 20-25 cm/year. Largest subsidence occurred at several areas along the coast. This subsidence is mainly due to natural consolidation of alluvial, excessive groundwater extraction, and load of constructions. During the high tide periods, these subsiding areas used to experience flooding. The sea level rise phenomena in Java sea and high sedimentation rates in 13 rivers which are flowing throughout Jakarta have worsen this coastal flooding phenomenon of Jakarta. Based on the linear-term of sea level change for period of 1993 to 2009 as derived from satellite altimetry data, the sea level rise around Jakarta coastal area is about 4-5 mm/year.The impacts of coastal flooding in Jakarta are numerous and resulted economic losses are quite significant. Besides causing coastal erosion, the frequent and severe coastal flooding is deteriorating the function of building and infrastructures and decreasing the quality of living environment and life (e.g. health and sanitation condition) in the affected areas. This paper analyzes and discusses the causes and impacts of coastal flooding in Jakarta, and proposes the potential mechanism to overcome the problems.