



Hydrogeological and Hydraulic Aspects on Land Subsidence and Coastal Flooding in Semarang, Indonesia



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BACKGROUND

Land subsidence and coastal flood have been a long-standing and complex problem in Semarang, Indonesia. Until 2015, the area affected by land subsidence was 4.92 km², with a loss of IDR 3,582 billion (US\$ 248.59 million) (Sarah, Satriyo, & Mulyono, 2014).

Many adaptation actions have been carried out by both the government and individual residents. One of the adaptation efforts for flood prevention in Semarang is to use a polder drainage system.

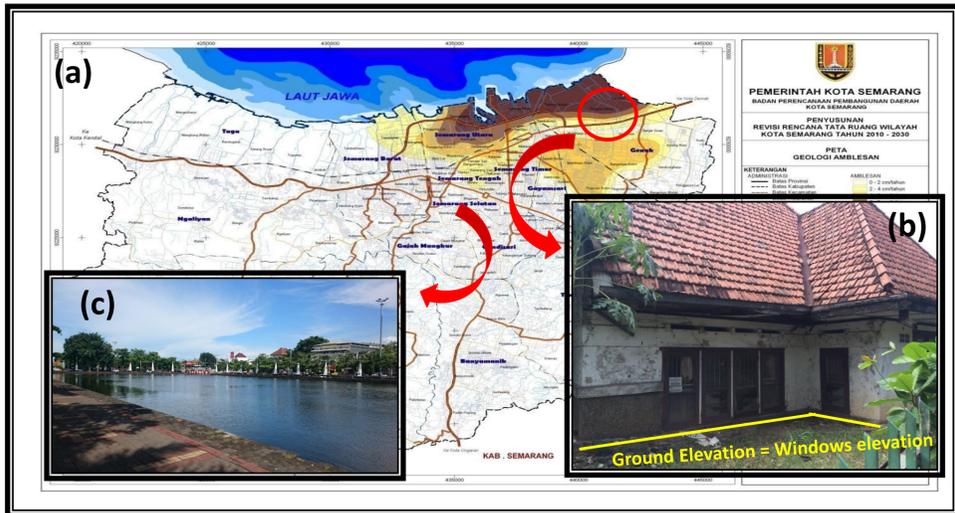


Figure 1. (a) Land subsidence map in Semarang City (Development Planning Agency at Sub-National Level, 2019), (b) house affected by land subsidence, (c) Tawang polder as adaptation action for coastal flooding

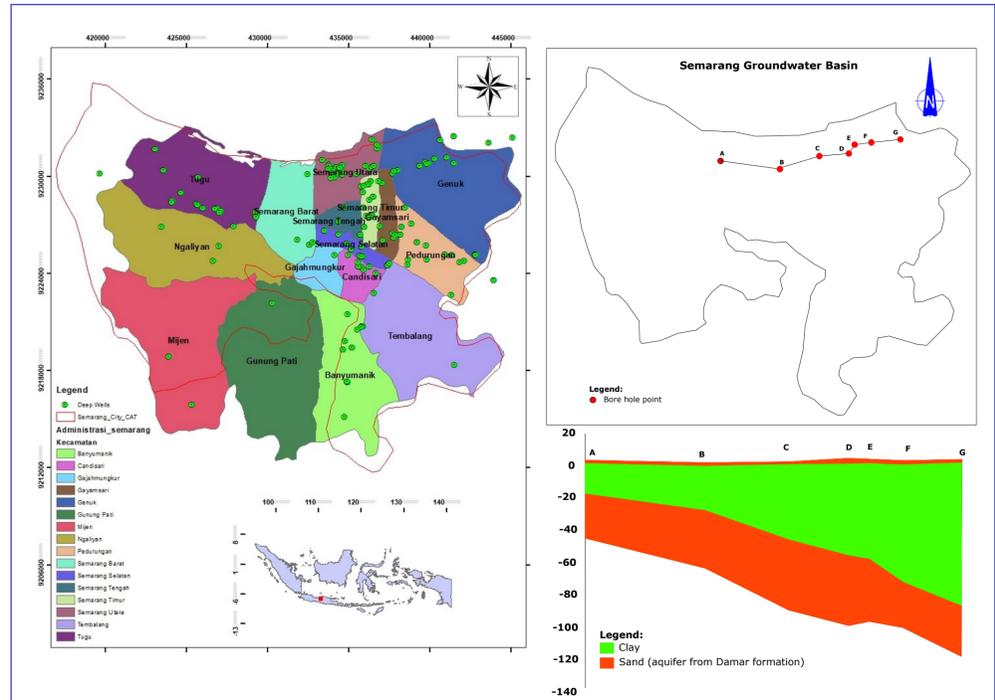


Figure 4. Factors causing land subsidence in Semarang City

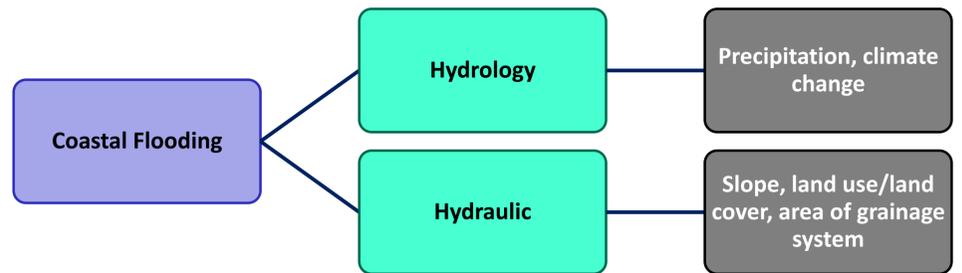


Figure 5. Factors causing coastal flooding

METHODS

The framework of reidentifying the hydrogeological and hydraulic aspects on land subsidence and coastal flooding in Semarang City can be summarised as follows:

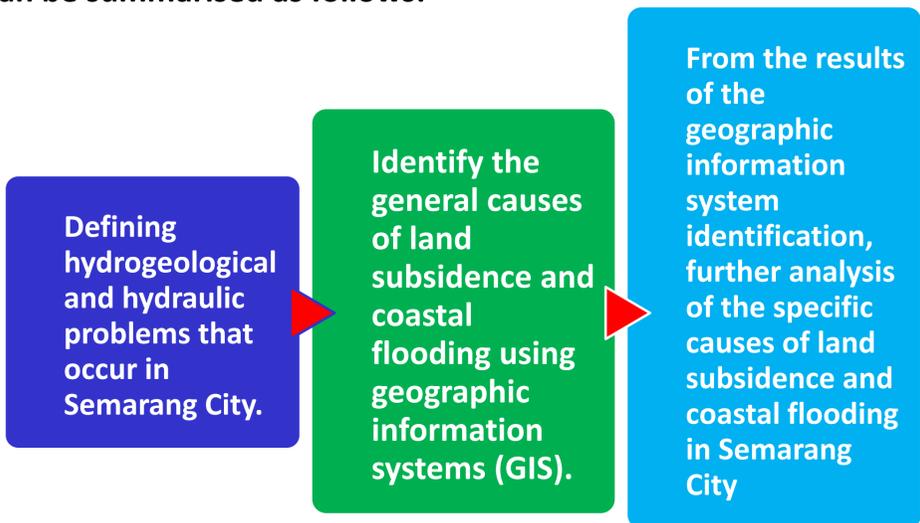


Figure 2. The framework of research

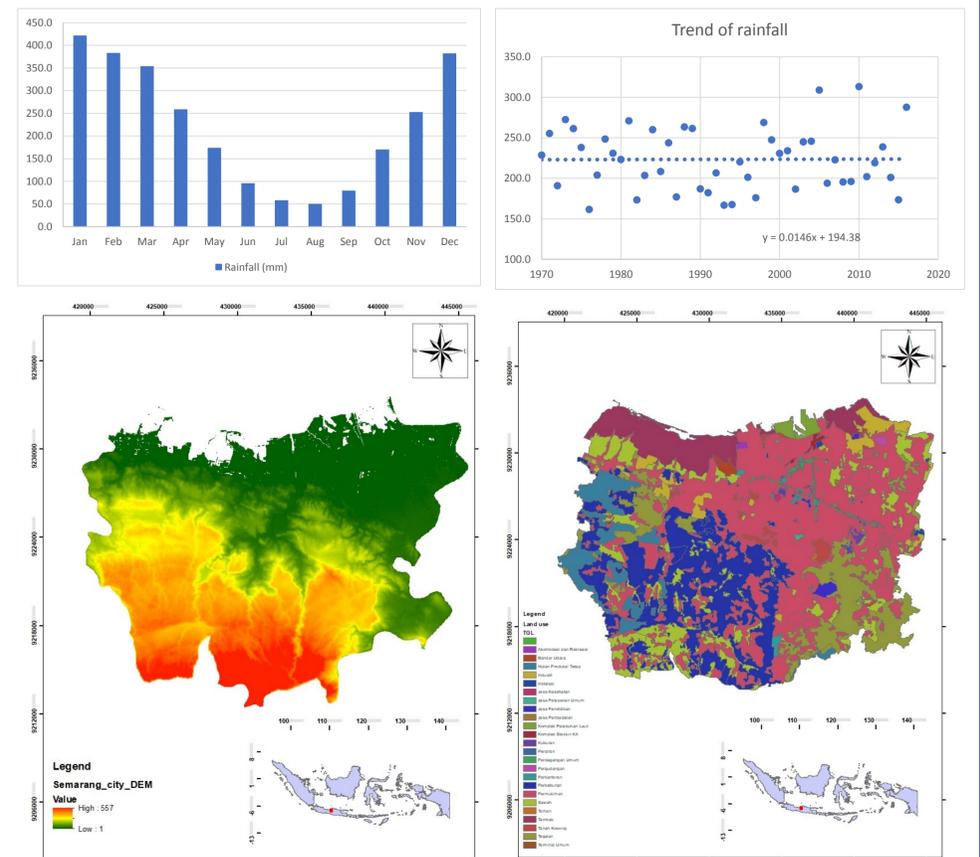


Figure 6. Factors causing coastal flooding in Semarang City

RESULTS

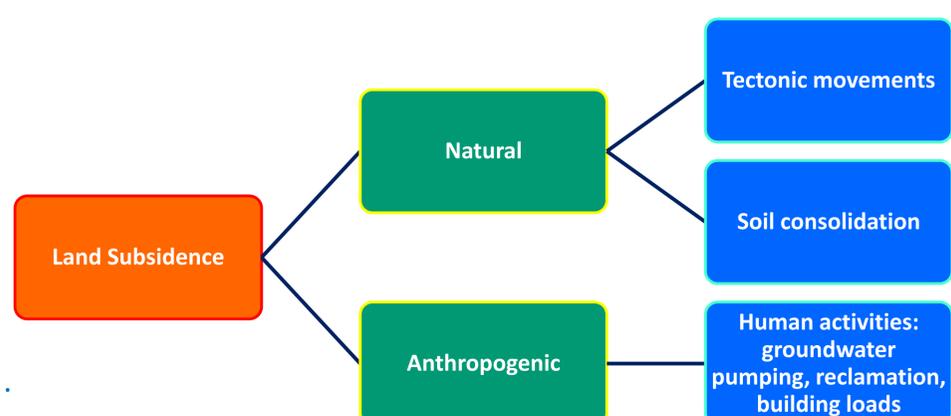


Figure 3. Factors causing land subsidence

CONCLUSIONS

In conclusion, we have succeeded in identifying the factors that cause land subsidence and coastal flooding that occurred in Semarang City. We found that the land subsidence that occurred in Semarang City was dominated by hydrogeological conditions, where the coastal area of Semarang City had a very thick layer of clay and was exacerbated by hydraulic conditions in the form of groundwater pumping. Meanwhile, coastal flooding in Semarang City is caused by hydrological conditions in the form of high rainfall, and hydraulic conditions in the form of topography in very flat coastal areas and land use that cannot absorb water.