Measuring the Risk of Coastal Inundation due to the Land Subsidence and Sea Level Rise Around Northern Coast of Java Island Indonesia (Highlight on Central Java)

H. Andreas[1], H.Z. Abidin[1], A.T. Yuherdha[2], D.A. Sarsito[1], Sujarwanto[2], P. Letitre[3], D. Pradipta[1], A.P. Handayani[1]

1 Geodesy and Geomatics
Faculty of Earth Science and Technology Institute of Technology Bandung
LABTEX IXC Jl. Ganesha 10 Bandung 40132 – Indonesia
2 Agency of Energy and Natural Resources, Central Java Province - Indonesia
3 Deltares Research Institute, The Netherlands

heri@gd.itb.ac.id
Heriandreas49@gmail.com

Session: Measuring and Monitoring

On the last decades the coastal inundation or tidal flooding in many places around northern coast of Java Island Indonesia is worsening very rapidly. As mentioned by the local people the inundation or flood that used to come whenever the high tide, it's now even comes on a regular tide. In fact, in some location flood is coming permanently. Some people in fact have to abandon their houses. This situation is beyond the geological scale. It is way too fast, and it is a real disaster. It looks like combination of land subsidence with the sea level rise is causing typical inundation in the area.

We the stake holder are busy now in measuring the risk of coastal inundation. Since risk involved hazard mapping, vulnerability and capacity mapping, in this case the measures or tasks are starting from monitoring (including hazard and vulnerability monitoring), examine the causes and set up short term and long term measures as part of capacity. As part of vulnerability monitoring, we include exposure on how many housing, farm areas and fisheries areas effected by coastal inundation due to land subsidence and sea level rise. We also calculate the estimation of economic losses due to these disaster as part of vulnerability parameters.

Regarding monitoring hazard we use several geodetic technology like GNSS, InSAR, LiDAR, Tidal Instrument, etc. to see rate and magnitude of subsidence and sea level rise as well as growing of inundation through time. Monitoring of groundwater well and geotechnical investigation have been conducted as well to answer the causes of such disaster since most probably exploitation of ground water play an important role. As for short term measures we are now busy on elevating coastal infrastructure and build dykes. Long term measures will be focused on controlling ground water exploitation.

The city of Pekalongan, Semarang and Demak in Central Java are places with most prone to above disasters. Main focus of measuring the risk is taking place around these areas along with several others not to mention Jakarta. What we are doing in Central Java is an image of what we are doing so far on how to measure the risk. Jakarta is quite special case since it is a capital of Indonesia. Risk management

in this city is beyond comparison to others places at the moment. Highlight to what happen in central Java is giving more realistic situation on how we are managing coastal disaster due to inundation, land subsidence and sea level rise in Indonesia.

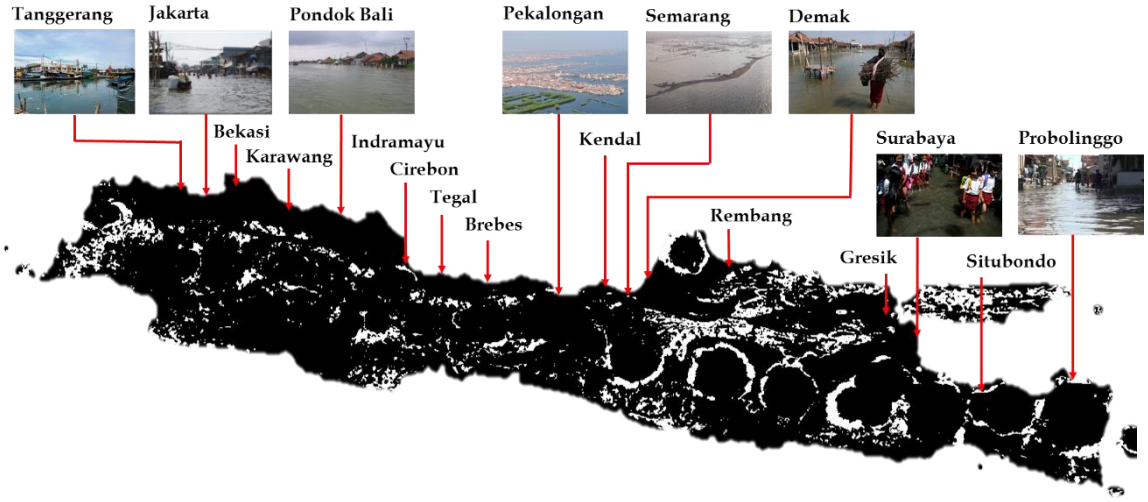

Figure 1 Coastal inundation or tidal flooding along northern coast of Java island Indonesia due to land subsidence and sea level rise

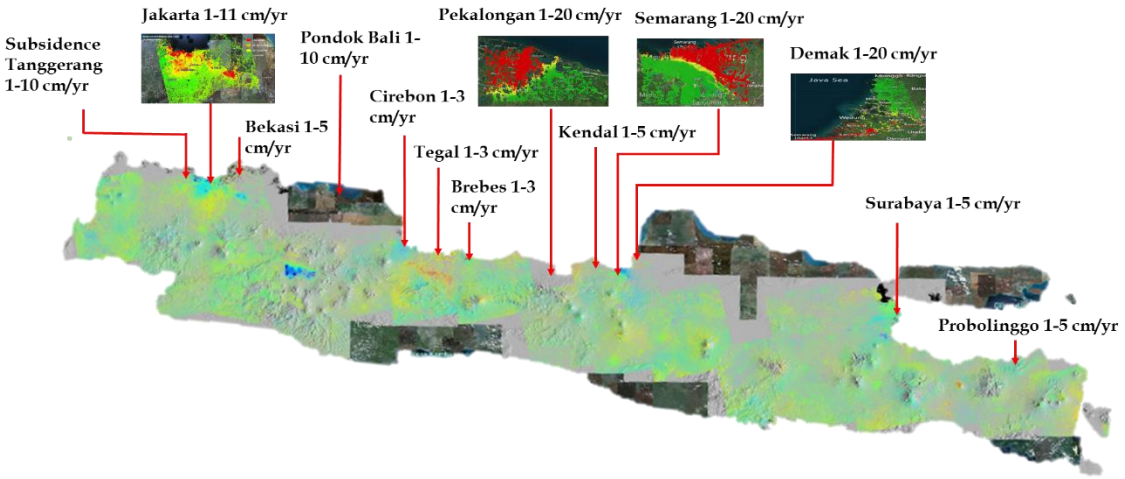

Figure 2 Measurement results of land subsidence along northern coast of Java island Indonesia

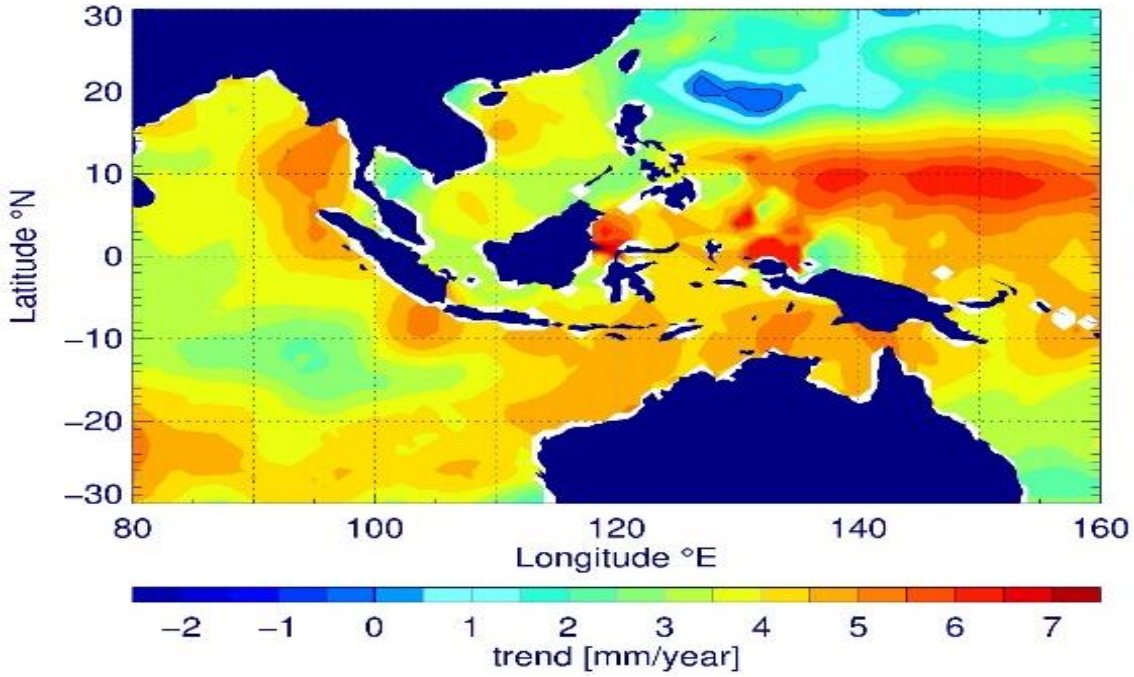

Figure 3 Sea level rise derived from Satellite Altimetry at Indonesia water (courtesy GFZ-ITB)

Heri Andreas, Hasanuddin Z Abidin, Angga Trysa Yuherdha, Dina Anggreni Sarsito, Sujarwanto, Peter Letitre, Dhota Pradipta, Alfita Puspa Handayani

hzabidin@gmail.com, angga.trysa@gmail.com, dina.sarsito@gmail.com, andreaskuliah49@gmail.com, peter.letitre@deltares.nl, dhotagd@gmail.com , alfitapuspa@gmail.com