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Water, floods and the sea wall

Scott Younger

JAKARTA

In the millions of years that mark the history of the planet and even during the measurable time that mankind has trodden the land, the level of the sea has changed several times and over a wide margin.

This can be witnessed in the geological story of coastal sediments and in the underwater remains of ancient cities, although still within historical memory.

Even the shape of the world's land mass has changed and continues to change over time as a result of the shifting of the tectonic plates that make up the skin of the planet.

When the Romans first came to Britain 2,000 years ago, the Channel that separates it from France was just about fordable at very low tides, but the northwest-southeast axis land mass shift, which continues, has led to the gradual rise of the northwest of Scotland and the matching sinking of the southeast corner of England.

This land surface movement was a key factor in the decision to build the Thames barrier to protect the city of London from severe North Sea storm surges.

In the case of Holland, without

its sea wall protection, the land of the country would be half inundated and uninhabitable.

However, many people live 5m under the level of the North Sea thanks to its dyke which allows such main centers as Amsterdam to thrive.

The engineering for protecting important land and assets from sea inundation is long understood and well developed.

Now protecting the assets of Jakarta has become a key issue for the future stability of the city and people ask why. Well, the north half of the city is steadily sinking, very largely brought about by the uncontrolled pumping of groundwater over the past few decades as population and commercial activities of the city have expanded, especially since the 1980s.

Jakarta has grown into a highly important center as the gateway to foreign investment as well as for national governance and domestic finance. Greater Jakarta is now a conurbation approaching 30 million people, the second largest in the world, and is forecast to grow to 50 million by mid-century.

The pressure on infrastructure will continue and as a vital issue for the success of the city arguably the most important will relate to what will be done about water supply for

this vast population, in itself larger than the total of most nations.

In order to discourage and gradually cease underground pumping in the center of the city this will require an alternative in the presence of a reliable and steady piped surface supply as replacement.

At this juncture the city is still some way off achieving that condition. There has been more focus on who should run the city water supply rather than on the fundamental question of when can the city obtain adequate bulk supply from outside its boundaries, and "up its game" in terms of distribution in order that there can be a justifiable phasing out of groundwater pumping.

Careful modeling and calculation shows that even with the phasing out of groundwater pumping in the 2020s, and that seems unlikely in terms of the current status of planning and implementation for further sources of bulk supply and the almost non-existent use of water recycling to date, further ground settlement in the north part of city by the end of the century would be in the order of 2 meters.

Furthermore, should underground pumping continue unchecked, causing continuing drawdown and induced consolidation settlement of the surface sediments,

the forecast settlement for the north of the city is over 5 m, compounded by a small sea level rise.

This rise could amount to a further impact in terms of level of about 10 percent more, but is relatively insignificant compared with the main issue relating to the settlement of the ground.

Thus the most likely scenario, because of the political reality of there being limited impact over controlling groundwater pumping in the decades ahead, would be towards the greater subsidence of the second forecast.

Without doing something to protect the north of the city, including the functioning of the land support for Tanjung Priok, the country's main seaport, then very large areas of land will be at risk as well as trillions of dollars of commercial assets.

The writer, who has degrees in civil engineering from Glasgow University, the University of California at Berkeley and the University of Hong Kong, is a director at PT Nusantara Infrastructure Tbk. and vice chairman of EuroCham. He has worked in Indonesia for nearly 30 years as academic and consultant in the infrastructure sector on a number of projects.