

Java's north coast cities and rising sea levels

The major cities on the north coast of Java — Jakarta, Cirebon, Semarang and Surabaya — are centers of economic activity and are growing rapidly and experiencing high population growth. But, that growth and the development of socioeconomic activities in those cities and their surrounding areas are linked to environmental problems such as intensive land conversion, land subsidence due to groundwater extraction and floods that have recently become a hot issue.

Because of their location in coastal areas with altitudes of less than 10 meters above sea level (Low Elevation Coastal Zone, LECZ) — some areas are even below sea level — cities on Java's north coast are particularly vulnerable when sea levels rise (SLR), which causes flooding. The most vulnerable are the poor who reside in those areas.

LECZs are generally located in low- and middle-income countries, with an area of 1.329 million square kilometers and inhabited by about 474 million people in 2005. The urban population is estimated to have reached 229 million in an area of 115,000 square kilometers. The largest is China, with a population of 143.9 million, while LECZs in Indonesia have reached 177,000 square kilometers and were inhabited by 41.6 million people in the mid 2000s.

Globally, SLR in the last hundred years has reached 1-2 mm per year on average, and is predicted to reach 5 mm per year by 2050. Prof. Safwan Hadi of the Bandung Institute of Technology has shown the SLR on the Jakarta Bay has reached 5.7 mm per year. Obviously, this will have a major impact on human settlements, socioeconomic activities and infrastructure in coastal cities and the small islands in the area.

SLR vulnerability in cities on Java's north coast has been studied by researchers and experts. For example, Nur et al in 2001 identified SLR impacts that had taken place and were expected to occur in North Jakarta, including tidal flooding, subsidence, water pollution, seawater intrusion and damage to the coastal environment.

In 2003, Supriyanto showed coastal areas in Surabaya, which cover 15,400 hectares with a population density of 44 people per hectare, were inundated most of the time, yet, the Surabaya administration still issued permits for various development sites on 3,780 hectares. Similarly, as described by Marfai and King in 2008, tidal flooding in Semarang had damaged infrastructure as well as created various other environmental problems in the city.

The Intergovernmental Panel for Climate Change (IPCC) has recommended various structural and non-structural mitigation measures and adaptations to the SLR. The structural mitigation could involve the construction of seawalls, flood canals, polder systems and drainage systems. For large cities like Jakarta, the challenge is how to optimize flood prevention through the completion of flood canals improving drainage systems. Adaptation and mitigation actions are two sides of a coin; one cannot be separated from the other.

Non-structural actions are efforts to adapt to the potential impact of SLR, which could include the adjustment of city and regional spatial planning, building regulations and codes and strengthening urban development. Ideally, adaptation measures should be done on multiple levels, at the national, regional and local levels as well as within communities.

Fankhauser has proposed the idea of comprehensive adaptation, which includes data collection on climate change and assessments of vulnerability with respect to population, housing, socioeconomic activities and ecosystems.

The first phase includes three options: 1) Hard protection, such as the construction of dikes, and soft protection such as coastal afforestation; 2) Retreat, such as restrictions on physical development and residential relocation of affected residents; 3) Accommodation, such as the conversion of agricultural land to fish ponds.

The second phase involves planning for the integrated management of coastal areas, the development of institutional capacities, including human resources and development of related technologies and the dissemination of information to the public. The third phase includes coastal development, the development of incentives and disincentives, rules and standards, physical planning, monitoring and prediction.

From policy and institutional development, there are several things to do to confront SLR, both at the national and local levels: First, develop the awareness of decisionmakers on the impact of SLR on city and regional development, particularly on human settlements, socioeconomic activities, population, infrastructure, agriculture and health. As Prof. Roland Fuchs argued in 2010: “The risks posed by climate change and sea level rise will continue to grow into the next century, even if a dramatic reduction in greenhouses gas emissions is achieved.”

Second, include the possible effects of long-term and short-term SLR in urban and regional development plans more specifically, both in the Spatial Plan and Long- and Mid-Term Plans at city, district and provincial levels. Third, create policies and incentives as well as disincentives not to concentrate urban economic activities in cities in coastal areas.

The most serious challenge is institutional development, because addressing the adverse impacts of climate change and SLR will require cooperation between municipalities and regencies, and of course the support of the central government. It is not easy to build this kind of synergy during the euphoria of decentralization, when the “egocentric” have descended into many regencies and cities in Indonesia. It is not possible for Jakarta to address the problem of flooding and transportation alone, without the cooperation of municipalities and regencies in Botabek (Bogor-Tangerang-Bekasi).

The phenomena that occurred in Jakarta recently has actually also started to manifest in other cities in Indonesia, especially those in coastal areas. There is a need to raise the awareness of decisionmakers and planners at the national, regional and local levels about the impacts of SLR, and climate change in general. At the national level, perhaps it is not seen as too much of a problem, as central government officials receive a lot of information about it, but, the situation might be very different for those in the regions, especially those living in more distant places where solutions are still constrained.

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