

# Growth in coastal areas may expose 1B people to sea-level rise by 2060

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HONG KONG -- While residents in Vanuatu are still battling flash floods caused by a devastating tropical cyclone last week, a study says coastal population growth may make storm threats from the sea a global crisis within a few decades.

In a paper published recently in the journal *PLOS ONE*, a team of researchers from several Western institutes estimated the number of people living in low-elevation coastal zones, as well as the scale of the population at risk from one-in-100-year storm surge events, by using scenario-based projections.

Their findings show that even under the lowest growth assumptions, the global population in low-elevation coastal zones could rise by more than 40 percent, from 625 million in 2000 to 879 million in 2030. By 2060, the researchers say, more than a billion people worldwide could be living in those flood-prone areas.

Among them, 411 million people could be affected by extreme flooding by 2060, the study notes. By contrast, this figure was 189 million in 2000.

When it comes to regions, the study says, Asia has the highest degree of exposure, both now and in future scenarios. To be specific, five Asian countries -- China, India, Bangladesh, Indonesia and Vietnam -- accounted for more than half of the world's population exposed to coastal flooding in 2000 and will maintain the top five positions over the coming decades.

Besides that, the researchers found that Africa is expected to experience the highest rate of population growth in at-risk areas, driven by its rapid coastal development. And while wealthier economies generally are less exposed to the danger of coastal flooding than those in the developing world, the study says, the United States is an exception.

According to the study, the United States was among the 25 countries with the largest population living in low-elevation coastal zones in 2000. This trend is likely to continue, the researchers said, adding that major coastal disasters such as Hurricane Katrina in 2005 and Superstorm Sandy in 2012 already have indicated the possibly increasing risks associated with settling in the country's low-lying coastal areas.

The study authors say that their findings can help identify areas where adaptation actions are not only desired but essential. They also suggested that policymakers worldwide should take climate shocks into account when planning future land use along the coast.

## Heavy toll, weak preparation, low awareness

The results of this research have come as a growing body of studies show that Asian countries are among the most vulnerable to sea-level rise and related hazards. In one such study, the World Bank estimated that flood damages could cost coastal cities globally \$1 trillion each year by 2050, and six out of the top 10 cities ranked by their economic losses are in Asia.

And sea-level rise also takes a toll on villages. One acute case is Vietnam, where rising sea levels already have made it easier for salt water to flow farther inland, damaging soil quality and threatening the livelihood of local rice growers. Other Asian countries, such as India, Thailand and China, have suffered

from severe coastal flooding in recent years, since giant storm surges can ride in on higher tides to invade coastal areas.

There are already adaptation efforts against threats from the sea. China, for one, last year rolled out its first natural disaster insurance program, with a southern Chinese coastal city, Shenzhen, being the first pilot region. And in Indonesia, government officials are planning to build a 35-kilometer sea wall in Jakarta at a budget of \$40 billion. The country will also reclaim land for 17 new islands as natural buffers to help defend its coastline.

"Policymakers in several countries, especially in coastal cities, are aware of the issue to some extent, but overall awareness on options to address sea-level rise is much [more] limited," said Ancha Srinivasan, principal climate change specialist at the Asian Development Bank in Manila, Philippines.

For instance, Ancha said, a recent survey showed that community leaders living along the coast of eastern China's Zhejiang province have little knowledge of climate change, and sea-level rise has failed to gain a foothold in the government's priorities. However, Zhejiang has been hit by increased coastal hazards over the past few years. Official figures show that in 2013 alone, storm surges caused direct economic losses of more than 2.8 billion yuan (\$452 million) and forced hundreds of thousands of people to leave their homes behind.