

The adaptation challenge of US coastal cities

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It's not only sea level rise but also subsidence of coastal land that increases flood risk of cities on the US coasts, and the impact of subsidence is often underestimated in urban planning. As a result, many more people and their homes will be at risk of coastal flooding in the coming decades than is often thought. In a nutshell, this is the warning scientists give in a recent article in the scientific journal *Nature* entitled 'Disappearing cities on US coasts'.

The scientists focused on the year 2050. For this short term, sea level rise projections are very accurate. Also, the time between now and 2050 is probably too short for significant improvements of coastal-defence structures and it is quite safe to extrapolate the current flood protection structures to 2050, so that's what those scientists did. For 32 major US coastal cities.

Sea level rise along the US coastlines is projected to rise by 0.25–0.3 m by 2050. Relative sea level rise, the rise of sea level with respect to the land surface, will be several centimeters more because of subsidence. Data on high-resolution vertical land motion show that further land area of between 1,006 and 1,389 km² is threatened by relative sea-level rise by 2050, compared with 2020. This poses a threat to 55,000–273,000 people and 31,000–171,000

properties. Without flood protection, these numbers would be almost twice as large: an exposure of 176,000–518,000 people and their 94,000–288,000 homes, with a total estimated home value of USD 32–109 billion by 2050.

More than half of these numbers refer to 11 cities on the US Atlantic coast, Miami in particular. Roughly 40% of these numbers are people and their homes in 11 cities on the Gulf coast. The exposure of inhabitants in 10 cities on the Pacific coast is much less, probably due to the higher topographic elevations, lower rates of land subsidence and relatively low rates of sea-level rise on the Pacific coast relative to the Atlantic and Gulf coasts.

The scientists warn that flood protection of these coastal cities was not designed with climate change in mind while also land subsidence is often neglected in urban planning. They conclude that their study 'shows the scale of the adaptation challenge, which is not appreciated in most US coastal cities'.

Source: Ohenhen et al., 2024. Disappearing cities on US coasts. *Nature* 627: 108-115.