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Ranking Port Cities with High Exposure and Vulnerability to Climate Extreme

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This global screening study is an OECD study that makes a first estimate of the exposure of the world's large port cities to coastal flooding due to storm surge and damage due to high winds. This assessment also investigates how climate change is likely to impact each port city's exposure to coastal flooding by the 2070s, alongside subsidence and population growth and urbanisation. The study provides a much more comprehensive analysis than earlier assessments, focusing on the 136 port cities around the world that have more than one million inhabitants in 2005. The analysis demonstrates that a large number of people are already exposed to coastal flooding in large port cities. Across all cities, about 40 million people (0.6% of the global population or roughly 1 in 10 of the total port city population in the cities considered here) are exposed to a 1 in 100 year coastal flood event.

For present-day conditions (2005), the top ten cities in terms of exposed population are estimated to be Mumbai, Guangzhou, Shanghai, Miami, Ho Chi Minh City, Kolkata, Greater New York, Osaka-Kobe, Alexandria and New Orleans; almost equally split between developed and developing countries. When assets are considered, the current distribution becomes more heavily weighted towards developed countries, as the wealth of the cities becomes important. The top 10 cities in terms of assets exposed are Miami, Greater New York, New Orleans, Osaka-Kobe, Tokyo, Amsterdam, Rotterdam, Nagoya, Tampa-St Petersburg and Virginia Beach. These cities contain 60%

of the total exposure, but are from only three (wealthy) countries: USA, Japan and the Netherlands. The total value of assets exposed in 2005 is across all cities considered here is estimated to be US$3,000 billion; corresponding to around 5% of global GDP in 2005 (both measured in international USD).

By the 2070s, total population exposed could grow more than threefold to around 150 million people due to the combined effects of climate change (sea-level rise and increased storminess), subsidence, population growth and urbanisation. The asset exposure could grow even more dramatically, reaching US $35,000 billion by the 2070s; more than ten times current levels and rising to roughly 9% of projected global GDP in this period. On a global-scale, for both types of exposure, population growth, socio-economic growth and urbanization are the most important drivers of the overall increase in exposure. Climate change and subsidence significantly exacerbate this effect although the relative importance of these factors varies by location. Exposure rises most rapidly in developing countries, as development moves increasingly into areas of high and rising flood risk.

It must be emphasised that exposure does not necessarily translate into impact. The linkage between exposure and the residual risk of impact depends upon flood (and wind) protection measures. In general, cities in richer countries have higher protection levels than those in the developing world. Exposed population and assets remain dependent on protection that can fail. Hence, even assuming that protection levels will be very high everywhere in the future, the large exposure in terms of population and assets is likely to translate into regular city-scale disasters across the global scale. The policy implications of this report are clear: the benefits of climate change policies - both global mitigation and local adaptation at the city-scale - are potentially great.