



Increasing Risks to China's Coastal Cities with Its Expansion to Low-lying Seaward under Rising Sea level

Jing Kang and Xiao Cheng

Beijing Normal University, Beijing, China (jkangbnu@gmail.com)

Global sea level rise has certainly accelerated through the 21st and far beyond the previous projections and will continue to rise, while the frequencies and strength of extreme events such like flood and storm will increase due to global warming. Coastal cities where always be with densely population and accumulated social wealth will be under enormous affects. Using Landsat TM/ETM+ satellite images (1990, 2010) to extract urban built-up area, 17 China's developed coastal cities, which account for only 1.2% of total land area but boast 18.3% of urban population and nearly 19.6% of GDP in 2010, are spotted a 550% increase of urban land from 1990 to 2010. Shuttle Radar Topography Mission (SRTM) with 90m resolution data were used to calculate average elevation of extracted urban area. Then we found that these cities are all expanding seaward, occupying the most vulnerable neighborhoods, often in low-lying areas, alongside waterways prone to flooding. 11 cities show a reducing trend of mean elevations with the total average of more than 3 meters. Particularly, Shanghai, Tianjin and Ningbo in Delta area are most serious with the mean urban elevation less than 5 meters in 2010. The rapid expansion to seawards and accumulation of population and social wealth processed in coastal cities will increase the vulnerability and exposure, which will exacerbated the existing risks of rising sea level or extreme events. Referring to Defense Meteorological Satellite Program (DMSP/OLS) city-lights data and SRTM data, we built the Urban Vulnerability Index (UVI) to do semi-quantitative assessment on vulnerabilities of coastal cities. The UVI case study in GuangZhou showed the most vulnerability region concentrated at the low-lying south area where is with the much higher relative South Sea level than other sea area of China. With relative sea level rise of 1-1.5 m by 2100 and increased frequency of extreme sea level due to cyclone propagation, and weak urban drain-off system, Chinese coastal cities face enormous challenges for urban adaptation. National development plans will need to address the growing risks of coastal occupancy and identify the most appropriate approaches to coastal management especially for the most vulnerability region.