

Impact of Sea Level Rise on Guangdong

Professor Du Yaodong
Guangdong Climate Center
16 February 2012

1. Observed Change on Sea Level and its Impact
2. Future Change on Sea Level and Possible Impacts
3. Comprehensive Analysis of the Vulnerability of the Impact of Sea Level Rise in Guangdong

1 Observed Change on Sea Level and its Impact

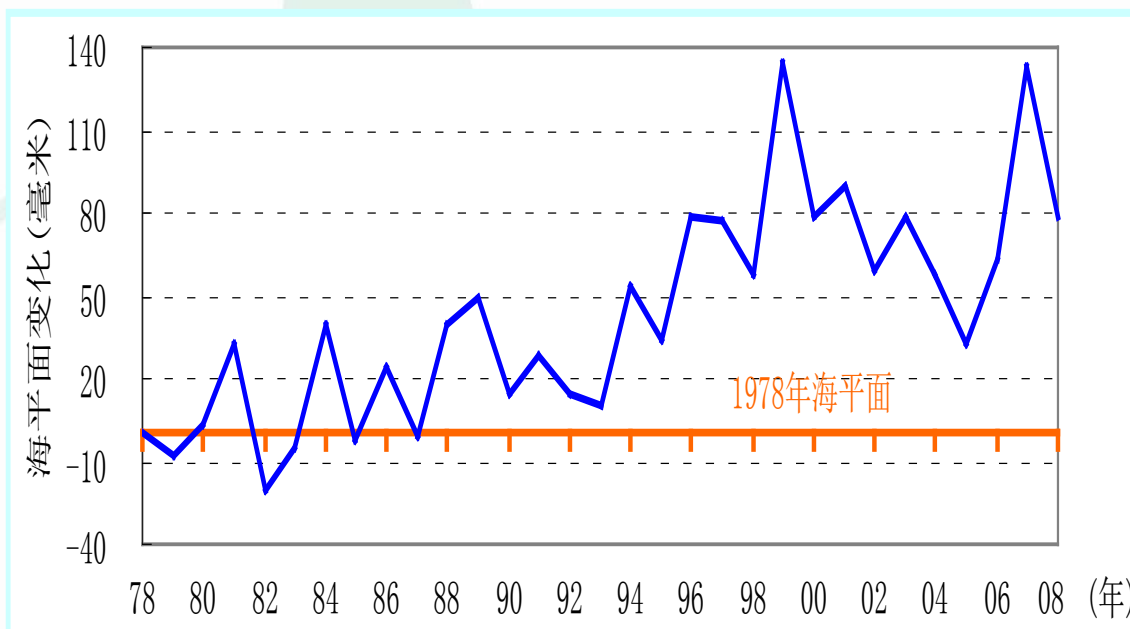


Fig.1 sea level change in South China Sea

Over the past 30 years, the rising rate of coastal sea level has been 2.7 mm/yr in South China Sea, 1.8 mm/year in Guangdong, which are similar to the national mean rise rate of sea level (2.6 mm/yr), slightly higher than global average value of the corresponding period(3.1mm/yr)

The ongoing sea level rise has had adverse effects on economic development and the ecological environment in Guangdong coastal areas.

Firstly, the magnitude of disasters and the probability of occurrence of storm surges have increased. For example, over the last 10 years, the frequency that the coastal areas in Guangdong have hit by strong storm surge has increased by 1.5 times compared to the period of 1949-1995.

Secondly, waterlogging 水涝, 水浸 in coastal cities has occurred more frequently. The siltation in the estuaries of rivers has increased and river beds have risen, which have seriously affected the normal operation of waterways and ports.

Table 1 Rise in Downtown Water Level of the Pearl River in Guangzhou

Decade of Century	10	20	30	40	50	60	70	80	90
Highest water level (m)	—	1.860	1.970	1.980	2.240	2.344	2.414	2.424	2.440
Annual average highest water level (m)	1.843	1.532	1.679	1.688	1.869	2.071	2.137	2.047	—



Fig.2 Bare stone beach in Chikan village, Zhanjiang City



Fig.3 Erosion section Chikan village, Zhanjiang City

Thirdly, coastal erosion has been exacerbated. In recent 40 years, Mashitongguling coast in Zhanjiang City of Guangdong Province has been eroded and retreated 25 m, with a rate of 0.6 m/yr.



Fig.4 Destroyed mangrove forest

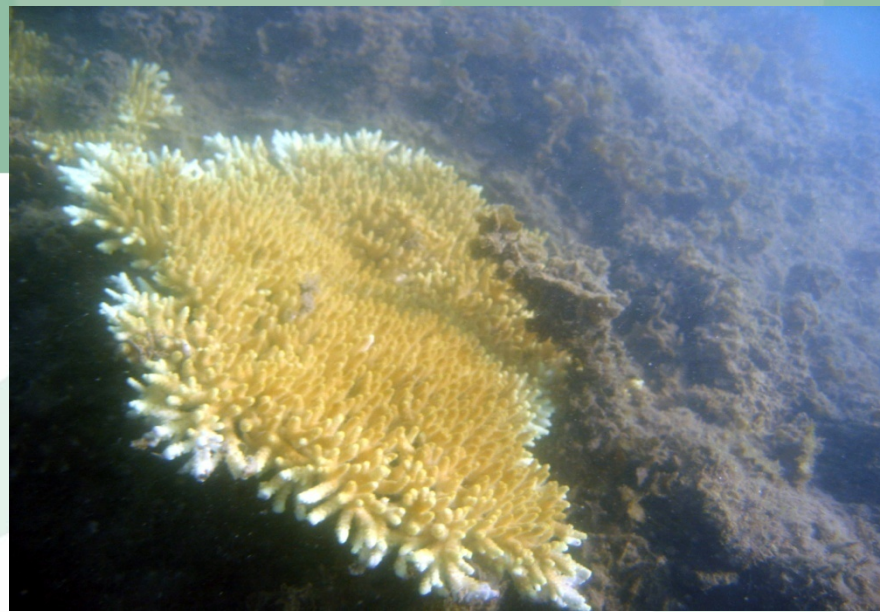


Fig.5 Coral bleaching

Fourthly, mangrove and coral reef ecosystems have degraded. From the 1950s to the 1990s, the area of mangrove forest in Guangdong has decreased by more than 65%. Most of mangrove forest is secondary forest, and original forest is rare. Some mangroves, such as *Lumnitzera littorea* 红榄李, has been endangered. Due to climate change, especially the impact of human activities, coral reefs have been severely damaged. In Daya Bay, Shenzhen City, the coverage rate of corals has decreased to the present 20% from 76.6% in 1984. Moreover, coral bleaching and death with varying degrees have occurred in South China Sea.

The highest observed tide level exceeded the highest tide level of coastal engineering design in Guangdong province. In Guangzhou City, the elevation standards for outlet have continued to rise.

2 Future Change on Sea Level and Possible Impacts

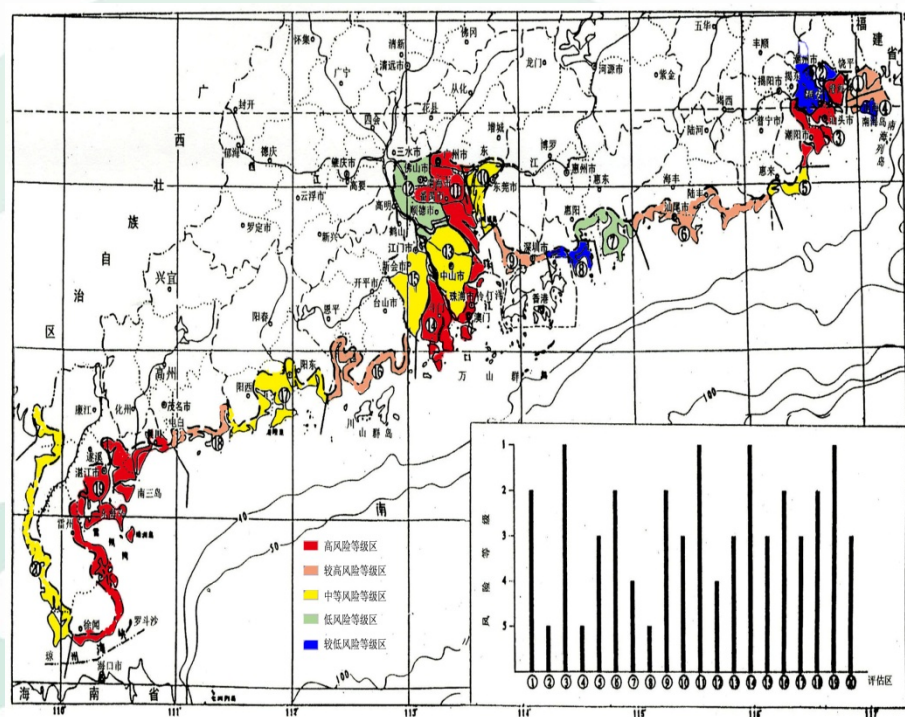
It is projected that coastal sea level in South China will rise 73 mm to 127 mm in the next 30 years compared to 2009 levels. Climate change and sea level rise will increase the impact frequency of strong storm surges, enlarge the flooded area in coastal lowlands, islands and shoals, extend the distance of sea water intrusion, increase the intensity and scope of coastal erosion, and aggravate the degradation of mangroves and coral reefs.

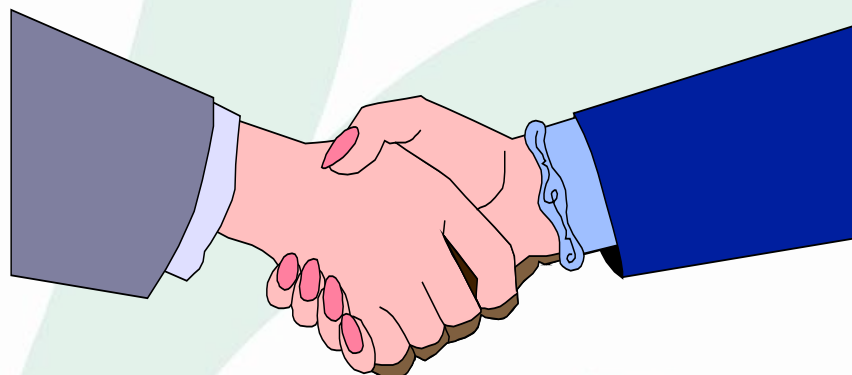
Research shows that Guangzhou, Zhongshan, Zhuhai, Hong Kong and Macao will be affected by the upstream salt tide in the dry season of a dry year or even an average year if sea level rises more than 100 mm. If sea level rises more than 300 mm, the return period of serious tide disasters in the coastal area of Guangdong Province will generally reduce by 50% to 60%; without tide-proofing facilities, according to the high water level of mean high tides, 48 offshore islands in the Pearl River Delta will be flooded; the growth of the coastal beach area in Guangdong Province will reduce by 23.3%.

Sea level rise will have adverse effects on regional planning and industrial layout, coastal typhoon and tide proofing, urban flood control and drainage, water supply security, homeland and sea security, coastal tourism resources, coastal protection engineering, critical infrastructure, land resource development and utilization, and ecological and environmental construction.

3 Comprehensive Analysis of the Vulnerability of the Impact of Sea Level Rise in Guangdong

Coasts in Guangdong Province are divided into 5 risk rating areas in comprehensive consideration of the range and impact scope of sea level rise, regional social and economic environments, strength of disaster-causing factors and regional disaster resistant capacity. High risk rating areas include Guangzhou City, Zhuhai City, coastal areas in Shantou City, coastal areas in the east of Zhanjiang City.





Thanks !