

Detection and Analysis of Coastline and Landuse Change from 1960 to 2012 in Pearl River Delta, China

Wang Jin (1,2), Wenfang Cao (3), Zhifeng Wu (4), Paolo Tarolli (3), and Peng Jia (5)

(1) Guangzhou Institute of Geochemistry, CAS, Guangzhou, China (455600350@qq.com), (2) University of Chinese Academy of Sciences, Beijing, China (455600350@qq.com), (3) University of Padova, Dept. of Land, Environment, Agriculture and Forestry, Legnaro (PD), Italy (wenfang.cao@studenti.unipd.it, paolo.tarolli@unipd.it), (4) School of Geographical Sciences, Guangzhou University, Guangzhou, Guangdong, China (gzuzwf@126.com), (5) University of Twente - ITC, Enschede, The Netherlands

Coastline is the sea-land demarcation line in coastal regions. The position and shape of coastline depends on various natural and anthropogenic factors. The change of coastline exerts obvious influence on environment and economy in coastal regions. Therefore, it is important to detect and analysis the change of coastline and landuse for coastal environment and sustainable development. Pearl River Delta (PRD) is one of the most prosperous and fastest growing regions in China. The coastline and landuse in PRD have changed remarkably and continuously during the past decades. In this research, the change of coastline and landuse during 1960 to 2012 was detected with RS and GIS. Furthermore, coastline characteristics of temporal and spatial variation were analyzed with quantitative and spatial approach. And the relationship between the changes of coastline and landuse was explored. Therefore, the impact that urban expansion brought to landscape in coastal zone could be quantitatively analyzed. Finally, local government management on coastal wetland was discussed. The main outcomes of this research are summarized in the following points:

- (1) The length of coastline in PRD increased from 1134.95km to 1508.02km with annul increasing speed of 7.17km/a. Relatively, the coastline changed more obvious in three period (2004~2006, 2006~2008 and 2008~2010).The annual average change rate of coastline in the three period were -3.45%, 2.85% and 2.98%, respectively. After 2010, the speed of coastline change in PRD became lower.
- (2) The coastline had a greater increasing amount in the cities of Zhuhai, Guangzhou and Shenzhen, where the length of coastline increased 60.81%, 22.00%and 19.71%, respectively.
- (3) Nansha in Guangzhou, south Zhuhai and Qianhai in Shenzhen gained more newly-added land than any other area in PRD. Their land area increased from 172.34km² to 303.22km², 344.70km² to 603.29km² and89.62km² to 145.49km², respectively.
- (4) In PRD, construction land expanded 33 times during 1960 to 2012. In the meanwhile, the area of forest and farm land decreased 47.53% and 56.70%, respectively.
- (5) The total area of newly-added land in PRD was 231.53km², where farm land accounted for61.07%. From 1979to 1990, the total area of newly-added land was 224.82km², where land for aquaculture accounted for 51.44%. From 1990 to 2000, the total area of newly-added land was 321.42km², where farmland and land for aquaculture accounted 61.07%. It can be known that the land demand for agricultural development was the key factor that changed coastline in PRD before 2000. From 2000 to 2012, the total area of newly-added land was 100.34km², where construction land accounted for 51.30%. Since 2000, Land demand for urban construction has been the key factor that changed coastline in PRD. In conclusion, human activities, including agricultural development and urban construction, largely resulted in the significant change of coastline in PRD.
- (6) Establishment of the natural conservation area and construction of wetland park were found to be both effective ways to protect coastal wetland. Otherwise it will gradually disappear under rapid process of urbanization.