# Pearl River Delta Comprehensive Regulation Planning

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# 1. Introduction

## 1.1 Common challenges that deltas face

1) Changes in local climate, hydrology and water environment

2) Sea-level rising, land subsidence and salt-water intrusion

3) Decreasing river water and sediment supply

4) Increasing urbanization

5) The rapid development of transportation network

6) Occurrence of a 'super storm' surge exceeding previous forecast

7) Occurrence of a 'super riverine flood ' exceeding previous forecast

8) The possibility of joint occurrence of such storm surge and river flood

9) Other influential processes (drivers)

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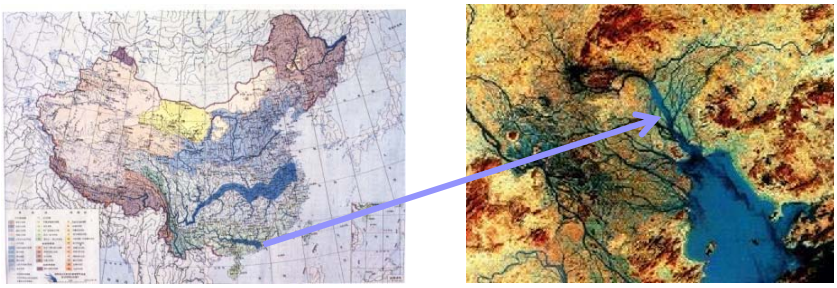
## 1.2 The Pearl River Delta



The Pearl River consists of Xijiang river, Beijiang river, Dongjiang river with a total catchment area of 440,000km$^2$. Its annual mean discharge is 312.4 billion m$^3$ and mean annual sediment discharge is 88.72 million t. The Pearl River Delta formed by these rivers is characteristics of netted channels and tributaries with eight mouths releasing river water and sediment into the South China sea. The channel-netted delta area is over 11,000 km$^2$ and mean altitude is 50 m or so above the mean sea level.

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## 2. The Pearl River Estuary Comprehensive Regulation Planning

To meet the rapid economic and social development of the delta region and deal with problems such as severe anti-flood pressures and salt-water intrusion, deteriorating water quality and ecological environment, over-exploitation of water, wetland, riverbed sand, shoreline resources, etc.

The State Council (China's Central Government) ratified the <Pearl River Estuary Comprehensive Regulation Planning> on October 11, 2010.

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## 2.1 Objectives

1) Strengthen the water-environment protection;

2) Ensure basin-wide, regional, local flood security and promote the sustainable utilization of water resources;

3) Ensure navigation waterways stable and improve the shipping conditions;

4) Rational utilization of wetland resources;

5) Push forward the faster and better basin-wide and delta socio-economic development.

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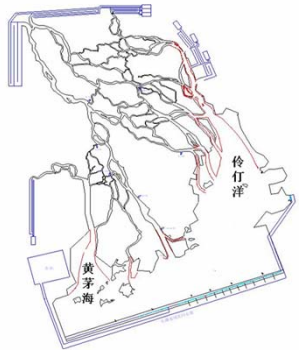
## 2.2 Major measures

### 1) Flood-guiding line management

- The flood-guiding line is the line to control water-related human activities aiming at guiding the mouth extension, stablizing the watercourses and reinforcing the passing capacity of river water and sediment into the sea. No engineering project is allowed to across the flood-guiding line.




A Physical model test to determine the flood-guiding line in the Pearl River estuary

Source: http://www.pearwater.gov.cn

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### 2) Flood discharging harness

- Engineering measures including dredging, clearing away of channel obstructions, building groins & dikes are taken to ensure 50-year-return-period floods to discharge into the sea smoothly.


Source: http://www.pearwater.gov.cn

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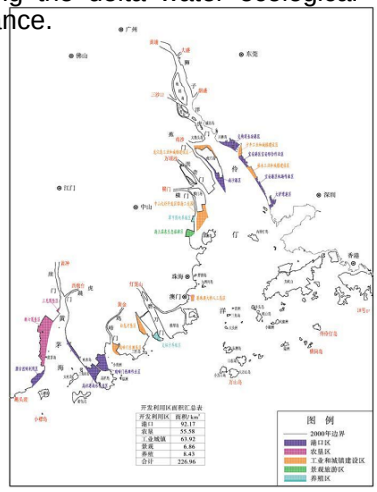
## 3) Water resource management and water function zone classification

- To implement strict water resource protection and pollutants releasing permit, aiming at improving the delta water ecological environment and water resource balance.

## 4) Shoreline and wetland resource management

- To protect the estuarine limited shoreline and wetland resources, and use them rationally to meet the requirement of rapid socio-economic development and nature conservation, such as port industry, agriculture, fishery, residence, recreation, landscape and biodiversity, etc.



Source: http://www.pearwater.gov.cn

Figure from Liang et al. (2001)

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## 5) Sand mining management

- To regulate sand mining activities in the delta river channels and estuarine area to stabilize the watercourse and flood propagation, safeguard dikes and levees.
- By licensing and charging management fee and mineral resource compensation.
- Has specified 1147.1 km sand-mining-permitable channels and 295 km sand-mining-prohibitive channels.

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Source: http://www.pearwater.gov.cn

## 2.3 Governance

### 1) Legal framework

- The Ministry of Water Resources was in charge of the formulation of the Planning by consulting involved Ministries such as Ministry of Transport, Ministry of Agriculture, Ministry of Environmental Protection, Ministry of Land and Resources, etc. Then the Planning was submitted to the State Council. Once the Planning is approved by the State Council it has become an administrative law.

### 2) Institutional structure

- As a dispatched institution of the Ministry of Water Resources, the Pearl River Water Resources Commission has the mandate to manage the water-related affairs in the whole catchment and delta region, under its leadership provincial, municipal, county-level water administrative bureaus to manage its own territory's water affairs, all water-related projects from various sectors must firstly get an approval from the water management authorities.

Source: http://www.pearwater.gov.cn



## 2.4 Strength and weakness

### Strengths

1) Emphasize the importance of flood-guiding-line control in regulating human activities in delta region.
2) Integrated regulating flood protection, water resources management, water environment (quality) protection, shoreline and wetland resources protection, nature conservation and sand mining management, etc
3) Reinforce the administrative management of water-related industry and other activities by issuing flood-protection-impact assessment, environmental-Impact assessment, water resource usage license, sand-mining permit, pollutant-releasing permit, etc.

### Weakness

1)Only focuses upon freshwater territory (The admistrative field of the Ministry of Water Resources). Therefore, no enough attention is paid to flood risk from storm surge.
2)Only short-term (i.e. till 2020) planning (lack of adaptivity and foresight)
3)Institutional coordination and cooperation needs improvement.

## 3. Concluding remarks

The core goal of the Pearl River Estuary (Delta) Comprehensive Regulation Planning is to ensure the fluvial floods to pass the delta channel network easily and smoothly into the sea, on this basis, to simultaneously implement strict water resource and ecological environment protection, harmonize the development, utilization and protection of navigation channel, wet land, riverbed sand, fishery, agriculture, etc.

The essence of the delta water management is the integrative manipulation of the delta water and sediment movement in a scientifically-sound, economically feasible & sustainable, environment-friendly, and foreseeing way. In so doing, correct understanding the basin-wide and delta hydrodynamic and morphodynamic processes under the climate change and intense anthropogenic intervention is a prerequisite.

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