



XVIII
World Water Congress
International Water Resources Association (IWRA)
Beijing, China | September 11-15, 2023



水利部珠江水利委员会
Pearl River Water Resources Commission of the Ministry of Water Resources

The drought prevention and water supply in Pearl River during 2021-2022 dry season

Department of flood and drought disaster prevention

Pearl River Water Resources Commission of the Ministry of Water Resources, Guangzhou, China

Sept. 2023

Beijing, China

Content

Introduction



Background



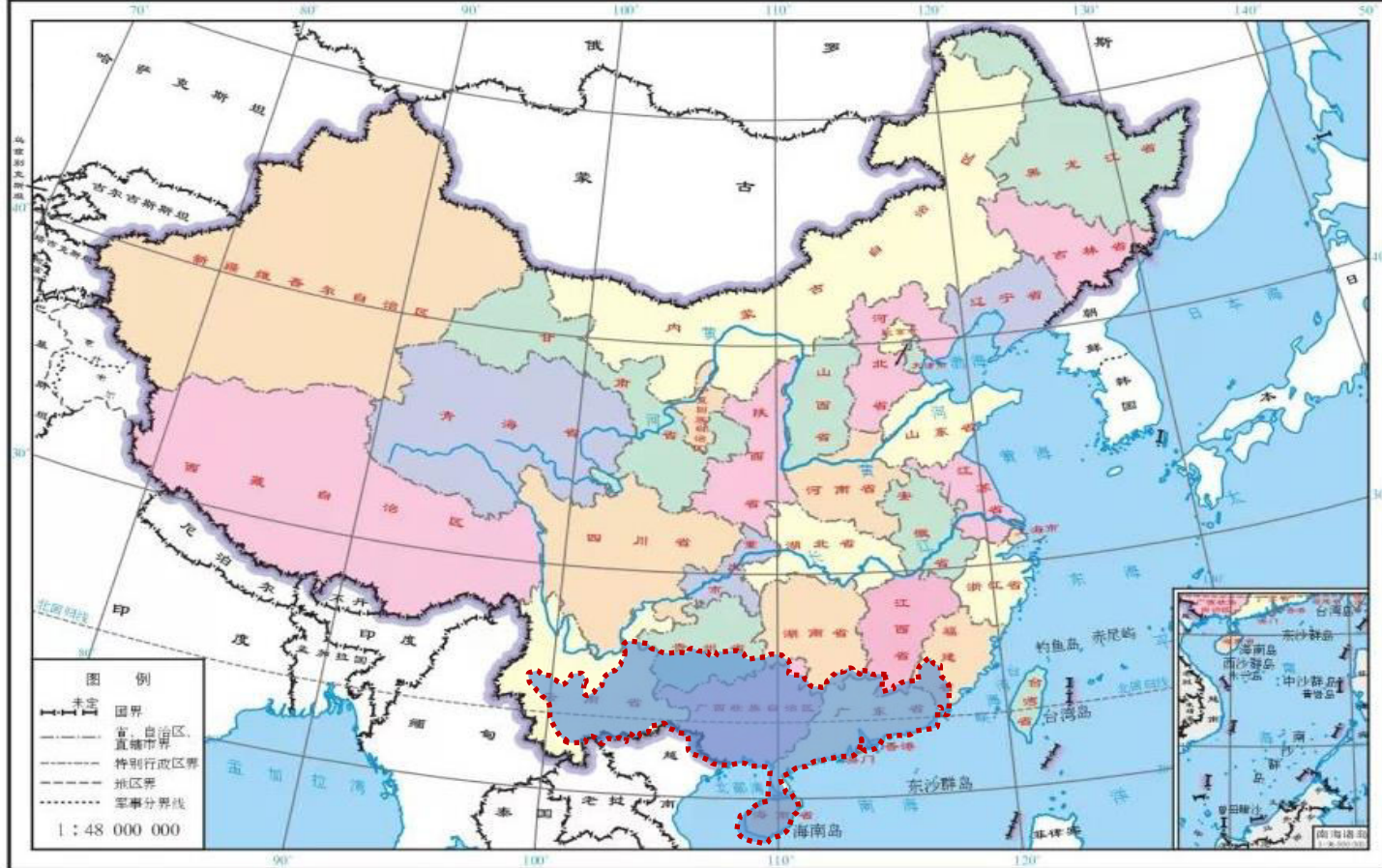
Strategies

1. Brief introduction of the Pearl River Basin

2. The characteristic of drought during 2021~2022 dry season

3. The practical methods for drought prevention

1.1 Pearl River Basin

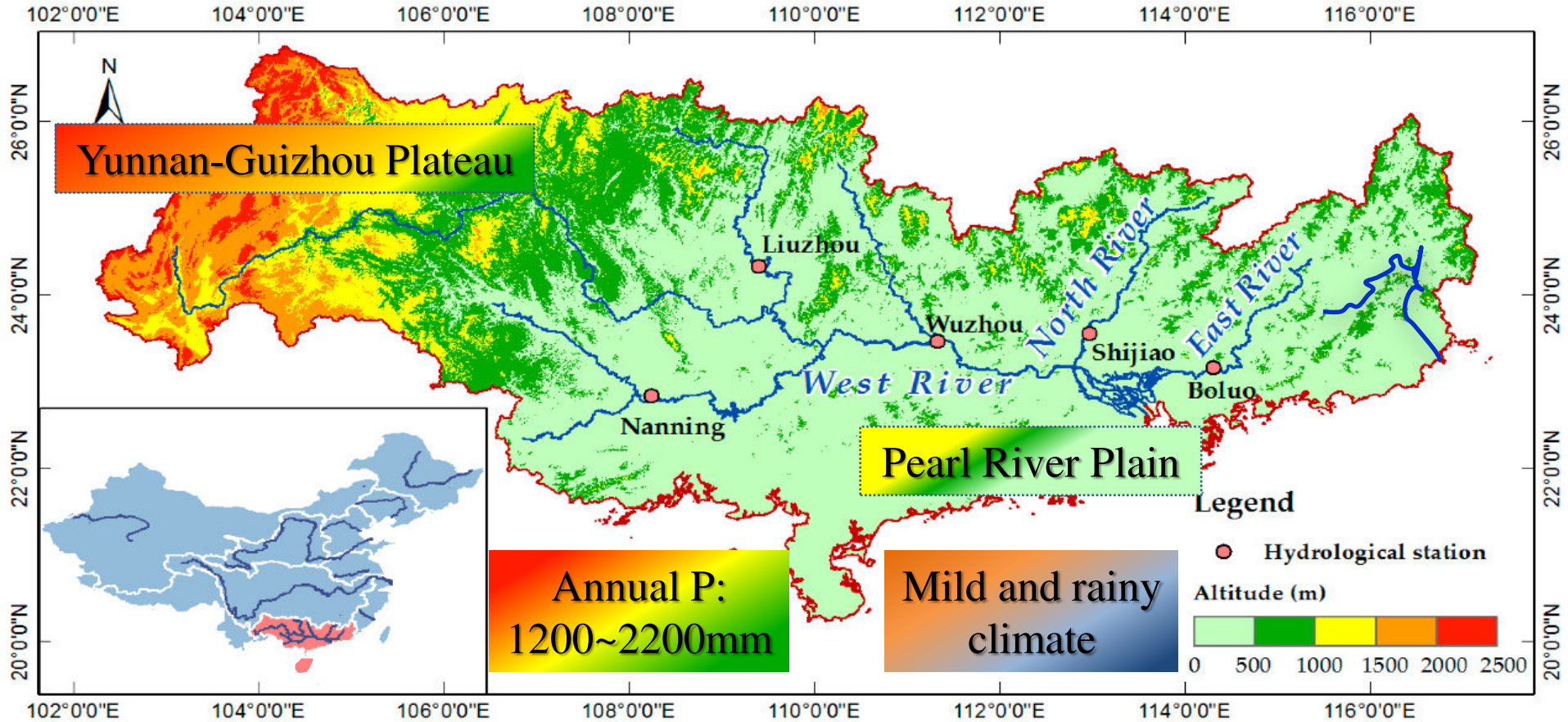


Located in the South of China

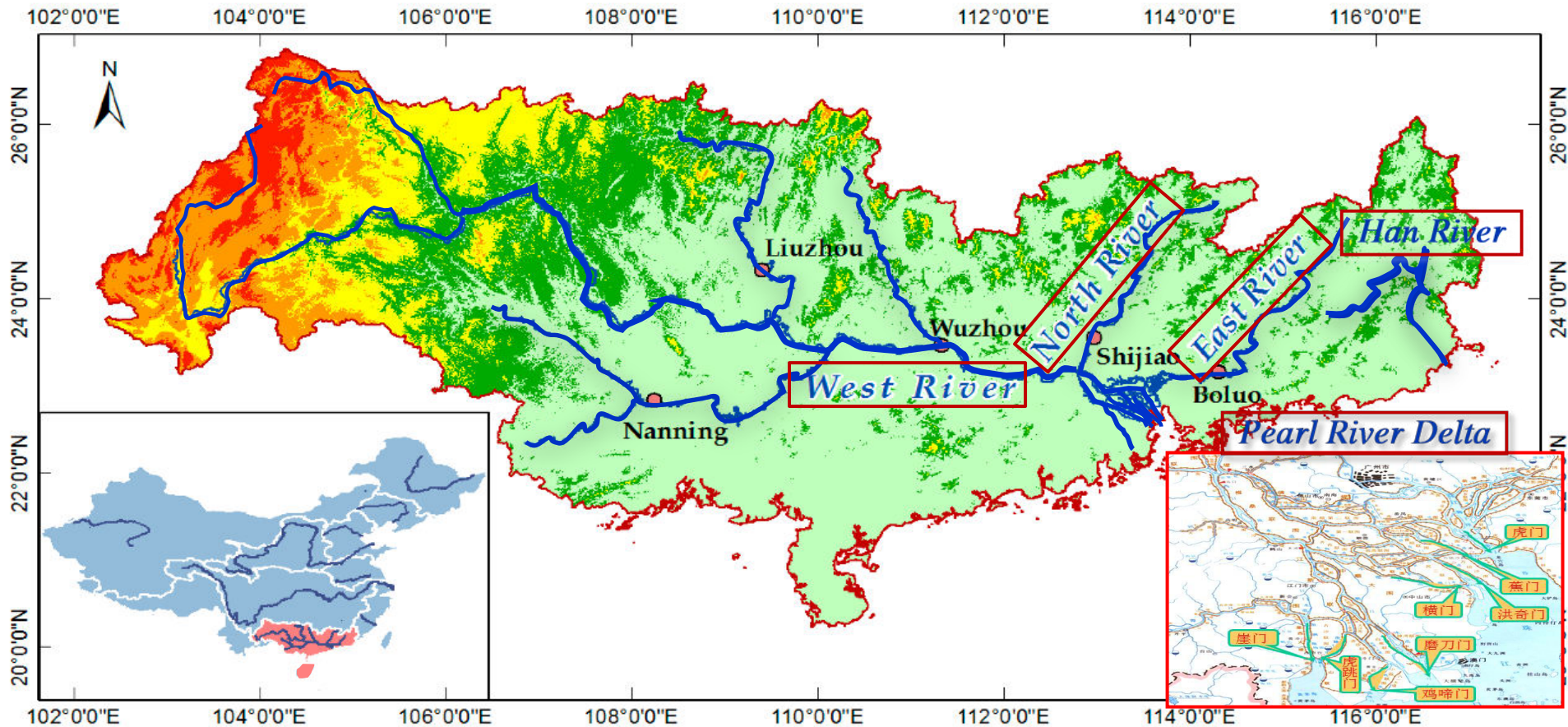
Long coastline

Population and GDP ranked top in China

1.3 Topography and climate



1.4 River system



1.2 Greater Bay Area



Guangdong-HongKong-Macao Greater Bay Area (GBA)

Population: >86 million;
GDP: **\$1.96 trillion** (2021), **1.84 times higher** than average per capita GDP;
GBA is one of the five popular Gulf Regions in the world.

1.4 River-reliance of water supply

Guangdong-HongKong-Macao Greater Bay Area (GBA)



Abundant rainfall in the PRB, while **uneven distributed** in the spatial and temporal; **80% annual rainfall** occurred during flood season; Water resource mainly **stored in the upstream reservoir**.

Since **the 21st century**, the water supply in Zhuhai, Zhongshan and Macao has been **seriously threatened** by the **continuous decrease of water inflow** in dry season and the **aggravation of saltwater tide**.



**water supply of GBA mainly
rely on river resource**

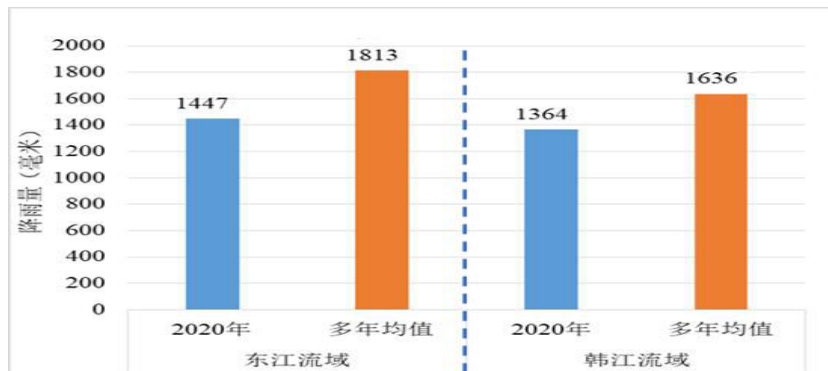
Water resource operation of key reservoirs in the upper Pearl River Basin has been implemented **since 2005**, basically guaranteed the water supply safety of GBA.

2. Drought during 2021~2022 dry season

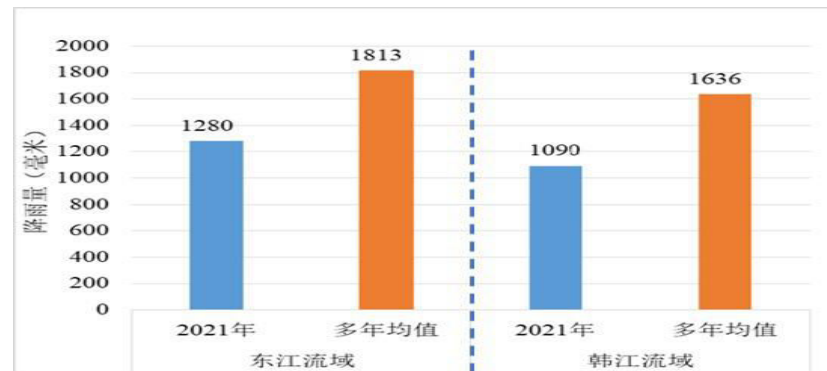
- in 2021, Affected by the frequent occurrence of **Extreme Climate** in recent years, the **East** and **Han** river in the PRB experienced **the most serious drought since 1961**.



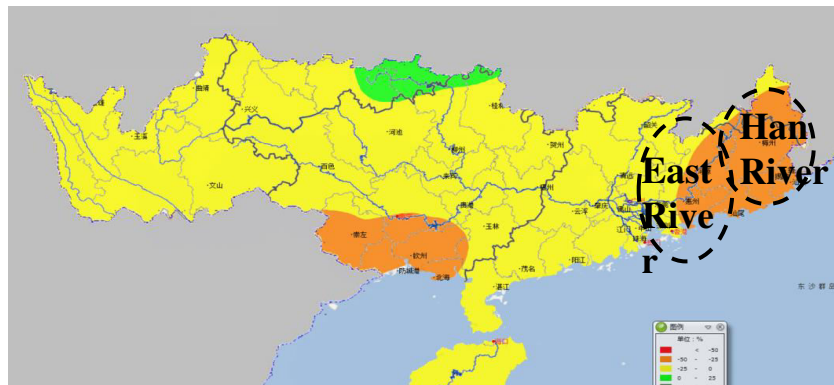
2.1 Rainfall: 70% less than average



Rainfall in 2020 with multi-year average



Rainfall in 2021 with multi-year average



Rainfall anomaly in Pearl river Basin in 2021

Since 2020, the Pearl River Basin, especially the East River and Han River, has experienced low rainfall for two years.

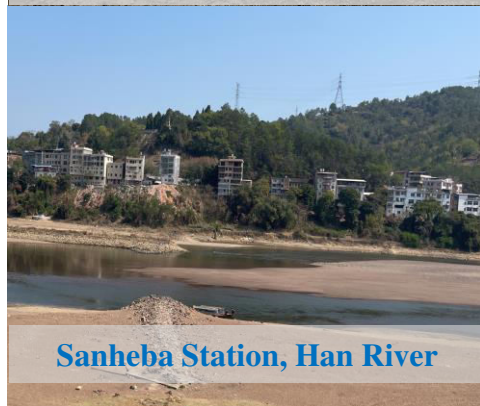
2.2 Inflow



Guilin station, West River



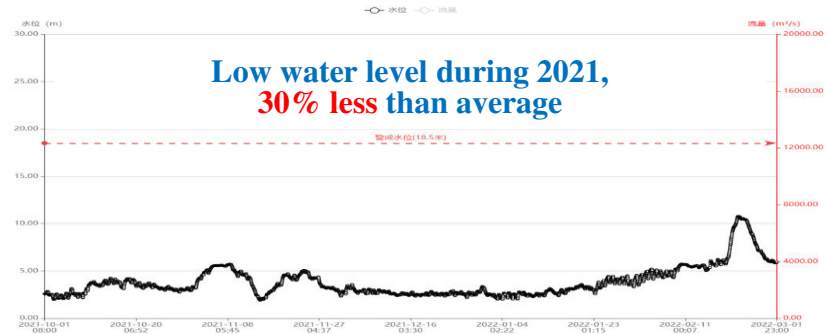
Liuhuang Station, East River



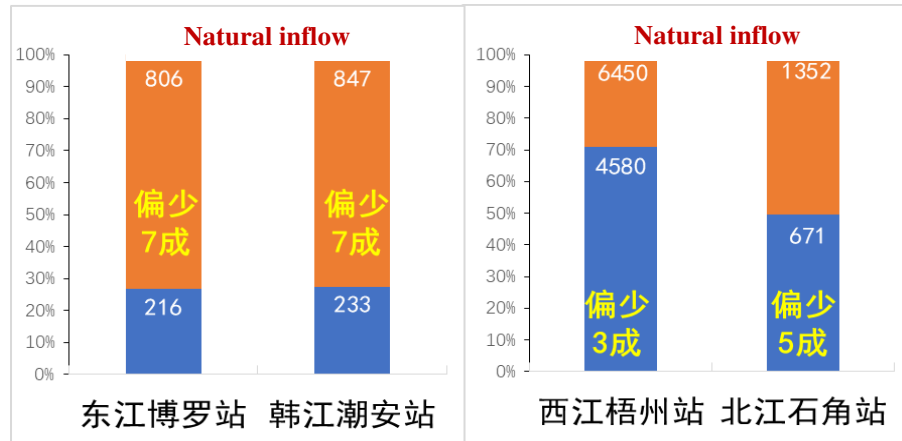
Sanheba Station, Han River



Emergency Water Intake Pump Station, GuangDong



Inflows of Wuzhou station in West river during 2021-2022 dry season

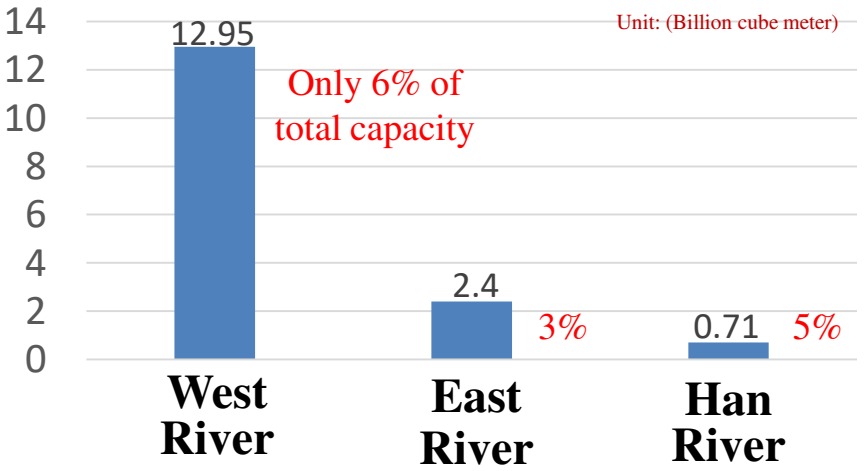


Inflow of main rivers in the PRB with multi-year average in 2021

2.3 Water storage

➤ In the autumn and winter of 2021, **drought continued to worsen** in Guangdong and Fujian

Water storage rate of crucial reservoirs in PRB at August 10, 2021



2.4 Active Saltwater Tides influence

➤ The occurrence of saltwater tides in the Modao Channel of the West River Delta, and in the East River Delta were the earliest since the monitoring records.



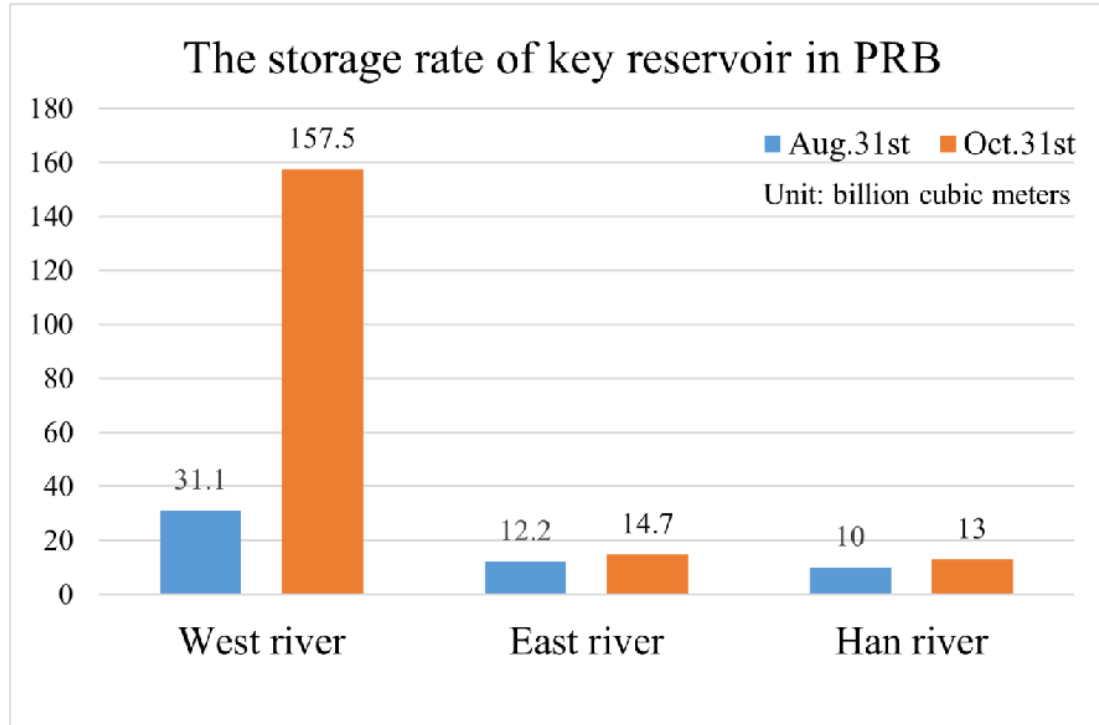
Saline water intrusion of West River Delta

3. The practical methods for drought prevention

- Faced with such a severe drought, if effective measures are not taken, the 2021~2022 dry season would face worse water supply situation, especially during the period of New Year's Day and the Spring Festival.



3.1 Impounding Water ahead before the end of the flood season



Raise the **flood control water level (FCWL)** of reservoirs to store more rain-flood resources

Negotiate with the power grid to reduce hydropower generation temporarily。

Reservoir storing water in advance at the end of 2021 flood season

3.2 Establish Three Defense Lines of water supply

龙滩水库

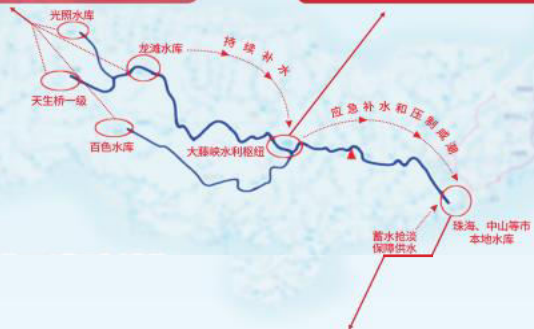


The third defense line

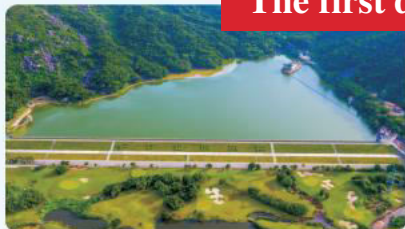
大藤峡水利枢纽



The second defense line



The first defense line



珠海竹仙洞水库



珠海竹银水库

➤ The Three Defense Line of West River

1. The first defense line (Local reservoirs):
Zhuyin reservoir and other Multi-reservoirs of
Zhuhai and Zhongshan

(for immediate water supply at local distance)

2. The second defense line (Middlestream
reservoir): Datengxia

(for urgent water supply from near distance)

3. The third defense line (Upstream reservoirs):
Tianyi, Guangzhao, Longtan, Baise

(for continuous water supply from far distance)

3.2 Establish Three Defense Lines of water supply

➤ The Three Defense Line of East River

1. Downstream reservoir: **Shenzhen**;
2. Middlestream reservoir: **Jiantan**;
3. Upstream reservoir: **Xinfengjiang**.

东江流域“三道防线”示意图

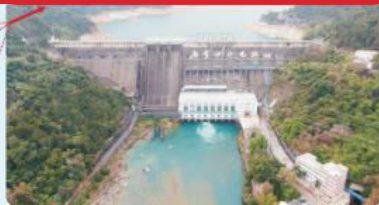
剑潭水利枢纽



The second defense line



The third defense line



新丰江水库

The first defense line



深圳水库

韩江流域“三道防线”示意图

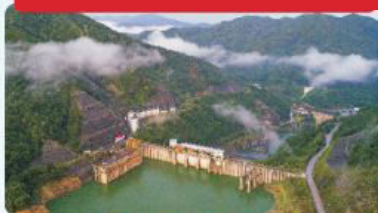
示意图

高陂水利枢纽



The second defense line

The third defense line



韩江棉花滩水库

The first defense line

➤ The Three Defense Line of Han River

1. Downstream reservoir: **Chaozhou**;
2. Middlestream reservoir: **Gaobei**;
3. Upstream reservoirs: **Mianhuatan**.

3.3 Three urgent reservoir operations



Xinfengjiang for urgent water supply

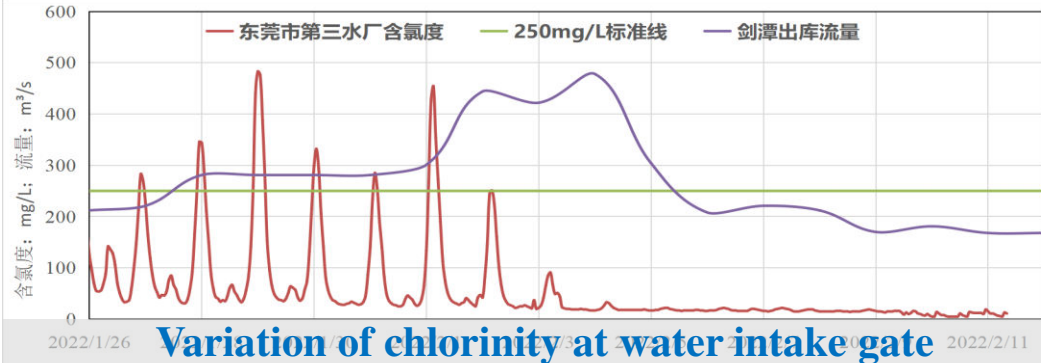
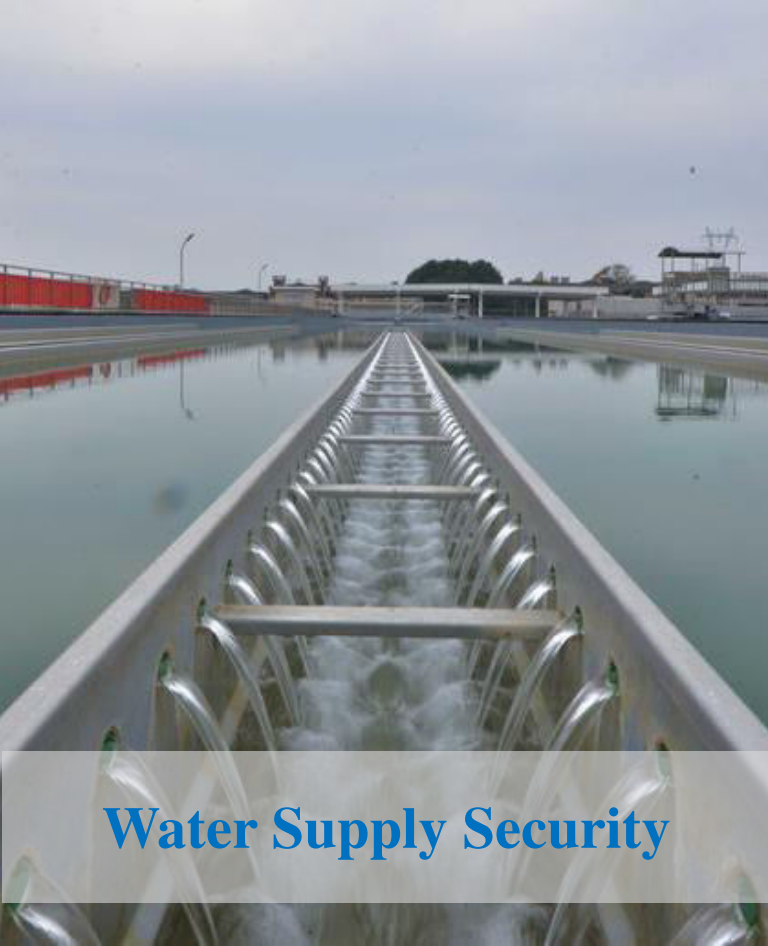


Datengxia for urgent water supply

- During the periods of New Year's Day, the Spring Festival and the Lantern Festival, three emergent operations of **upstream reservoir** for **saltwater tides suppression** were implemented, which effectively **guaranteed the water supply safety** of GBA.



Conclusion——A win-win situation



Water Supply Security

Generate
More
Electricity

Navigation
safety
Guarantee

Agricultural
Irrigation
Safety



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Thanks for your attention!

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