

# Introduction to Flood Control and Management in Changjiang River Basin

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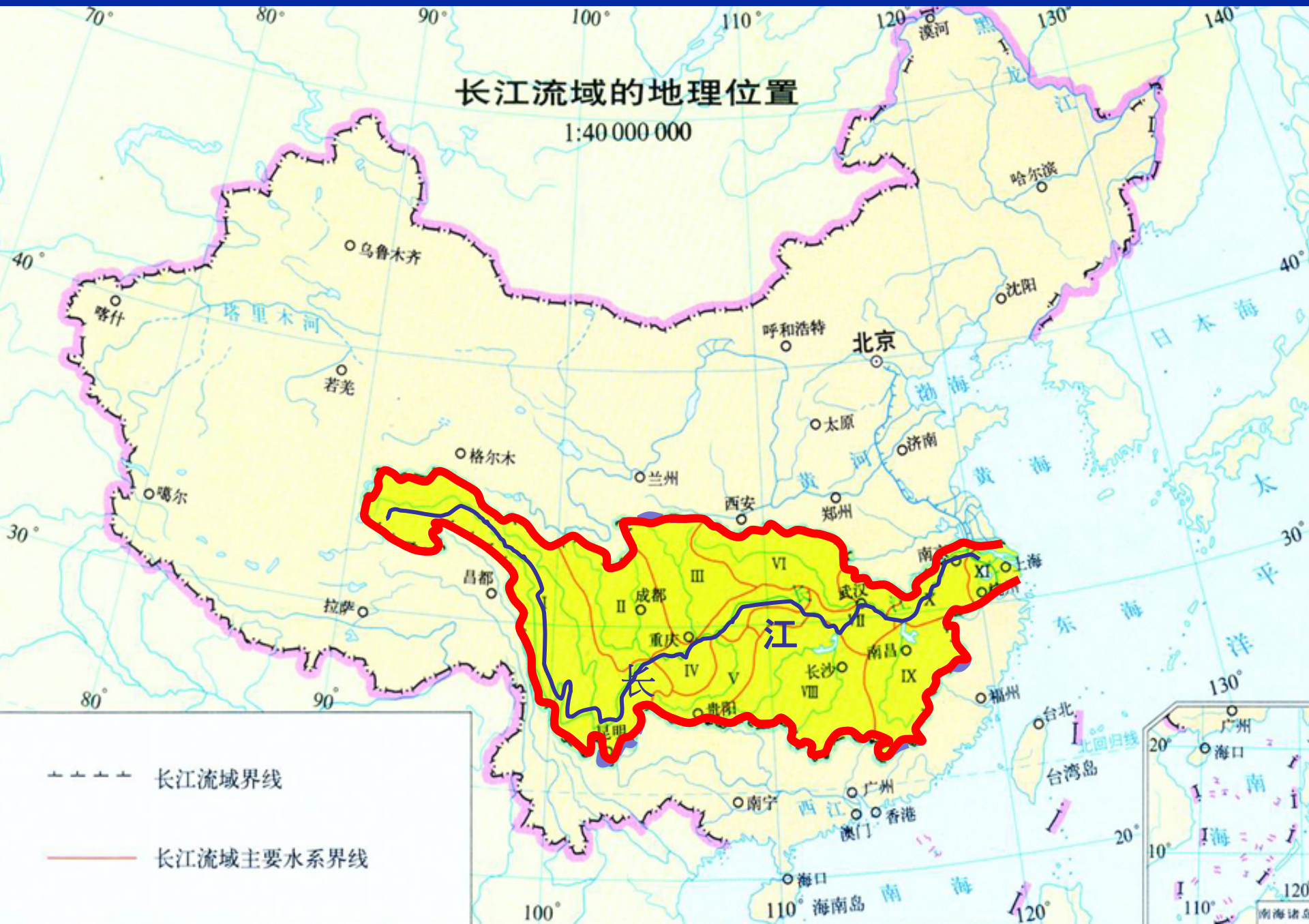
**Oct. 2014**

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# 长江流域的地理位置

1:40 000 000





**Changjiang River Basin is higher in the west and lower in the east through 3 stages of Chinese terrains.**

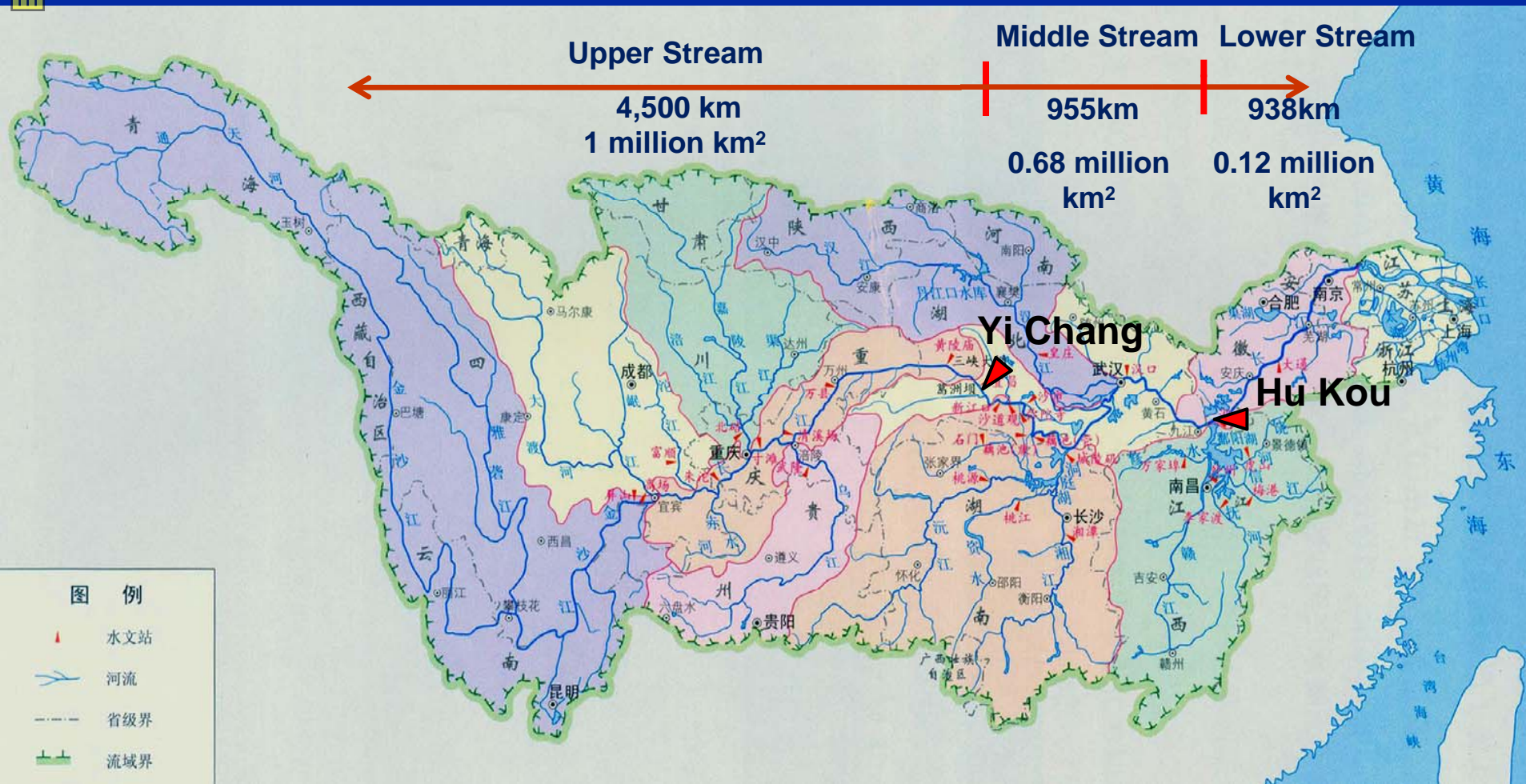
1<sup>st</sup> stage  
EL 3,500 to 5,000m

3<sup>rd</sup> stage  
Lower than 500m

2<sup>nd</sup> stage  
EL 500 to 2,000m



**Mean annual precipitation is about 1100mm, of which rainfall occupied in Summer and Fall seasons.**



Changjiang River has many tributaries, including **8 tributaries** with drainage area of more than **80,000 km<sup>2</sup>**.

The River Basin involve 19 provinces, and the main stream flow through 11 provinces.



**Flood in Changjiang River is storm flood.**



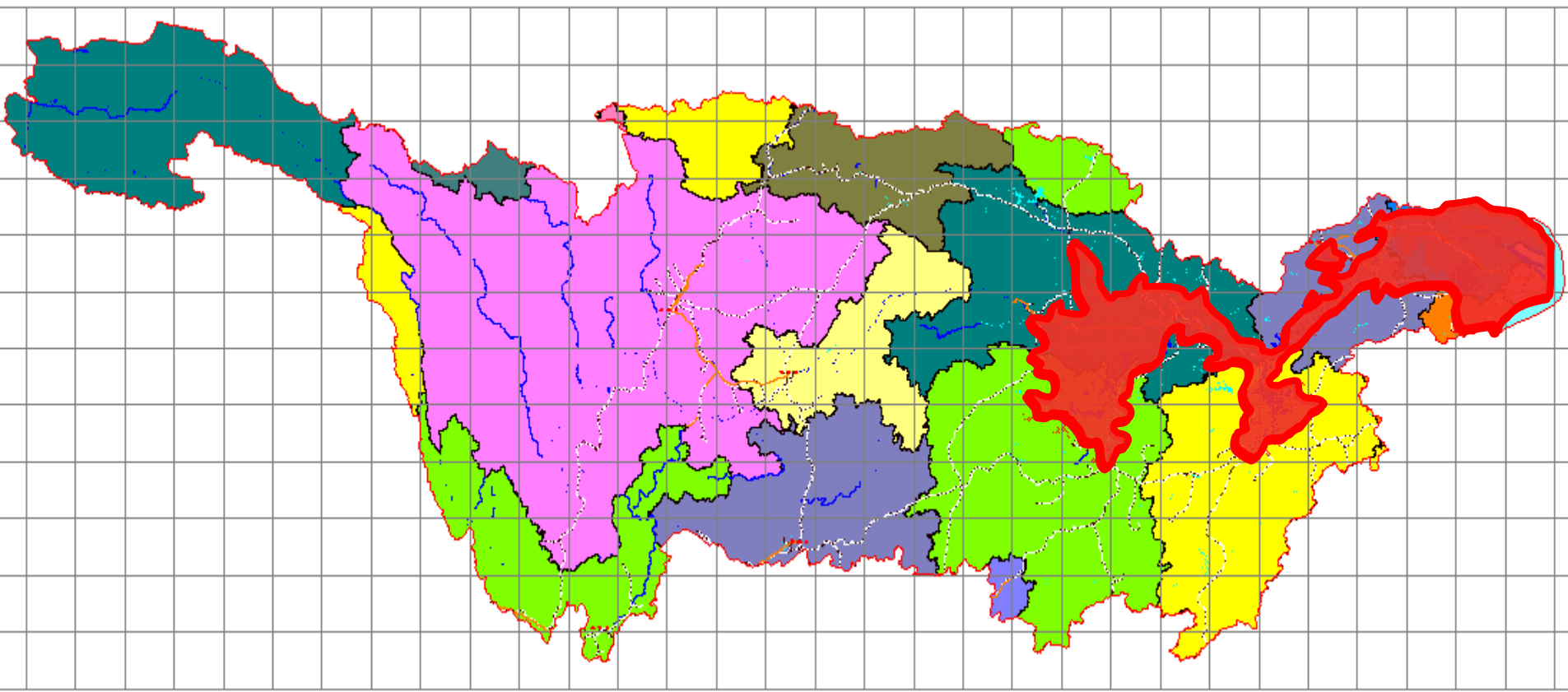
The flood of upper rivers are interlaced at the upper reach, forming the flood with sharp and slim ridge type. The gathered flood above Yichang will reach Yichang one after another, so that, **the flood in Yichang is characteristic of large volume with high peak and long duration.** The flood process in one flood will last for 7 to 10 days in short, or longer than 1 month in long duration.





The flood hydrograph shall rise gradually, and after reaching the peak, it will fall slowly, the process is very slow. However, if it encounters the flood of one tributary, it will happen to rise again in partial regions and form a continuous flood with multiple peaks, and **the flood process will generally last for 30 to 60 days once.**





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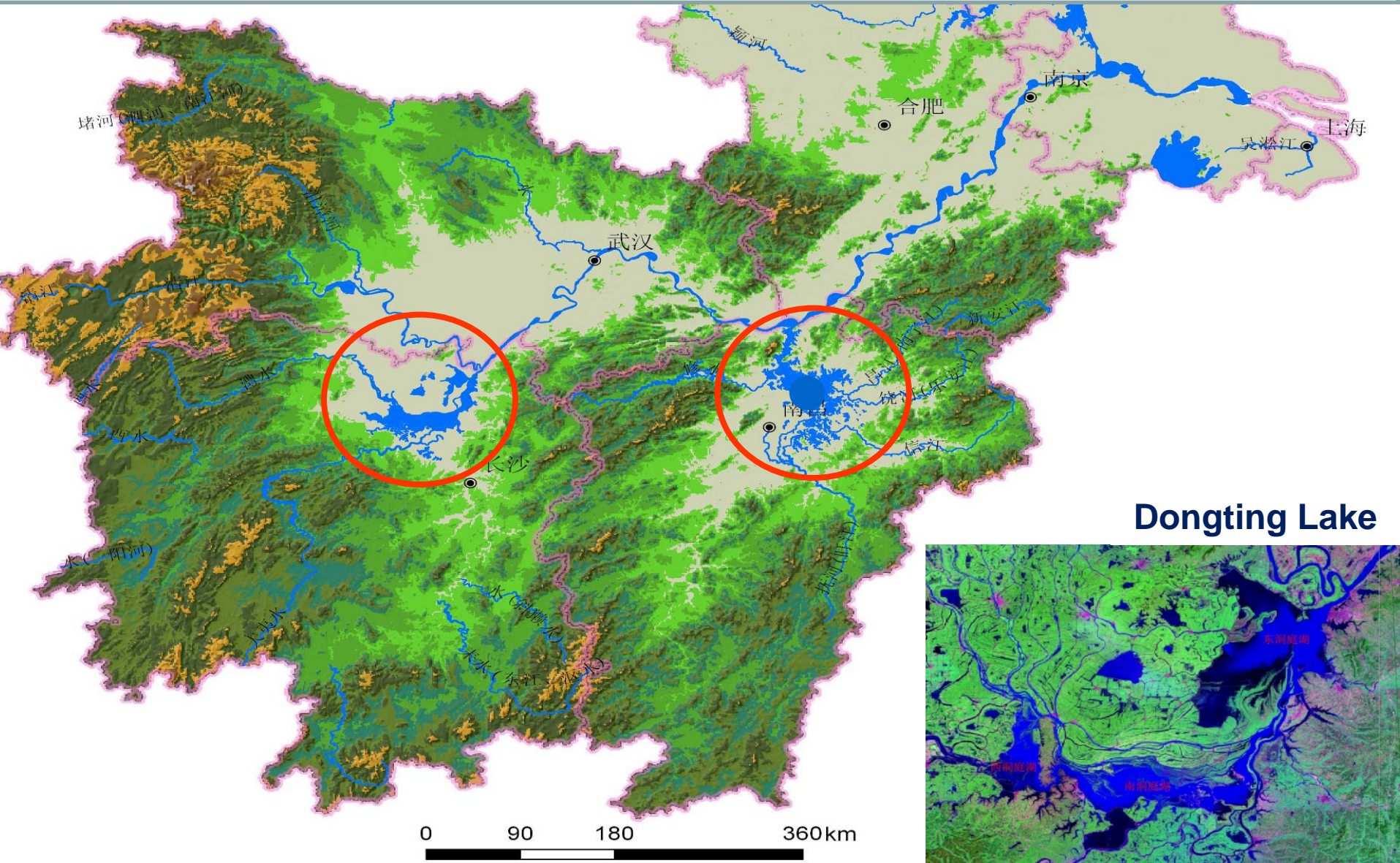
3. Master Plan of Flood Management

➤ In fact, riverways and lakes in the middle and lower reaches have a big flood discharge capacity and storage capacity.





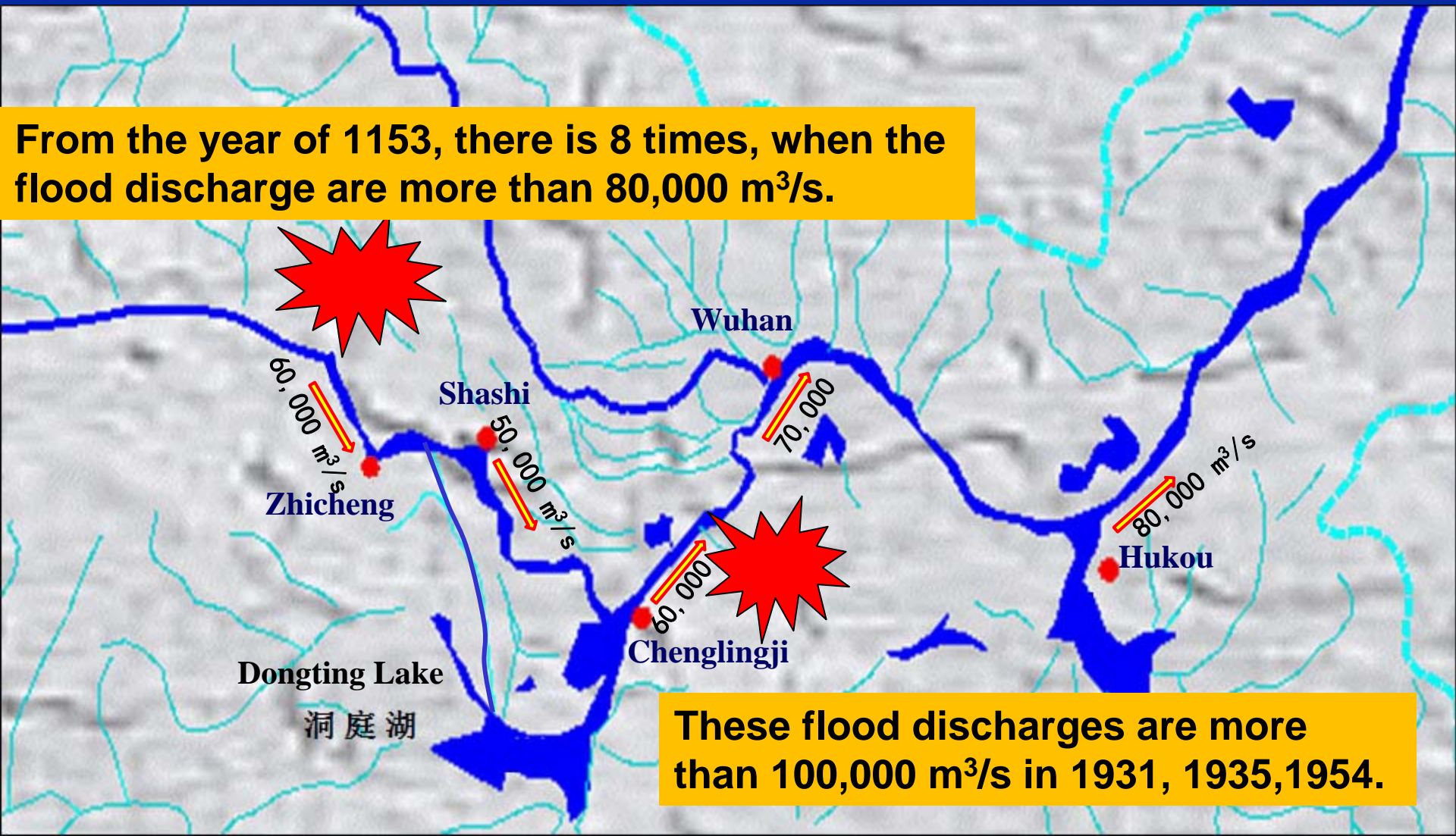
The Dongting Lake and Poyang Lake are connected with Changjiang River. The storage capacity of Dongting Lake is 16.7 billion m<sup>3</sup>, water surface is 2,625km<sup>2</sup>, and the storage capacity of Poyang Lake is 30.3 billion m<sup>3</sup>, water surface is 3,708km<sup>2</sup>.





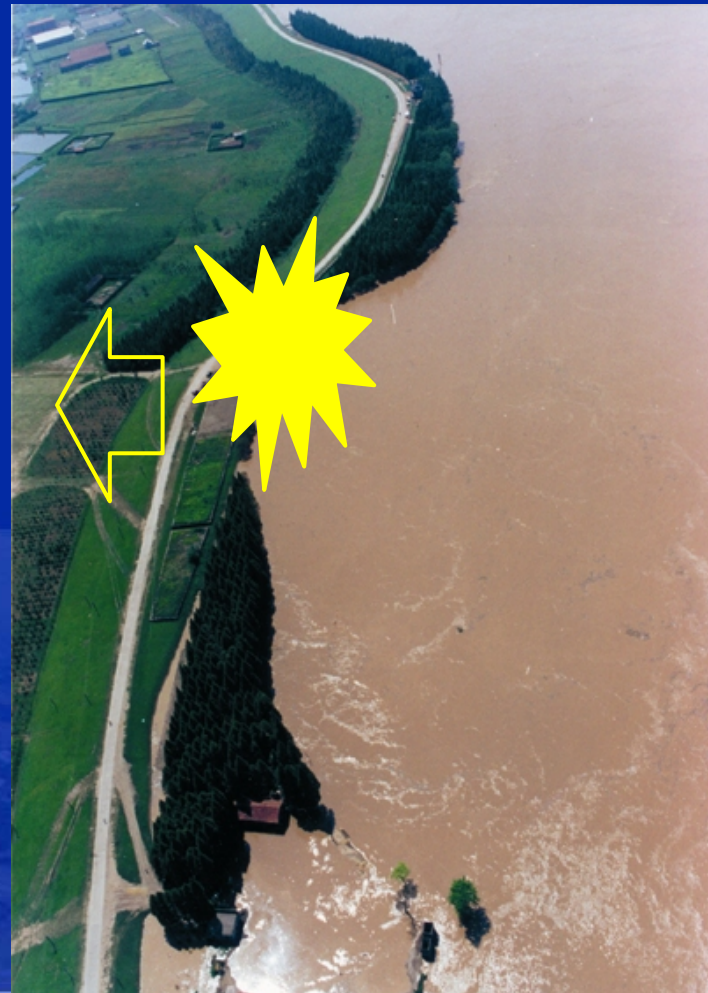
➤ But, the flood discharge capacity & storage capacity is still not enough.

From the year of 1153, there is 8 times, when the flood discharge are more than 80,000 m<sup>3</sup>/s.



These flood discharges are more than 100,000 m<sup>3</sup>/s in 1931, 1935, 1954.

- **Once dikes are burst, it will be a disaster, there is huge damages including many people death with a long period.**





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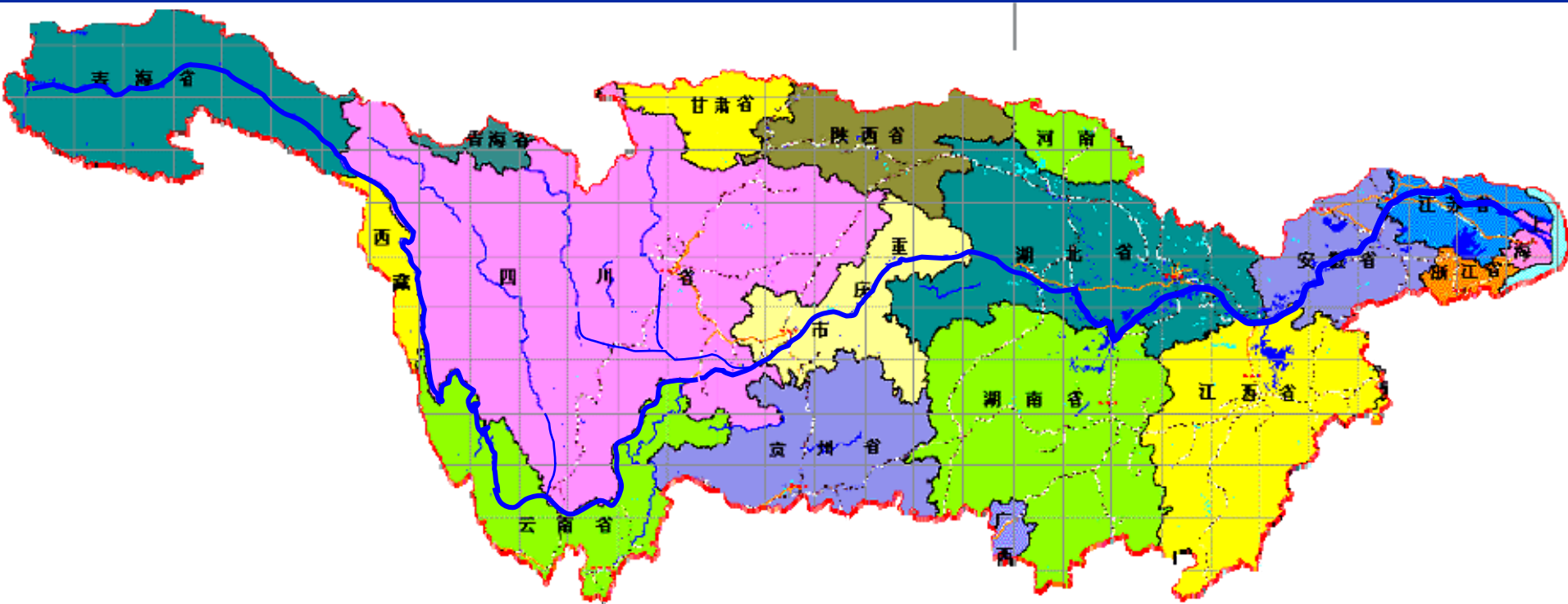
1. Overview of Flood

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# 1 Principles

- ◆ Discharge Concerned with the balance of Storage and Discharge
- ◆ Protection to rivers and lakes, Concerning two-bank areas, Coordinating upper, middle and lower reaches



## 2 Flood Control Standards

According to flood history and economic status in middle and lower stream area, the flood of 1954 is concerned as flood control standards, because this flood is the max flood since 20<sup>th</sup> century.

<b>The Flood of 1954</b>		<b>Value</b>	<b>Return-period</b>
Yichang	discharge	66,800	About 10 year
	30 days volume	138.6	About 100 year
Wuhan	30 days volume	218.2	About 200 year
	60 days volume	383.0	About 200 year

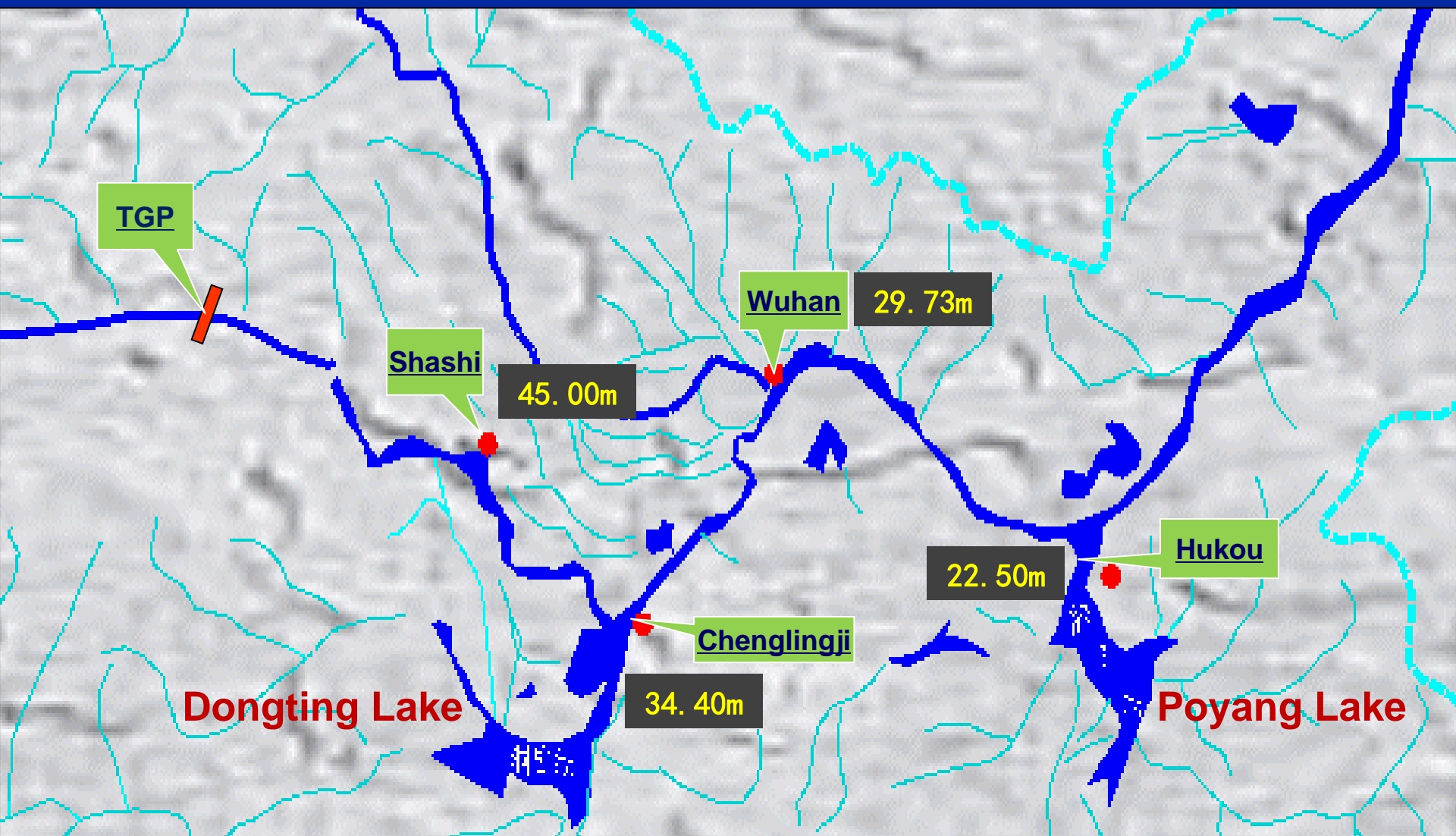
Discharge: m<sup>3</sup>/s; Volume: bil m<sup>3</sup>



### 3 Planning Schemes

- **30,000 km long dikes** (including construction in main stream and tributaries)
- **Reservoirs construction**
- **Flood detention and retention zones, 50 billion m<sup>3</sup>**
- **Riverway regulation**
- **Water and soil conservation**
- **Non-engineering Measures**

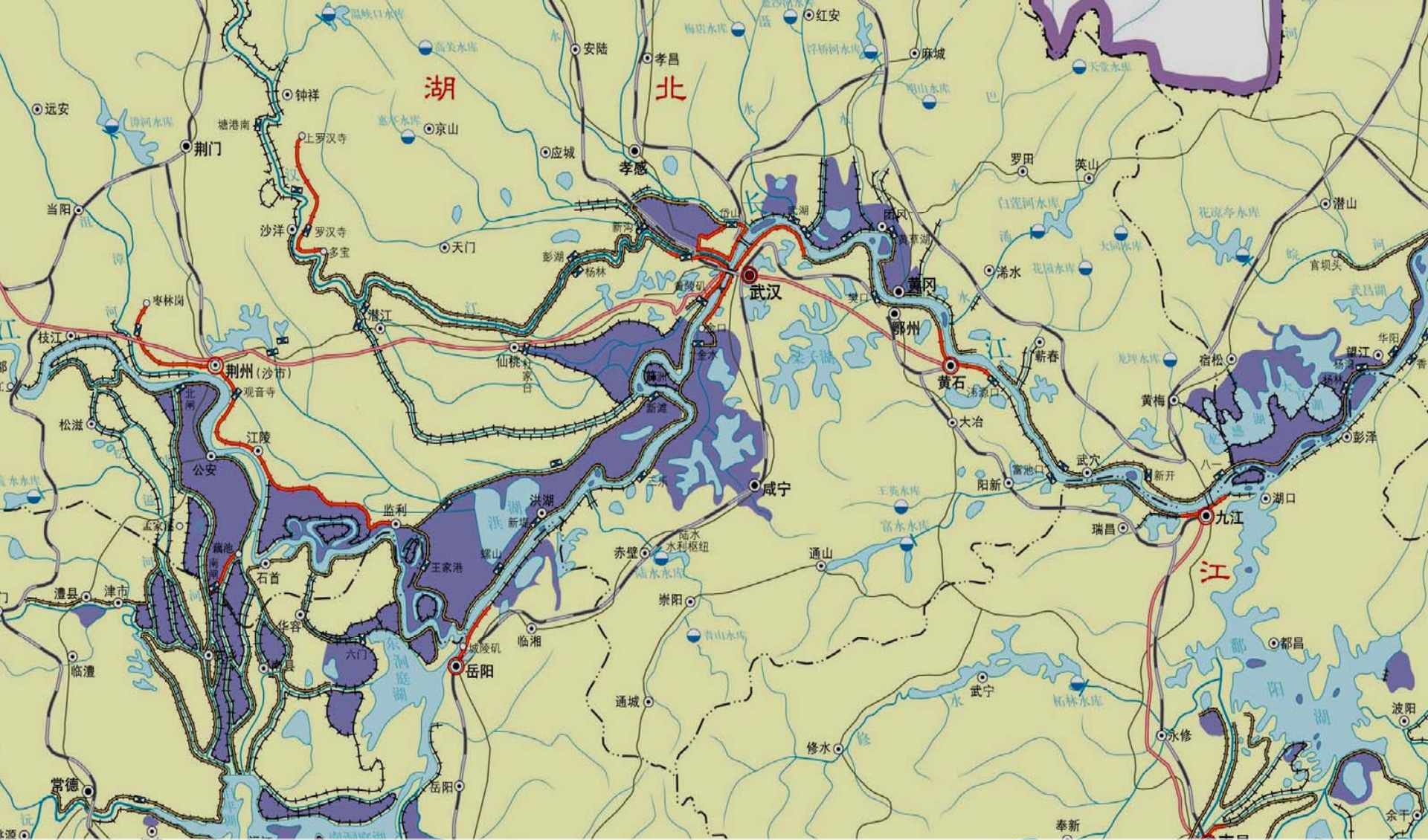
# Water level for flood control



TGP is backbone project for flood control of Changjiang River, catchment area is 1 million km<sup>2</sup>, flood control capacity is 22.15 billion m<sup>3</sup>. Then this project improve the flood standard of Jingjiang river-section, better flood situation of middle and lower stream of Changjiang River.

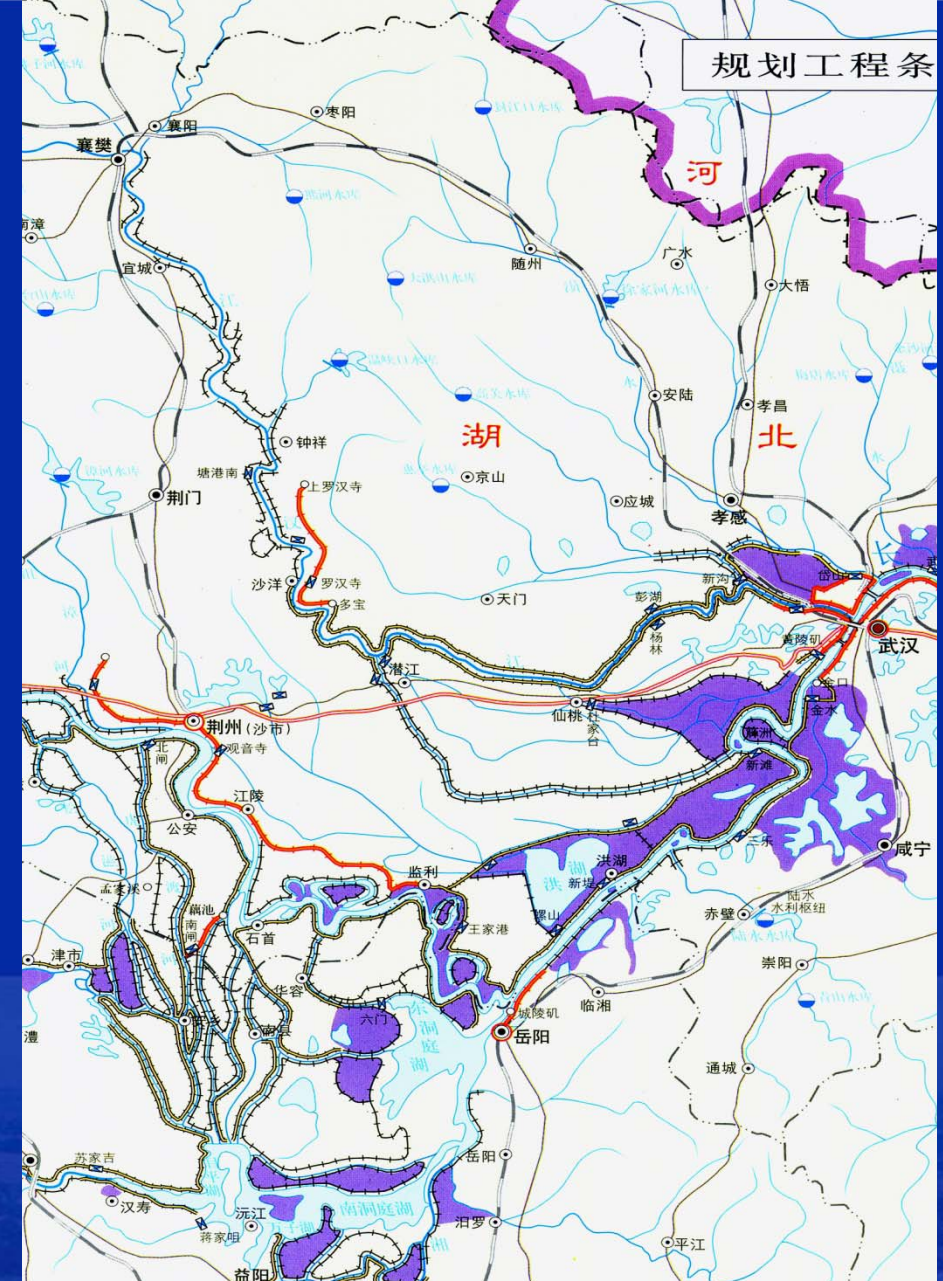
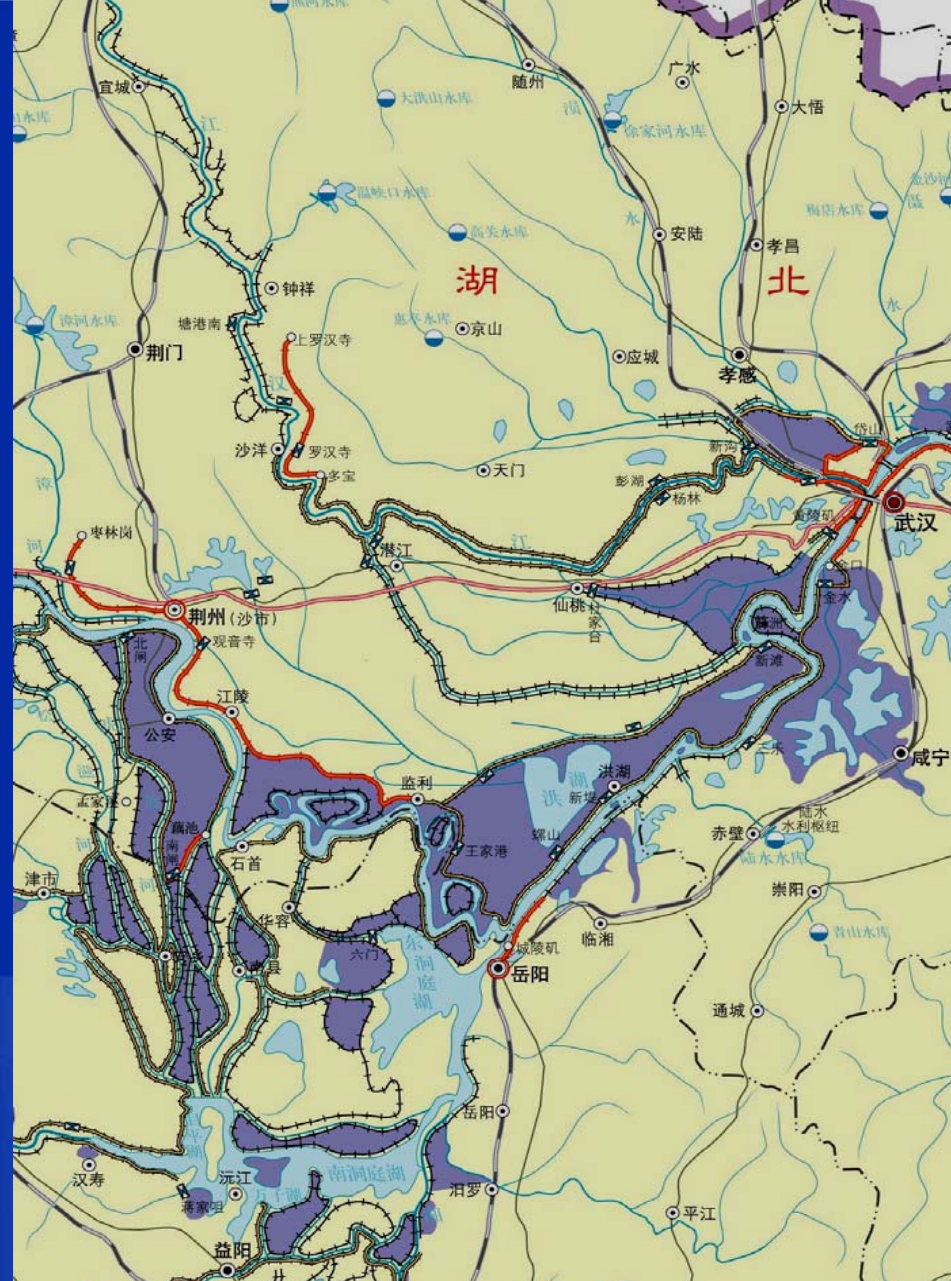






Before TGP construction, if the flood happened like 1954 year, 49.2 billion m<sup>3</sup> flood volume should be restored in middle and lower stream (5.4 billion m<sup>3</sup> in Jingjiang area, 32 billion m<sup>3</sup> in Chenglingji area , 6.8 billion m<sup>3</sup> in Wuhan area, 5 billion m<sup>3</sup> in Hukou area.)





**However, after TGP construction, if the flood happened like 1954 year, flood storage area decrease.**







◆ **The similarity of the Lanchang-Mekong River and the Changjiang River flood control characteristics:**

- **Flood cause similar**
- **The river discharge capacity and Lake flood storage capacity are large**
- **Important cities located in both sides of the river.**

◆ **Principle of Mekong River flood control for reference :**

- **Concerned with the balance of Discharge and Storage**
- **Concerning two-bank areas, Coordinating upper, middle and lower reaches**

## ◆ The Planning Schemes :

### Engineering and Non-engineering Measures

- Two reservoirs , namely Xiaowan and Nuozhadu, are with capacity for inter-annual regulation on runoff.



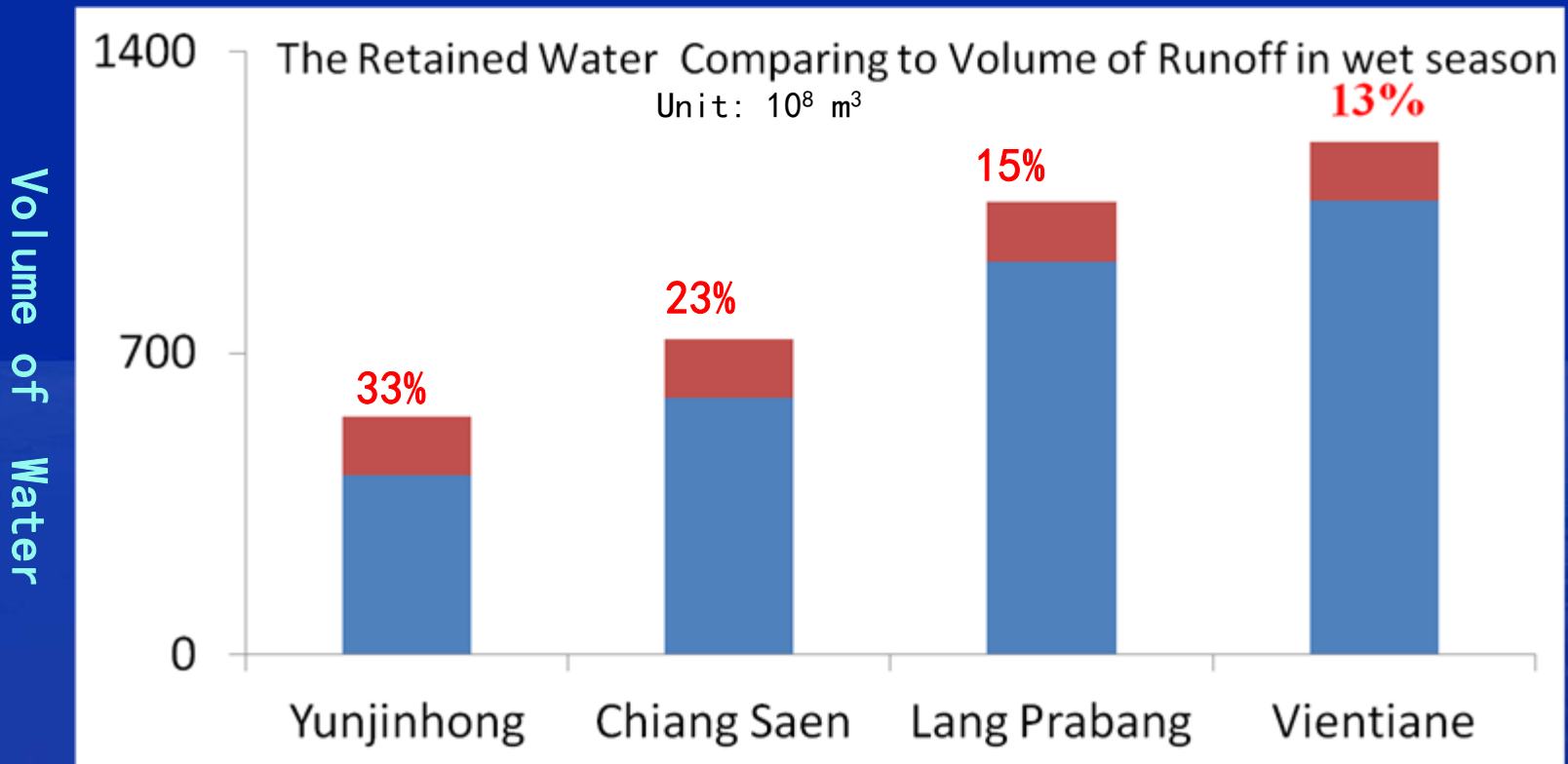
**Xiaowan hydropower Station**



**Nuozhadu hydropower Station**

- The storage capacity of total cascade reservoirs in Lanchang river is still small, especially comparing to annual runoff of the whole basin.

- In wet season, scientific operation on cascade reservoirs in Lanchang river could retain and store about 13 billion m<sup>3</sup> of flood in the long term average level.
- The water level from Chiang Saen to Vientiane section will decrease about 1 m averagely during July to August.





➤ In dry season, scientific operation on cascade reservoirs in Lanchang river could raise water level through increasing discharge, which will benefit water supply and navigation.

➤ Based simulation results, the water level from Chiang Saen to Vientiane could be raised about 1 m on average during dry season.

➤ However, the effect of cascade reservoirs operation will be weakened rapidly due to contributed from downstream tributaries.



**Thanks !**