



Study on Hydrological Forecast Scheme for Water Replenishment Regulation of Longtan Reservoir in the Xijiang River Basin

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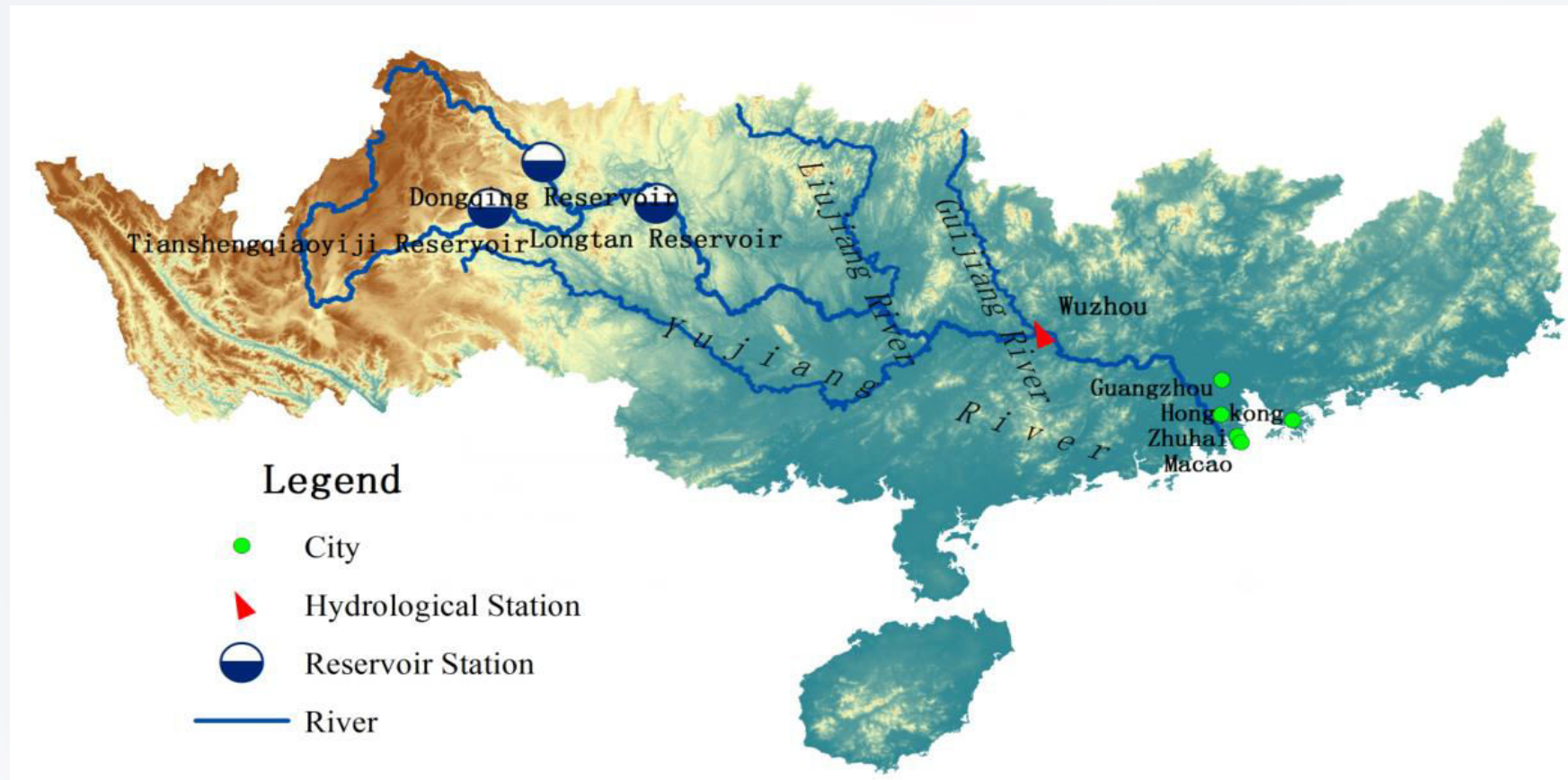
Bureau of Hydrology of Pearl River Water Resources Commission

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River system:

- ◆ Xijiang River is the main tributary of the Pearl River Basin.
- ◆ The Pearl River Delta is close to the South China Sea, making it susceptible to saltwater exposure.



Problem:

- ◆ Persistent water shortages in the Pearl River basin and changes in the river system have caused severe salt tides in the Pearl River Delta during winter and spring.
- ◆ Water supplies in cities such as Macao, Guangzhou, Zhuhai, and Zhongshan have exceeded acceptable salinity levels.

Solution:

- ◆ Managing water resources in the basin and using runoff to control saltwater intrusion.
- ◆ This study aims to improve the utilization of flood resources in Longtan Reservoir and address the problem of insufficient hydrological forecasting support capacity in reservoir operations.

记者昨日获悉,珠海、中山受咸潮影响较大。到目前为止,珠海已经连续 35 天抽不到达标水,主要取水口含氯度也出现了历史的最高记录,达到 1 万毫克/升,最低的含氯度也超过 3000 毫克/升;同时,由于珠海的经济发展,目前珠海每天的用水量与去年同比增加了 10 万吨。因此,本次珠海的供水形势比较紧张。

目前,珠海全市已经将局部供水咸度上限值调至 800 度,紧急启动供水应急预案第三级,政府实行强制性节约用水,特种行业限制甚至停止供水。珠海、中山市水务局相关负责人昨天均表示,将全力以赴配合此次上游压咸工作,力保珠海、澳门、中山等地人民春节期间正常用水。

政府应对篇

绿化、环卫 改用循环水

珠海:暂停小区公共用水

日前,珠海市政府发出公告,要求香洲区范围内的绿化、园林、环卫等行业改用污水处理厂出厂水。珠海市建设局也发出通知,为确保全市生产生活用水供应,近期暂停珠海各小区内的公共用水,如公共泳池、景观喷等项目等。

珠海市建设局表示,如果出现小区居民基本生活用水难以保证的情况,可联系消防部门用消防车向小区物业供水。同时要求各物业管理企业加强宣传,提倡市民节约用水并鼓励饮用桶装水,共同应对目前供水的严峻形势。

另外,各物业管理企业立即采取各项节水措施,在确保设备设施安全、植物生长基本正常的情况下,近期暂停小区内的公共用水,各小区、停车场的清洗应视情况控制,不能因节日临近增加。

中山:加大力度供水

中山市供水公司透露,面对历时持久的这次咸潮,市供水公司正在采取有力措施及时调度保证城区供水。

日前,长江水库的蓄水量达 2312 万立方米。根据其调度运用计划分析,假若 2006 年出现降雨量偏少或咸潮来袭的情况,长江水库可完全满足市供水公司今年计划取水 1460 万~1825 万立方米的需求。

与此同时,大水车厂清水池进行了扩建,扩建后其调蓄容积增加了 1 万立方米,遭遇咸潮时可延长供水时间。东升至沙港公路 DN800 连通管工程已把城区的管网与东升水厂连接起来,至升水厂目前正在全力向城区,特别是西区“支援”供水。

市民应对篇

山泉水受宠 取水现长龙

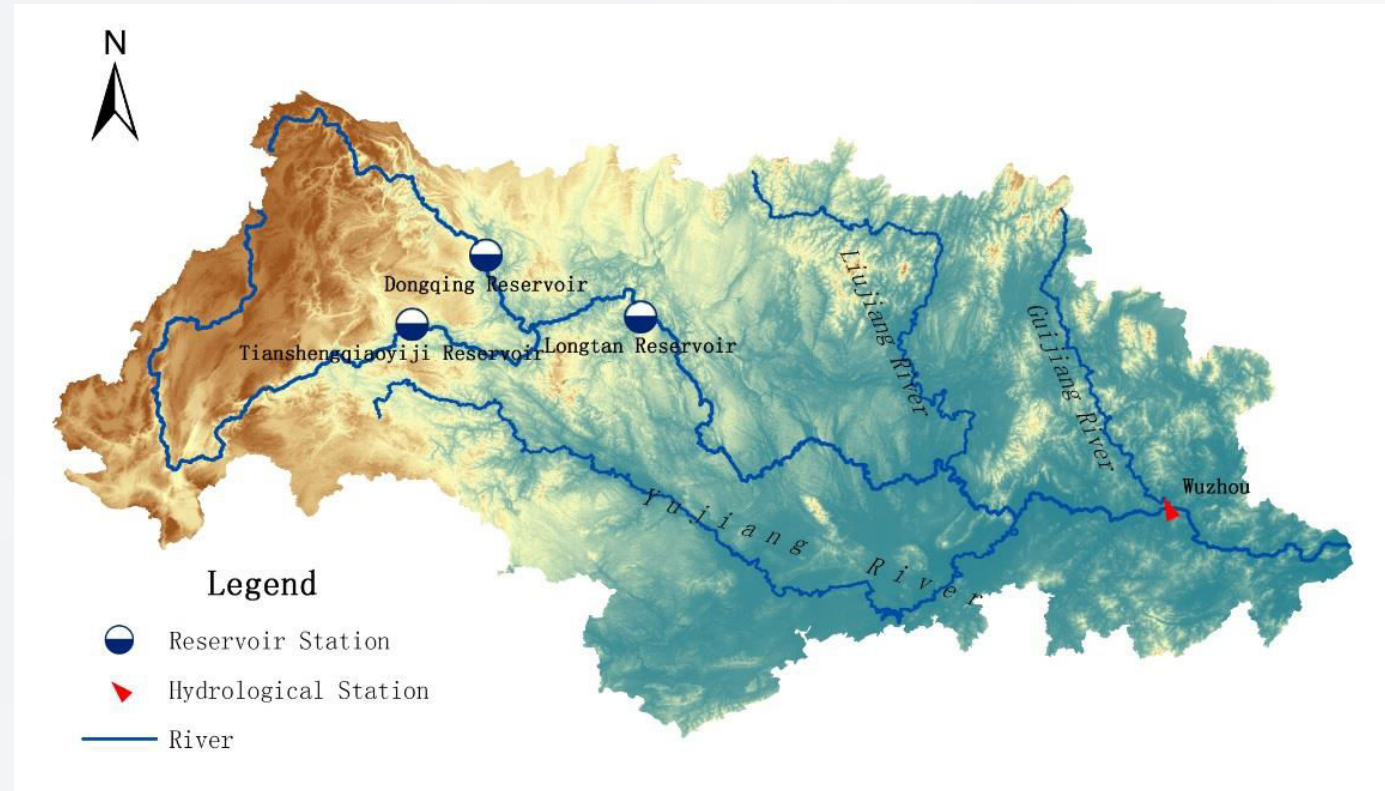
由于自来水咸度提高,连日天采访中了解到,珠海、中山市居民纷纷涌向山泉水厂取水。市民正在排队取山泉水。

Scope:

- ◆ The focus of this paper is the Xijiang River Basin, where the main regulatory points are the Longtan Reservoir and Wuzhou Hydrological Station.

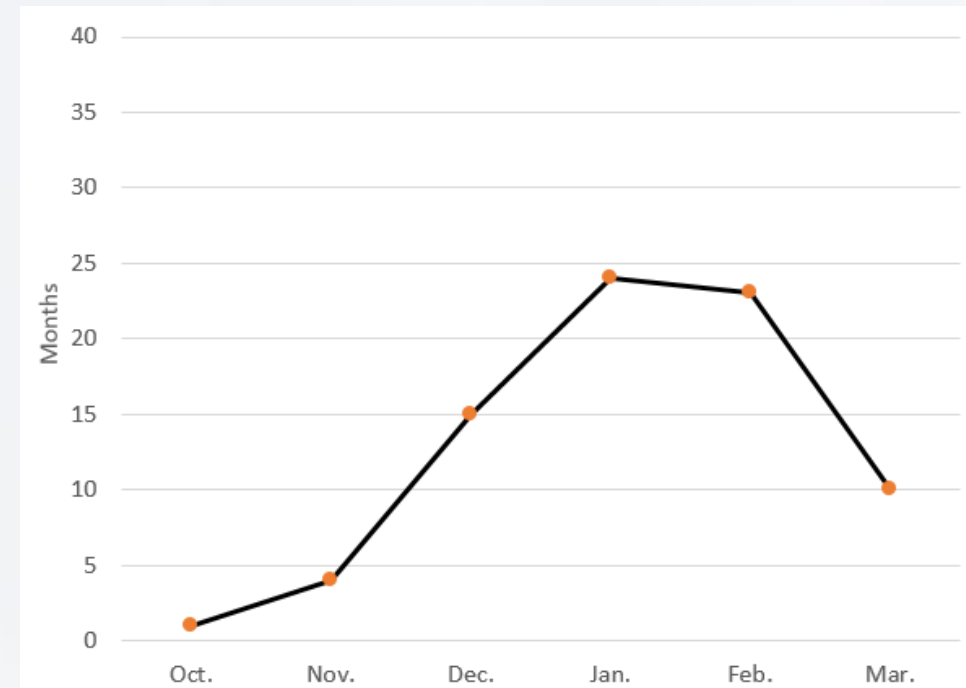
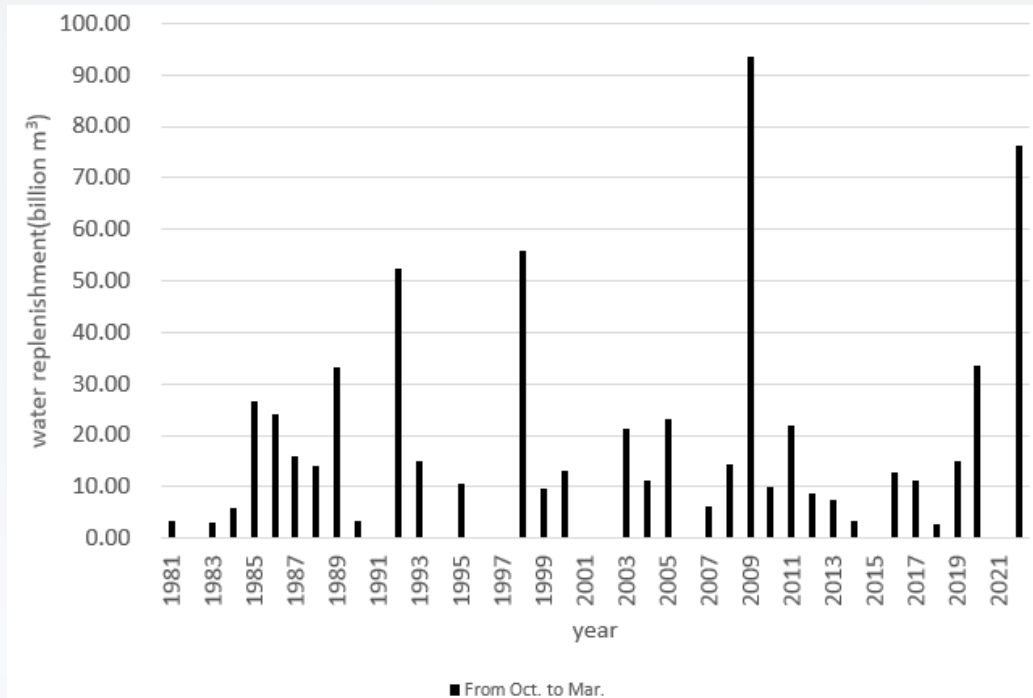
Data:

- ◆ Mean precipitation of the Xijiang River Basin
- ◆ Natural runoff sequence of the Xijiang River
- ◆ Flood data and runoff series from the region above the Longtan Reservoir



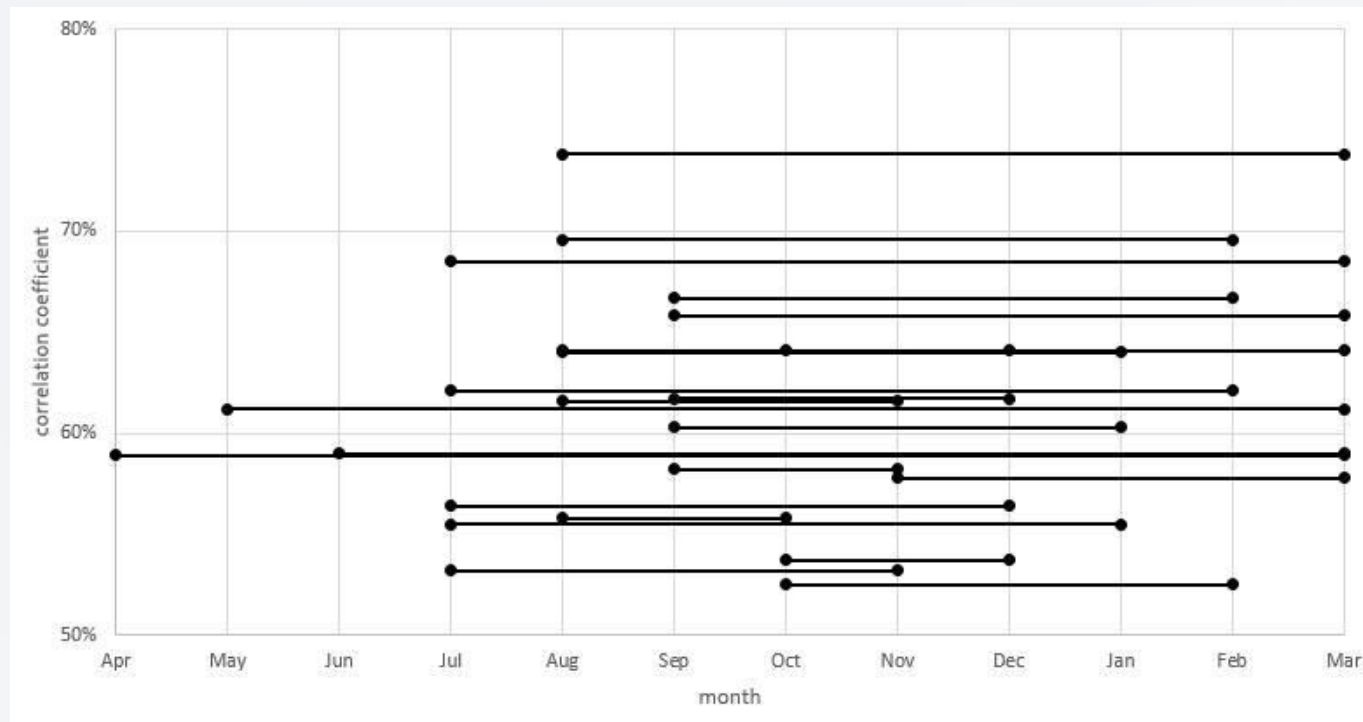
① Relationship between precipitation in the Xijiang River and water replenishment in the dry season:

- ◆ A significant amount of water is needed to replenish the Xijiang River during the dry season, especially in years of low rainfall.
- ◆ The replenishment period is mainly concentrated in the middle and late stages of the dry season.



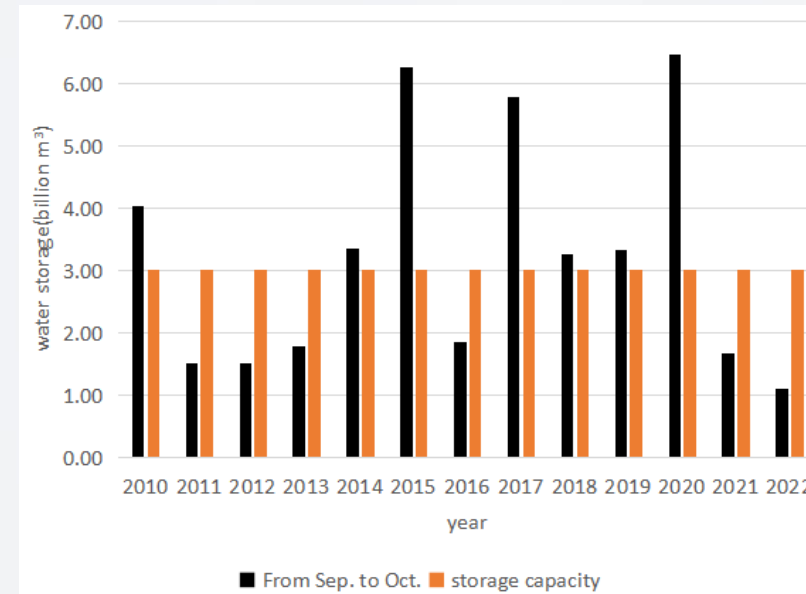
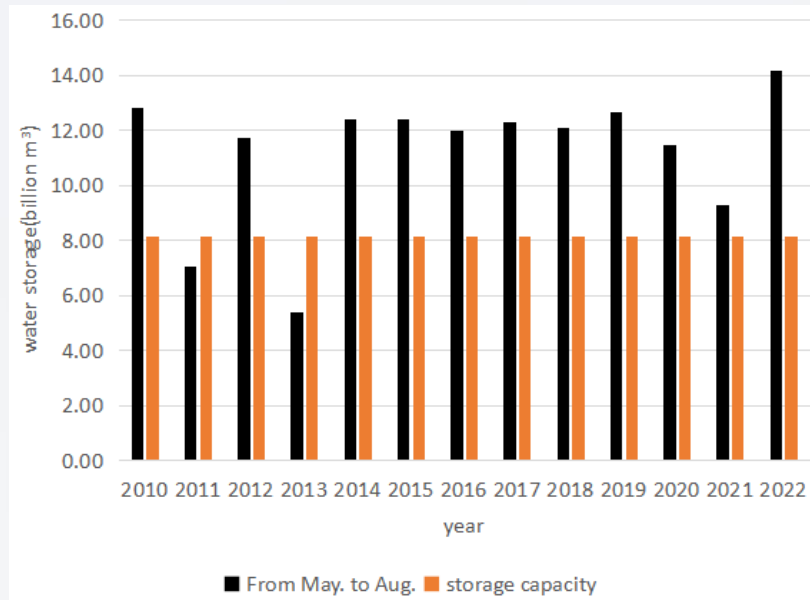
① Relationship between precipitation in the Xijiang River and water replenishment in the dry season:

- ◆ A significant correlation between natural water inflow in Wuzhou hydrological station during the dry season and rainfall in the flood season, specifically from July to September, and the subsequent dry season from October to March.



② Analysis of flood storage capacity of Longtan Reservoir:

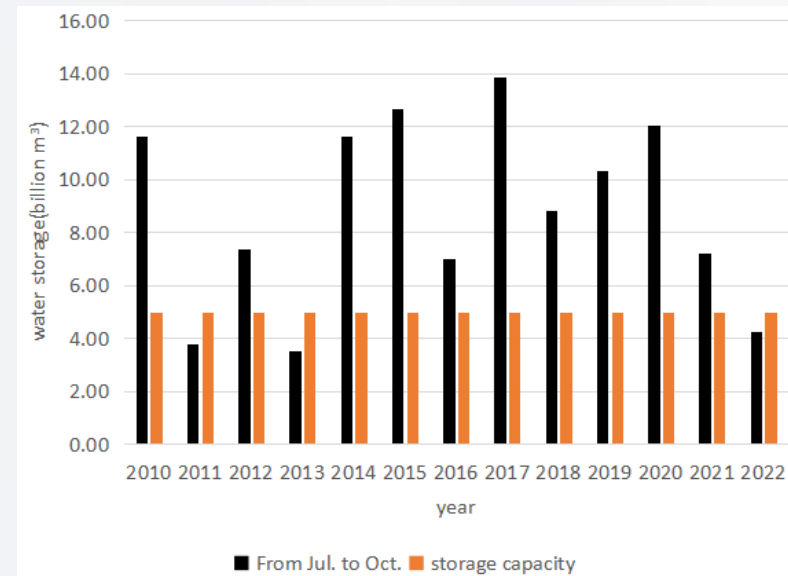
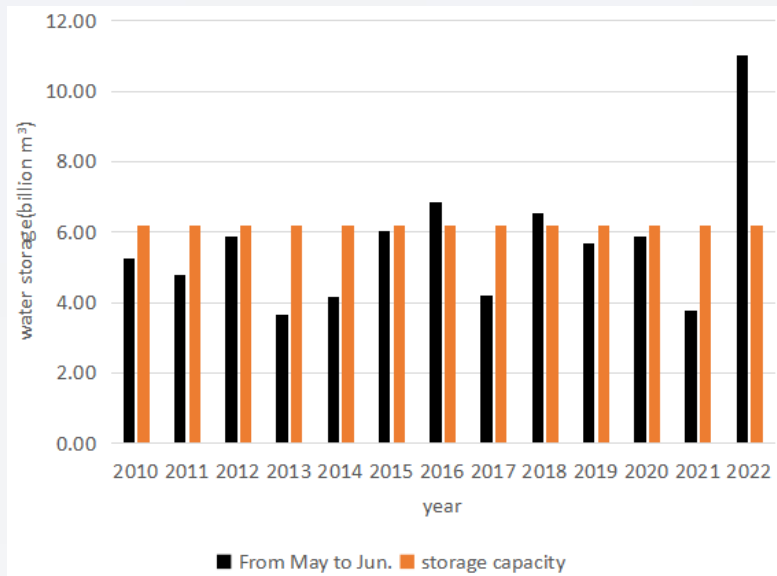
- ◆ Longtan Reservoir could begin early water storage between July and August while still maintaining flood control safety in the basin.
- ◆ It is essential to consider short-term flood forecasting to minimize reservoir storage risks.



Scenario 1 (segmented into May-August and September-October periods)

② Analysis of flood storage capacity of Longtan Reservoir:

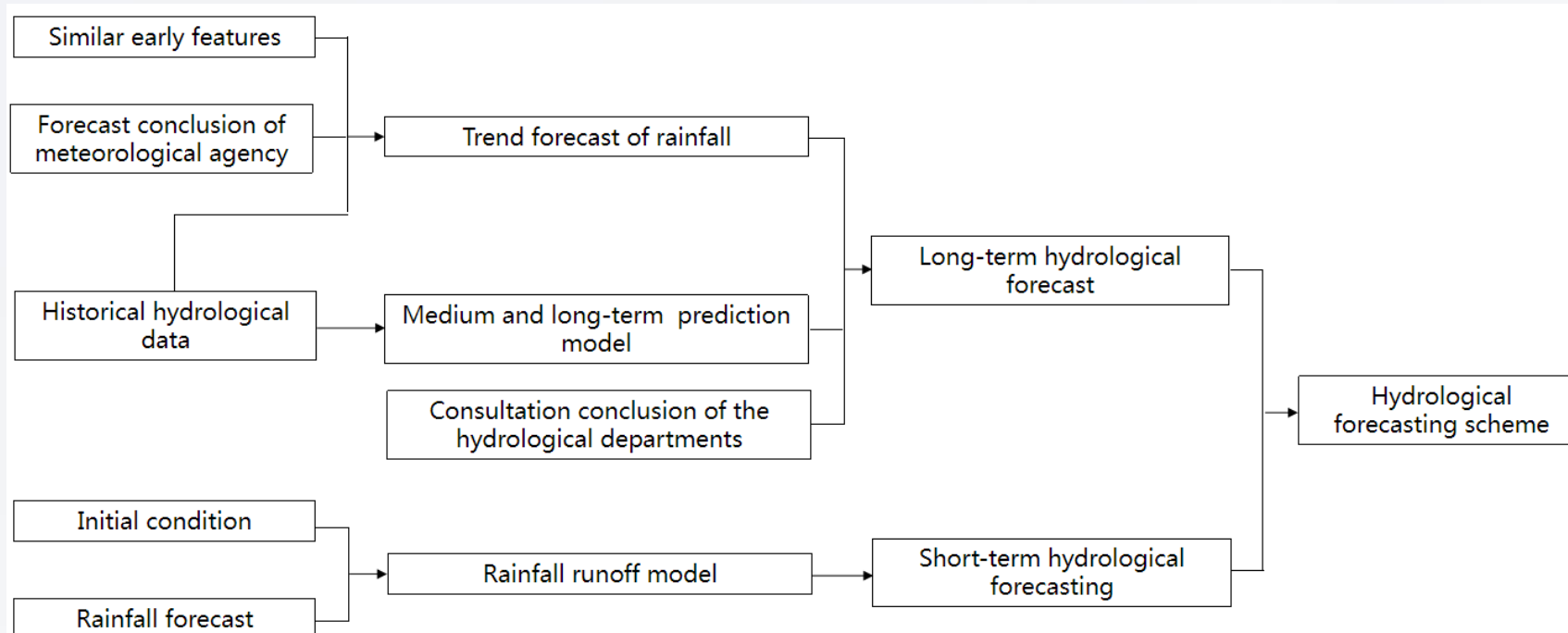
- ◆ The flood resources of Longtan Reservoir are mainly concentrated in the months of July and August.
- ◆ If the impoundment work is carried out before the dry season, the floodwater resource at the end of the flood season can be fully utilized, and the probability of full storage will be increased from 54% to 77%.



Scenario 2 (segmented into May-June and July-October periods)

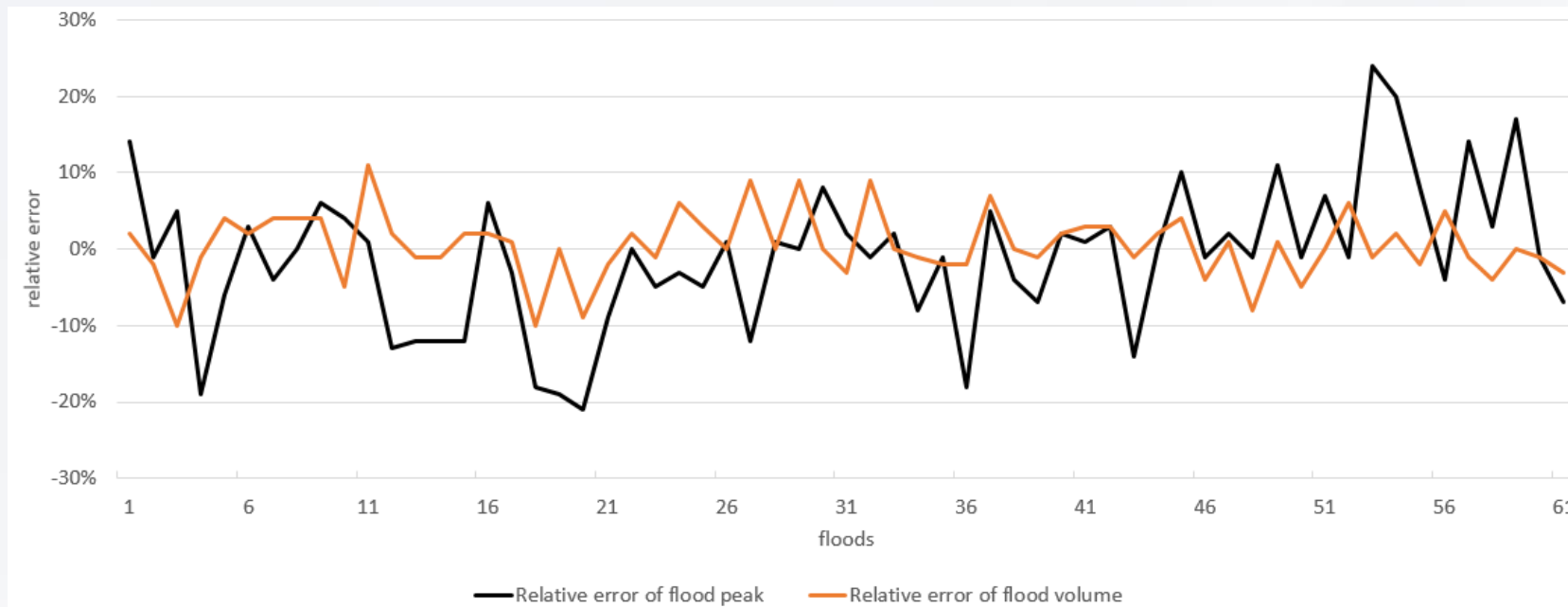
③ Hydrological forecasting scheme for water replenishment:

- ◆ Water scheduling involves both long-term planning and short-term decision-making, requiring the use of accurate and relevant forecast information.
- ◆ Examining the critical time frame for long-term runoff prediction and evaluating the accuracy of short-term flood forecasts.



③ Hydrological forecasting scheme for water replenishment:

- ◆ The period between July and October has the greatest significance in hydrological forecasting for efficient replenishment scheduling.
- ◆ The accuracy of short-term flood prediction in the Longtan Reservoir Area has reached a qualified rate of more than 85% for flood peak prediction, with the error of flood volume prediction falling within the acceptable tolerance range of plus or minus 20%.



Key results:

- ◆ Use the average precipitation in the Xijiang River Basin from July to March of the following year to evaluate the runoff situation before the dry season as soon as possible.
- ◆ If the impoundment work is carried out before the dry season, the floodwater resource at the end of the flood season can be fully utilized, and the probability of full storage will be increased from 54% to 77%.
- ◆ The optimal time frame for hydrological forecasting in the Longtan Reservoir water replenishment process extends from July to October.
- ◆ Long-term forecasting is used as the basis for an early water storage plan for the year.
- ◆ Between July and August, incorporating short-term flood forecasting with a relatively high level of prediction accuracy is recommended as a basis for reservoir scheduling decisions to regulate the rate of water level rise.