

Technical Visit to the Three Gorges Dam, China



by Ir. Dr. Wong Wai Sam

WATER RESOURCES TECHNICAL DIVISION

THE Water Resources Technical Division (WRTD) organised a technical visit for 11 participants to the Three Gorges Dam from 23 to 27 October 2013.

The visit started with a river cruise from Yichang, heading upstream towards the Three Gorges Dam. On the way, the boat passed through Gezhou Dam, which is 38km downstream of the Three Gorges Dam.

Gezhou Dam is 2,595m long and 47m high. It has 27 gated spillways which can release discharge of up to 110,000 m³/s and has a total installed hydropower capacity of 2,715 MW. There are three navigation locks and the No.2 lock is one of the largest lock gates in the world. The dam also has two outlet sluice gates for sand by-pass and this reduces the sedimentation problem upstream of the dam.

Along the journey, we also had the opportunity to observe various types of riverbank revetment works, hydraulic structures and bridges.

At our destination, a few technical employees of the Three Gorges Dam Corporation were assigned to provide us with presentations and information as well as a guided tour. Among these were Professor Wang for the overview of the dam and Engr. Wong for the hydropower generation.

We were briefed that the Three Gorges Project is the largest water conservancy project in the world. It is situated in the middle reaches of Yangtze River. The dam site is in Sandouping of Yichang City, Hubei Province, in the areas of Xiling Gorge, one of the three gorges of the river. The upstream catchment of the dam has an area of about 1 million km² and an average annual runoff of 451 billion m³.

The Three Gorges Project consists of the dam, hydropower station and navigation buildings. The river dam is a concrete gravity dam, with the flood discharging section in the middle and the powerhouse and non-overflow section on both sides. The dam crest elevation is 185m, the maximum dam height is 181m, and the total dam axis is 2309.47m long.

Flood control is the primary function of the dam. It has significantly enhanced the flood control capacity of the Yangtze River in the middle and lower reaches. With this, the flood protection level of the Jingjiang River section has been raised from 10-year ARI (Average Recurrence Interval) to 100-year ARI. The total reservoir storage capacity is 39.3 billion m³, of which flood control reservoir storage capacity is 22.15 billion m³.

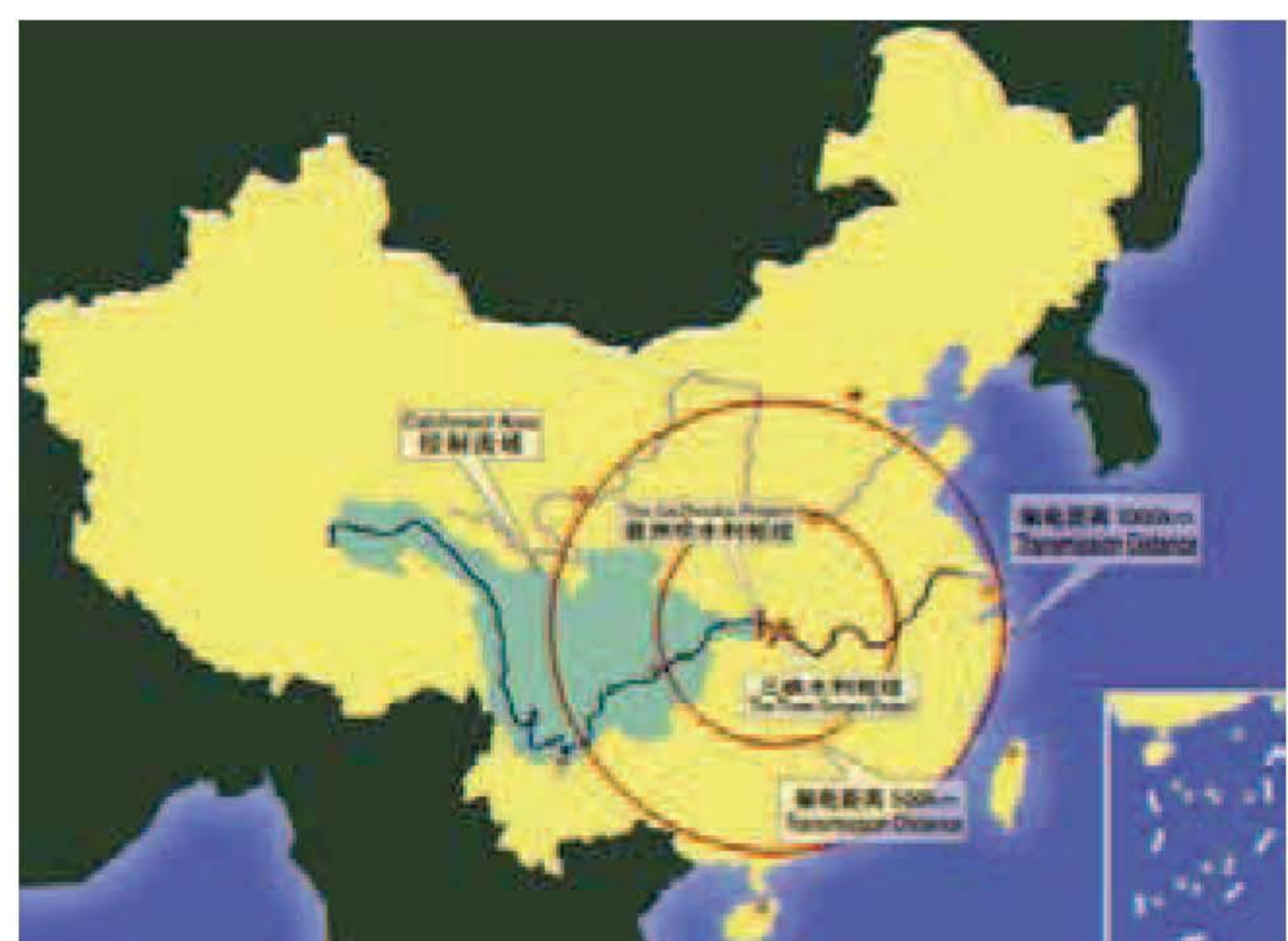


Figure 1: Location and Catchment Area of the Gezhou Dam and Three Gorges Dam



Aerial View and General View (from the Model) of the Three Gorges Dam

The Three Gorges Hydropower Plant consists of the left bank power station, the right bank power station, the right bank underground power station and the power supply station. The left and right bank power stations are located behind the dam. The left and right bank power stations are equipped with 26 sets of 700 MW hydroelectric generating units, together with 2 sets of 50 MW hydroelectric generating units. In addition, 6 sets of 700 MW hydroelectric generating units were installed later in the right bank underground power station. With these, the total installed capacity of the plant reaches 22,500 MW, with the yearly average generation capacity as much as 88.2 billion kilowatt hours, making it the world's largest hydropower station. The Plant has the maximum transmission radius of 1,000 km and the power is sent mainly to the East and Central of China, Guangdong and other areas.

The dam navigational passages have a double-line five-step ship lock and a vertical ship lift that is still under construction. Annual one-way transportation capacity is 500 million tonnes. The dam has managed to improve navigation for 660km, from Yichang City to Chongqing City upstream through inundation of rapids where, the ten-thousand-ton-rank fleet can navigate directly to Chongqing City. ■

