Case Story – Highlights

Optimising water resources allocation within Xin'an River Basin, China

Applying numerical modelling to improve water allocation strategies across provinces

Establishment of a holistic water resources management system

Improved transparency of water allocation strategies

Enhanced working efficiency

Challenge

Xin'an River Basin is a 11674 km^2 catchment located upstream of the Qiantang River Basin, spanning across Anhui Province and Zhejiang Province. Optimal water resources allocation within the Xin'an River Basin is crucial to support the sustainable economic development of the two provinces. Commissioned by Taihu Basin Hydrological and Water Resources Monitoring Center (TBHWRMC), DHI established a Water Resources Management System based on MIKE Powered by DHI technology to help local authorities manage water resources.

Multi-objective demands must be taken into account when planning for water resources allocation in the Xin'an River Basin. The Qiandao Lake is a major source of hydropower production for the provinces. There are also specific needs in agricultural production when it comes to water access for irrigation. Environmental flow should be maintained to decrease the ecological impact and ensure sustainable water use. These objectives become increasingly difficult to maintain due to global warming and the increased occurrence of dry years. TBHWRMC needed a tool that can consider long-term water allocation across the entire basin to support their decision making and control the total water consumption in the Xin'an River Basin.

Solution

To better manage the water resources, numerical models and a decision support system were developed using MIKE software. Two lumped hydrological models – the Three Water Sources Xin'anjiang Model and a MIKE 11 NAM model – are being used to analyse the water availability in the catchment.

Both models feed into a MIKE HYDRO Basin model. This water balance model analyses the water supply and water demands for the entire Xin'an River Basin. The water consumption of various industries is considered, and the FAO irrigation model is used to assess the long-term daily irrigation water demand. Two scenarios are simulated to assess the impact compared to the base year: a do-nothing scenario and an active planning scenario.

Both hydrological models are also coupled to MIKE 11, which simulates the river flow. This helps assess the impact of different scenarios on the environmental flow and flood risk along the river. The water resources management system was developed based on all the above models, and provides real-time update of observed and forecasted data through a user-friendly web application. The system forecasts water balance one year ahead, based on the monthly rainfall forecast data and estimation of water consumption.

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