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The Impact of Fushi Reservoir to the Hydrological Situation of the Upper Reaches of Western Tiao River in the Lake Taihu Basin

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Abstract [U+FF1A] Tiao River consists of Western Tiao River and Eastern Tiao River, which is located in Zhejiang Province of China, belongs to one of the rivers that flow into Lake Taihu. Western Tiao River is in humid sub-tropical monsoonclimate zone, and has a length of 150km, valley area of 2274 km2. Multi-year average (1956 -2000 years) natural runoff is 1.578 billion m^3, and accounts for 18.9% of runoff into the Lake Taihu. Fushi Reservoir, which is constructed in the upper reaches of Western Tiao River in 1978, holds the reservoir capacity of 218 million m^3, and controls 13.8% of the total runoff of Western Tiao River.Western tiao River mainly flows through the Huzhou City in Zhejiang Province, and plays an important role in the city's economic and social development. This paper discusses the impact of the construction of Fushi Reservoir on the hydrological situation of the down reaches. 33 important hydrological parameters are compared by the method of Indicators of Hydrological Alteration (IHA) according to flow data of the Fushi hydrometric station which is close to the reservoir, and the flow series are 22 years and 29 years pre- and post the reservoir construction. At the same time, combined with Range of Variability Approach (RVA), change of the important hydrological parameters before and after the construction of the reservoir are analyzed by hydraulical alteration degree.

The results indicated: (1) the construction of Fushi Reservoir has considerable influence on the hydrological situation of the down reaches. The annual runoff becomes more even, and the annual runoff from February to May reduces after the reservoir was built, while that from July to December increases. The peak flow decreases from 37.9m3/s before reservoir construction to 27.8m3/s after construction, which drops about 27%.(2) Five groups of parameters in IHA have changed on different extent, including the flow magnitude, duration, timing, frequency, pulse and rate. There are 17 parameters changed heavily, accounting for 52% of the total IHA parameters, and 13 parameters changed moderately, accounting for 39%, and 3 parameters changed lightly, accounting for 9%. (3) These frequency parameters alters the most, reaching 90% of the hydrological alteration degree, the followings are the year extreme flow which is 79%, high and low pulses which is 77%, the timing of the extreme flow which is 75%, and the average monthly flow which is 67%. (4) For single indicator, monthly flows of October, November, December and January have changed the most, which are mainly increasing tendency, and the minimum flows of 1 day, 3 days, 7 days and 30 days are in reducing tendency, and the number of zero flow shows increasing trend, and the base flow index shows the decreasing trend, the timing of annual minimum flow changes from winter to spring, pulse frequency of high flow and low flow are in decreasing trend. Above analysis shows that the construction of Fushi Reservoir has obvious influence on the hydrological characteristics of the down reaches.