

## THE RESEARCH OF THE RIVER WATER CONFIGURATION

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Water is becoming a scarce resource in many regions of the world. In China, especially in the north of the country, this problem is more serious. At the same time, the drought and the flood break out frequently and the range of influence continuously spreading in China, such as the Flood of the Changjiang River and the Songhua River in 1998 as well as the nationwide great drought in 2003. The problem of water has become the main restriction factor of the national economy development.

At the case of short of water, to fine tuning the river water can effectively bring into playing the favorable action for the national economy as well as the environment. In order to allocate the river water in reason, it is necessary to analyze the configuration of river water. The main aim of this paper is to carry out the analysis of the river water configuration (RWC). The meaning of the RWC is that the river water is divided into different parts according to the need of exploitation as well as the environment.

For the division of the river water configuration, at the point of flood prevention and utilization, according to the characteristic of the river flood as well as the different functions and actions possessed by the river water, the river water can be divided into four parts, namely ecological water volume(EWV), safe water volume(SWV), risk water volume(RWV) and disaster water volume(DWV).

For the ecological water volume(EWV), The EWV occupies the very important basal position in the RWC. Synthetically the current research results (Novotny, 1994; Willis, 1999), the EWV can be generalized that in order to maintain the rudimental ecological environment, ensure the lowest material balance of the river organism, the watercourse water must be kept certain level and satisfy certain criterion of the ecological environment at the given time and space. In order to calculate the EWV accurately, we divide the calculation period of time into the high water period (from the April to the September) and the low water period (from the October to the March). In the north of China, the river needs lesser water volume during the low water period. But in the high water period, the river requires large amount of the water because this period is the breeding season of the river biotas. When calculating the EWV, we respectively take the 30% and 60% proportion of the average annual discharge as the lower range value during the low water period and the high water period.

For the safe water volume(SWV), the SWV is the part of river water that between the EWV and the RWV. To this part of water we should research from the two aspects of the river safe and the economic consumptive use of water. The SWV can be described that on the base of assurance the EWV, not to take any measures, the river possesses of the water volume which can provide large amount of the economic consumptive use of water for the society and not bring on the flood at the same time. The upper limit of the SWV can be determined by the bankfull discharge (The flowing capacity of the main river channel). For the river of little sediment concentration, the flowing capacity of the main river

channel generally changes a little after the flood season. Thus when calculating the SWV, we can consider there is not variation for the bankfull discharge. The bankfull discharge can be determined by the rating curve of the river.

For the risk water volume(RWV), the RWV is related to the flood water. For the river, the small and medium floods often occur in the flood season, which can bring certain menaces to the embankment and the reservoir. According to the characteristic of this part of water, the conception of the RWV can be described that at some period in one year the river maybe come into being larger scale water volume, which can produce certain menace to the embankment and the reservoir, but not bring disaster at last by taking some proper measures.

For the disaster water volume(DWV), the DWV the intuitionistic sensation is that the river water distributes non-uniformly in a year, and in flood season the large runoff greatly surpasses the permissible capacity of the river. After taking measures the runoff still can produce flood disaster. The DWV is the river runoff which exceeds the maximal critical flow and can bring on the flood disaster. The DWV general appears in the flood season and which itself possesses the available character of water resources. Such as the flood can be used to dilute the contamination and wash out the watercourse. The research has showed that the flood washes out about 80% sand in lots of the world rivers (Pitlick, 1998).

For the calculation of the RWV and the DWV, While to determine the boundary value between the RWV and the DWV, we can refer to specificity water level of the control section of the flood prevention. The warning water level is an important index mark in the parameters of flood prevention. Thus this article takes the warning water level as the boundary value between the RWV and the DWV. According to the rating curves of the four hydrological stations, the runoff corresponded to the warning water level can be determined.

For the calculation results of the four kinds of water volume, after determining the boundary values, the quantity of the four kinds of water volume can be gotten by calculation. According to the forgoing method, making use of the hydrological data of the main stream of the Songhuajiang River from the year 1953 to 1989, we can get the quantity of the four kinds of water volume. Basing on these quantities of which, we can analyse the character of each kind of water volume.

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