

# Influence of Water Conservancy and Hydropower Project Construction on Hydrologic Test in Downstream

Junying Xue

Linfen Hydrology and Water Resources Survey Station, Linfen, 041000 Shanxi, China

**Keywords:** Water conservancy and hydropower project, Downstream hydrological test, Impact

**Abstract:** As a basic project of People's livelihood, hydraulic engineering is attracting more and more public attention. In order to make full use of water resources, not only can we build on the previous hydraulic engineering, a series of extension, reconstruction and other related work, but also organized a number of different water conservancy and hydropower project construction. The hydrologic test itself is a very important part of obtaining water resources data. It pays more attention to the comprehensiveness, timeliness and accuracy of the data, and combines with the related data and information, ensure that water resources can be more fully utilized. Based on the current situation of Water Conservancy and Hydropower Project Construction and the main contents and significance of hydrologic test work, this paper analyzes the influence of Water Conservancy and Hydropower Project Construction on hydrologic test work downstream, and put forward the effective optimization strategy.

## 1. Introduction

With the development of social and economic integration, the construction of Water Conservancy and hydropower projects in China has been paid more attention to. Combined with the current situation of Water Conservancy and hydropower project construction in China, the water resources distribution is obviously unbalanced. Therefore, in the process of actual construction of the project, it is necessary to pay attention to the development of hydrologic test, make clear the actual situation of the construction of Water Conservancy and hydropower projects, and optimize the work of hydrologic test, to minimize the impact of the whole water conservancy and hydropower project construction, promote the quality of hydrological testing work effectively, and provide scientific data support for the follow-up development of Water Conservancy and hydropower projects.

## 2. Construction Status of Water Conservancy and Hydropower Projects

In terms of world water resources ranking, China's water resources are relatively abundant, ranking high. However, under the conditions of ecological and environmental impact, some parts of China are often dry and rainy, especially North-Western Territory; Moreover in the individual year, the precipitation also has the very big difference, this also brings the negative influence for our country some regions agricultural production activity<sup>[1]</sup>. In order to ensure that water resources can be used more fully, it is necessary to maximize the supply of water resources themselves so as to effectively improve the quality of life of the population, the state also attaches more importance to the construction of Water Conservancy and hydropower projects. According to the actual situation, our country pays more and more attention to the Water Conservancy and hydropower project construction, and the development of the whole project construction is also very stable. In the process of rapid economic development, the ecological environment of our country suffered great damage, the construction of Water Conservancy and hydropower projects led to further increase in the pressure of the surrounding ecological environment; At the same time, the construction speed of Water Conservancy and hydropower projects will also affect the effect of hydrological test<sup>[2]</sup>. Therefore, plans need to be drawn up in advance to further clarify the situation of Water Conservancy and hydropower projects at all stages in order to minimize the adverse

impact on the environment, this is the focus of the current hydraulic engineering development period.

### **3. The Main Contents and Functions of Carrying out Hydrological Test**

The hydrologic test is a very systematic work, which needs to start from the collection of hydrologic data until the completion of data collection, sorting out in an orderly manner; The main objective of scientific analysis of water resources is to input data into it <sup>[3]</sup>. Among them, it is necessary to make full use of hydrologic test work to analyze hydrologic data and actual data of different regions in detail, and to provide more accurate and effective reference basis for the follow-up construction of Water Conservancy and hydropower projects, and lay the foundation for its continuous development. In hydrologic test work, it is necessary to have accurate test data as a basis for analysis, together with the assistance of other information, in order to work out more accurate and useful auxiliary scheme through calculation, to carry out flood control, drought relief work, and to achieve accurate control of hydraulic engineering. In the use and development of water resources, hydrological testing is very important, not only in flood control, drought resistance play an important role, but also bring greater economic benefits for society.

### **4. Influence of Hydropower Project on Hydrologic Test in Downstream**

#### **4.1 Will Affect the Hydrologic Test Data Related Information**

In the hydrologic test, it is necessary to conform to the original state of the local natural area, so as to ensure the authenticity and accuracy of the whole data measurement, which is also of great reference significance for the follow-up hydrologic test itself <sup>[4]</sup>. From the actual situation of the construction of Water Conservancy and hydropower projects, in order to achieve the corresponding results and effects more quickly, people blindly exploit river channels, resulting in significant changes in the flow rate in some areas. Under such circumstances, the experimental data obtained from the hydrological test before has lost its own reference significance, and has seriously affected the quality of hydrological monitoring. At the same time, during the construction of Water Conservancy and hydropower projects, there will be various hydrological projects involved, and the amount of sand around the hydrological stations will easily increase, thus causing the lack of accuracy of the data obtained by the hydrological stations, it is difficult to reflect the specific situation of hydrology.

#### **4.2 Will Affect River Runoff**

In the process of construction of water conservancy and hydropower projects, river runoff is easily affected by temporal and spatial variations. From the practical point of view, the construction of Water Conservancy and hydropower projects is mainly to realize the organic regulation of water supply flow, so as to exert the regulation and storage of Water Conservancy and hydropower projects, water storage projects are obviously affected, resulting in significant changes in its water level, but also will lead to a significant rise in the water level downstream of the problem <sup>[5]</sup>. The construction of Water Conservancy and hydropower projects is mainly for flood control and drought relief, which can increase the river flow in the dry season and ensure the stability of river water, and also can reduce the times of unstable pulses as far as possible, in order to ensure the effectiveness of hydrological data, objectivity, authenticity.

#### **4.3 Affect the Stability of Hydrologic Test Data**

The construction of Water Conservancy and hydropower projects will easily affect the construction area downstream of the hydrologic station, and backwater problems will easily appear. Thus, it is easy to change the hydrologic section, as a result, the average cross-section velocity and the stability of vertical velocity are obviously destroyed, and it is difficult to clearly understand the specific hydrological situation <sup>[6]</sup>. At the same time, it will also affect the efficiency of the whole hydrology testing work. The construction of the hydraulic engineering upstream of the entire

hydrology station will also affect the whole hydrology year and water level to varying degrees, it is difficult to obtain specific hydrological samples in regional tests at hydrological stations. However, the quality of Water Conservancy and hydropower project construction can play a decisive role in the normal development of hydrologic testing, therefore, we must base on the reality, formulate more scientific, effective and reasonable program, to completely eliminate the adverse effects brought about by the construction of Water Conservancy and hydropower projects.

## **5. The Main Reasons That Affect the Hydrologic Test Work in the Construction of Water Conservancy and Hydropower Project**

### **5.1 Water Conservancy and Hydropower Projects Have Been Rebuilt Too Many Times**

At present, the development of water resources and hydropower projects in our country is very rapid, and the development technology of water resources has also made obvious progress, at present, in order to further adapt to the pace of urban development, many regions will interfere with the flow of the entire river to a certain extent during the construction of Water Conservancy and hydropower projects, but the change of river flow direction can have a direct effect on the result of hydrologic test. Once the entire hydraulic engineering is officially under construction, real-time hydrological measurements must be obtained to keep up with the progress of the project. However, if changes in the hydrological stations are difficult to match with the progress of the hydraulic engineering construction, it is also easy to affect the difficulty and quality of the actual test. At the same time, the hydrographic survey also needs real-time statistics of water and sediment in river sections, mainly because the construction of hydraulic engineering will have a significant impact on the statistics of water and sediment in river sections, thus, the difficulty of hydrologic test will be further increased, and it will be difficult to achieve accurate control of the overall situation of hydrology.

### **5.2 Downstream Hydropower Projects Lead to Backwater Problems**

Backwater is also an obvious problem, which can easily affect the accuracy of hydrologic tests, in which hydrologic stations are usually built upstream of hydropower stations, and the distance between them is relatively close, in most cases, the water flow of the hydropower station changes, and the hydrologic station data will also change obviously<sup>[7]</sup>. For the backwater, it is easy to cause the hydrologic section to be in the passive development state under the influence of backwater downstream, and it is easy to destroy its original state. But only in the original state of the hydrographic section, can more accurate hydrographic test data be obtained, the staff can fully control the indicators of various parts, and this balance is also difficult to maintain stability, once the downstream hydropower station backwater problem, this balance will be broken, the hydrological section of the state will be unstable. Thus, throughout the hydrographic testing work, staff need to take into account different aspects of the risk, hydrological water level change is an indispensable factor, this will also have a direct impact on the accuracy of the entire test.

### **5.3 The development of Water Transfer project is not perfect**

At present, the state pays more attention to and continues to promote the water diversion project, and the continuous advancement of the whole project will also have different degrees of impact on the distribution of water sources; at the same time, will also affect the accuracy of the entire original data<sup>[8]</sup>. The main reason is that the water diversion project involves a relatively wide scope and the entire project is relatively large in scale, and it is very easy to change the flow direction of many different rivers themselves, upstream, middle and downstream will cause more obvious changes. Moreover, this project will affect the efficiency of the whole hydrologic test work to different degrees, and even hinder the further development of the hydrologic test work. Prior to the completion of the water diversion work, the water sources within the entire river need to be more systematic adjustment and transformation, and accurate to the construction of roads, in order to ensure the accuracy of hydrological tests.

## **6. The Effective Strategy to Reduce the Influence of Water Conservancy and Hydropower Project Construction on Hydrologic Test Work**

### **6.1 Improve the Relevant Hydrological Test System**

From the daily work management point of view, Hydrology Test and Water Conservancy and hydropower belong to different departments, and the management method is also obviously different, the two are not close in the work link level, therefore, if we do not pay attention to the exchange of information, it's easy to get disjointed. In the Water Conservancy construction project, the two main departments must be fully aware of the importance of Water Conservancy and hydropower project construction, and the negative impact of Water Conservancy and hydropower project on the hydrological test work. In order to further improve the accuracy and validity of hydrologic test data, it is necessary to coordinate the relationship between hydrologic engineering and hydrologic test based on the actual situation of national development, in order to ensure that the two more synchronized development. It also requires the relevant departments and officials responsible for hydrologic testing to pay more attention to the construction of water and hydropower projects, and to formulate effective emergency plans and protection plans to ensure that in the course of hydraulic engineering construction, the work of hydrological testing can be further implemented. Through specific and effective programs, improve the efficiency and effectiveness of the entire project construction.

### **6.2 Improve the Professional Quality of Professionals**

In the process of water storage and continuous discharge, the backwater problem is easy to appear, and the river speed is also easy to appear obvious fluctuations. At present, the hydrographic survey has not found an effective way to deal with the activities caused by this backwater problem, mainly because the equipment used in the hydrographic survey is relatively backward, the equipment has not been updated in a timely manner, and it is difficult to take advantage of the equipment in the face of some water sources with high frequency of change, so the overall investment must be further strengthened; at the same time, in order to ensure the efficiency and quality of hydrographic survey, some staff members are obviously inexperienced, especially in some complicated conditions, and must innovate the testing methods, only by constantly updating the equipment, can we promote the work of hydrologic test better, so as to ensure the accuracy of data.

### **6.3 Introduction of Advanced Hydrological Equipment and Instruments**

With the development of Water Conservancy and hydropower projects, the number of projects continues to increase, and the number of corresponding hydrological stations has also started to increase significantly. Among hydraulic engineering related projects, it is easy to affect the water level and velocity of the whole working area because of a series of factors, such as water storage and waterproofing. In view of the existing problems, it is difficult for conventional instruments to meet the basic needs of actual testing, and the accuracy of data is difficult to meet the requirements, so it is necessary to introduce advanced equipment and use advanced technology, can effectively improve the accuracy of hydrological test.

### **6.4 Increase Observation Station and Low Water Test Section**

For the problem of difficult relocation of hydrologic stations, the accuracy of hydrologic test can be ensured by adding auxiliary observation points and investigation points. In this way, hydrologic data of local area can be collected better. To promote the accuracy of data effectively, and bring into full play the specific value of hydrological testing work. At the same time, for the lower reaches of water conservancy and hydropower projects less affected hydrological stations, also need to be combined with the actual situation, set up the necessary low-flow monitoring points.

## **7. Conclusion**

At present, the state attaches great importance to the construction of Water Conservancy and hydropower projects, and the projects are promoted more and more rapidly, and the development degree is gradually deepened. Under the influence of Water Conservancy and hydropower project construction, the local water level and discharge are also easily affected, which leads to the authenticity of the measured data is difficult to be effectively guaranteed. Therefore, we need to base on the existing reality, strengthen the management of personnel, improve the professional quality of personnel, introduce more professional equipment, promote the hydrological test work and water conservancy and hydropower project construction between the two can be more synchronous development.

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