Study on Ecological Hydrological Process under Water Control

Qing Hai[1,2,a,*], Changshou Wang[1,2], Lega Tong[1,2], Na Li[1,2], Caiqin Li[1,2]

[1] Hetao College, Bayan, Nur, Inner Mongolia, 01500, China

[2] Academician Expert Workstation Of Ecological Governance and Green Development of Bayannur City, Hetao College, 01500

[a] 310672072@qq.com

*corresponding author

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Abstract: At present, the research on ecological hydrological process is mainly about the formation of hydrological process, hydrological pattern, and the impact of hydrological ecological process on the environment. It is the theoretical basis for rational exploitation and utilization of water resources and natural resources of ecosystems, and also the basis for scientific ecosystem protection and restoration to achieve sustainable development. However, these studies do not focus on the analysis of the ecological hydrological research process under water control. This paper mainly expounds the ecological hydrology under water control from the point of view of water control, analyzes the research methods of ecological hydrological process under water control, and probes into the research prospect of ecological hydrological process under water control and ecological hydrological process under water control in order to contribute to the development of ecological hydrological process research in China.

1. Introduction

With the rapid development of social economy, the contradiction between supply and demand of water resources is deepening, and it shows the trend of globalization. Based on this background, people put forward the research of "ecological hydrology" on the basis of original ecology and hydrology, and this research can develop rapidly. Ecological hydrological process is a hydrological process formed under the combined action of natural force and human activity, which can influence and adjust the water circulation and the movement and transformation of matter in the environment. Water control is the main method of water resources management. In order to study the ecological hydrological process under water control, we must master different research methods and analyze the ecological hydrological process under water control.[1].

2. Ecological Hydrological Concept under Water Control

There is a close relationship between water control and ecological hydrology. From the perspective of ecology, the problems of water control and ecological hydrological process control are the problems that need to be considered and solved urgently in maintaining the virtuous cycle of water resources and building a harmonious ecological environment. The influence factors of ecological water process are more, which leads to this problem is more complex, in addition, the academic circles of our country have less research on ecological hydrological problems, have not formed a systematic and mature system, lack of effective suggestions, and need people to carry out further scientific exploration. "Ecological hydrology" is mentioned in China's Hydrology Research. With the development of modern society and economy, people's research on hydrological problems has gradually increased, and the term "ecological hydrology" appears frequently in people's view and becomes the main research direction[2].

Combined with different standards, the ecological hydrological process research under water control can be divided into: research methods, process research, mutual influence research, the

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hydrological process between atmosphere, soil and vegetation can be used as the basis, considering the water control method, so as to analyze the influence of water quantity, water quality and water cycle mode on hydrological process.

3. Hydrological Process under Water Control

3.1. Comparative Analysis

Comparative analysis is a common method of ecological water process research. From the point of view of water control, it is suggested that time contrast analysis method and watershed contrast analysis method can be adopted respectively. According to the specific research scale, the ecological water process under different water conditions is compared and analyzed. According to the actual situation of the area, the staff can select the runoff comparative analysis method, select a pair of runoff experimental site or runoff ditch, observe it at the same time, collect data, so as to study the influence and result of different water control measures on the ecological hydrological process. In the process of observing and collecting data, we can first make a comparative observation for a period of time to determine whether the basis can ensure consistency, and then list one of the runoff as the experimental object, and carry out a number of water control measures, such as planting vegetation, artificial rainfall, improving water quality, and then compare with the control runoff. This method is not suitable for large area contrast analysis when it is recommended to use runoff contrast in small area[3].

3.2. Watershed Hydrological Modelling Methodology

Watershed hydrological model analysis method, mainly for a certain hydrological element to carry out a specific basin simulation research, this research method of early origin, longer development time, in 1960 was formally put forward the Stanford hydrological mathematical simulation model of the basin, it is necessary to combine computer technology and other information technology to build a basin hydrological model, combined with previous analysis experience, hydrological process law and physical concepts, through a relatively simple mathematical formula to express the hydrological process in the basin. After that, the staff need to integrate different hydrological processes to form a comprehensive watershed hydrological calculation system. Since then, over time, more hydrological process models have been proposed, such as: lumped model, distributed model (as shown in Fig .1), empirical statistical model, unit line method statistical model, random model and so on. In order to explore the ecological hydrological process, we should consider the difference factors in spatial distribution and the biological coupling factors in hydrological process, select the aggregate model, distributed model and other models with strong predictability, adjust the data parameters, so as to simulate the change of water environment under human activities and realize water control, so as to explore the ecological hydrological process, grasp the development trend, and obtain the effective basis of regional hydrological control[4].

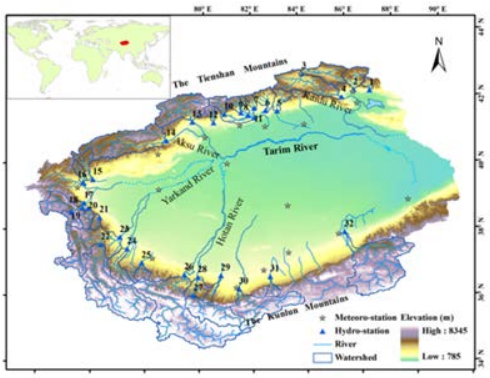

Figure 1 Distributed model

3.3. Water Balance Method

Water balance analysis is the equation of water balance, which analyzes the situation of soil and water loss in the same area, and the influence degree of ecological hydrological process by water change and its external embodiment. Typically, staff work on the basis of the multi-year average watershed water balance equation: R=P-E, R is runoff, P precipitation, and evaporation. In the process of using this research method, the staff combined the soil and water conservation form in the area with the "water control measures ", and analyzed the variation in the other formula, so as to evaluate the effect of the water control measures in this area on the ecological hydrological process (see figure 2).

Figure 2 Schematic diagram of ecological hydrological process after "urban construction" measures

4. Ecological Hydrological Process Under Water Control

4.1. Formation of Ecological Hydrological Processes

Ecological hydrological processes are easily affected by many complex factors, resulting in different changes and results. The most sensitive areas are inland waters, land and water interlaced areas, forest areas and arid areas, which are also the focus research topics of ecological hydrological processes under water control. This research focuses on the relationship between ecology and water. With the rapid development of modern society and economy, urban construction has been vigorously carried out in various regions, and different transformation and water conservancy measures have promoted the change of ecological hydrological process. It can be said that any construction project and soil and water transformation behavior will cause the effect of water control and affect the overall process of ecological hydrology; for example, the construction of reservoirs in the region will change the water situation in the region, resulting in the influence of water control and the change of hydrodynamic conditions in the region and the ecological pattern of upstream and downstream rivers.[5].

4.2. Reactions of Watershed Ecological Hydrological Processes to Water Control

The ecological hydrological process will not only be affected by the change of water in the region, but also react to the water in the region, such as affecting the water runoff, affecting the regional water quality, affecting the water ecological environment and so on. From the geographical point of view, surface runoff is the hinterland of lake evolution, and any change of ecological hydrological process will be reflected from lakes, rivers and so on, forming a specific watershed ecological hydrological phenomenon (Fig .3). In the study of ecological hydrological process under water control, it is suggested that the water situation should be adjusted by human measures, and the changes of rivers and lakes in the region should be observed separately, so as to analyze the influence of the changes of ecological hydrological process in the basin on the regional water synthesis, grasp the law of reaction, and provide information for river management and water resources management in the region. The influence of ecological hydrological process change on water synthesis is one of the key contents in the study of ecological hydrological process under water control. The staff can combine the knowledge of river management, select the appropriate ecological hydrological process analysis model, explore its mechanism, and explore and analyze it from different stages respectively.

Figure 3 Ecological hydrological process and water balance in Qinghai lake basin

5. Ecological Hydrological Process under Water Control

Combined with the above-mentioned concept of ecological hydrology under water control, analysis model and process exploration, it can be found that the study of ecological hydrological process under water control is still in the primary stage of development, but it is of great significance, which can provide important reference materials for water environment construction, water resources management and allocation, ecosystem, and has good development prospects and broad development space. In the future research process, we can carry on the research separately from the ecological hydrology formation process, the ecological hydrology process water control measure, the ecological hydrology valley grass and the water and the ecology change and so on many aspects, thus promotes our country water resources research domain progress and the development.

6. Conclusion

To sum up, people's research on ecological hydrological process is still at a relatively simple stage. In order to further study the ecological hydrological process under water control, it is necessary to clarify the relationship between water control and ecological hydrology.

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