Research on Water Resources Carrying Capacity of Taiyuan City

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Abstract: In recent years, Taiyuan's economic development trend is good, the degree of urbanization has gradually deepened, and the population of urban and rural residents has expanded rapidly. The resulting conflicts between the environment and the supply and demand of resources have become more and more serious. Among them, the water resources situation facing Taiyuan City is not optimistic. Solving the current problems facing water resources is a major issue today. Therefore, this article takes the water resources carrying capacity of Taiyuan City as the research object, analyzes the water resources carrying capacity of Taiyuan City, and then puts forward corresponding suggestions, hoping to realize the harmonious development of water resources, society, economy and ecology in our city.

1. Introduction

Due to its special environmental conditions and geographical location, Taiyuan has become one of the cities with severe water shortages. Data show that the per capita water resources in Taiyuan City is 178m3, which is not more than one-eleventh of the national per capita water resources. The city's daily water supply is 1.4 million m3, of which industry accounts for 35.3%, agriculture accounts for 30.4%, and the remainder is urban life. As far as urban industry is concerned, the daily water supply seriously exceeds the normal available water supply. The daily water shortage plus the daily over-extraction of groundwater, the actual daily water shortage is as high as 470,000 m3. It can be seen that the serious shortage of water resources in Taiyuan City limits the level of urban economic development and at the same time affects the improvement process of the quality of life of the residents in our city.

2. Background and Significance of Topic Selection

2.1 Background of Topic Selection

Water is the source of all life. It is closely related to the growth of all living things. No living thing can grow without water. Water resources are one of the material materials that are the foundation of human social and economic development, and they are an indispensable and important role in nature [1]. Nowadays, water resources have brought an unprecedented impact on the world's environment and development. Whether from a national or regional perspective, the discussion of water resources security has always been one of the key issues of global concern [2]. With the rapid development of economy and science and technology, people's daily life, industrial and agricultural production, and environmental protection are increasingly dependent on water. Water has become the basic yardstick and indicator for formulating regional development plans and goals. The overall development of a country or region plays an important role.

2.2 Significance of Topic Selection

Theoretical significance: The carrying capacity of water resources is based on the predictability of scientific, technological, economic and social development in a certain period of development, and it follows the principles of sustainable development while ensuring a good ecological environment and maximizing the support of water resources. Reasonable allocation and the ability

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to support social development to the greatest extent [3]. In the field of sustainable development of water resources, one of the main measures to enable the rational allocation of water resources is to look at the level of their carrying capacity, which is the basic measure of the sustainable use of water resources, all about water and sustainable development, water and economic society In essence, his research topic will return to the question of thinking about carrying capacity. Therefore, the research on the carrying capacity of water resources is a necessary condition for solving many water problems.

3. Overview of Domestic and Foreign Literature

3.1 Overview of Foreign Research

Compared with China, the research results of individual resource carrying capacity in foreign countries are slightly less, and few people participate in the specific resources of a specific area, especially the single topic research on water resources carrying capacity. Generally speaking, only The sustainable development theory involves some related theories about the carrying capacity of water resources. For example, Harris et al. [4] focused on the study of agricultural production areas and used it as a criterion for assessing the development potential of the area. Scholars such as Falkenmark et al. [5] analyzed the influence of factors such as population, climate, ecology, and proposed reasonable management practices for industrialized countries in a semi-arid environment. Varis et al. [6] used the Yangtze River Basin as the background to analyze the impact of the acceleration of industrial processes and the weakening of the environment's own capacity on the carrying capacity of the Yangtze River Basin, and also evaluated the socio-economic development under different conditions.

3.2 Overview of Domestic Research

Compared with foreign countries, the research on water resources carrying capacity in my country is relatively late. It was first defined by the Xinjiang Soft Science Group in 1985. The group believes that after ensuring water for the ecological environment, the maximum amount of industry and agriculture and the number of population that can be supported by the remaining amount [7]. Subsequently, domestic research mainly focused on two aspects: the carrying capacity of water resources based on provinces, cities and administrative regions and the carrying capacity of regional water resources based on topography and economic circles.

In the field where the administrative region is the research object: Feng Dan et al. [8] established Chunhua County’s water resources carrying capacity evaluation model using system dynamics, and comprehensively put forward practical recommendations for the protection and utilization of Chunhua County’s water resources from all sides. Dai Minghong et al. [9] divided the water supply system in Guiyang into three levels, and then selected multiple indicators that could evaluate it, and then established a multi-level fuzzy comprehensive evaluation model, and used the results to evaluate it. Wang Li et al. [10] selected 17 evaluation indicators, and then used principal component analysis to reduce their dimensionality, and selected three subsystems: natural support of water resources, social living standards, and economic development levels, and then used the entropy method to analyze them. They assign weights and calculate the comprehensive score of Linhai City’s water resources carrying capacity.

4. Suggestions and Countermeasures

Based on the above analysis results, combined with the current development and utilization problems and constraints, this article puts forward the following suggestions.

(1) Comprehensively promote the construction of a water-saving society

In agriculture, speed up the transformation of water-saving technologies, build high-efficiency water-saving irrigation projects, actively promote the application of high-efficiency water-saving technologies such as sprinkler irrigation and micro-irrigation, and implement quota irrigation to increase the utilization rate of irrigation water. In terms of industry, strengthen the internal recycling

of water in the industry, vigorously popularize water-saving appliances and water-saving technologies in high water-consuming industries, and improve water use efficiency and recycling utilization. In terms of urban water supply, use high-quality water supply and drainage systems to reduce the occurrence of leaks, strengthen the leakage management and anti-leakage technology of the urban pipeline network, and reduce the leakage rate of the water transmission and distribution pipeline network.

(2) Strictly standardize water resources management system

After the actual investigation of the current situation of water resources in Taiyuan City, the development direction and scale are reasonably determined. Strengthen the unified management and unified allocation of water resources in Taiyuan City, strengthen guidance, promote the transformation of the growth mode, adjust the economic structure, and match the economic and social development with the load of the water environment. In order to improve the water resources management system of Taiyuan City, support the sustainable economic and social development of Taiyuan City, further strengthen the standardization and specialization of water resources protection, ensure the safety of water supply, and promote the construction of water resources ecological civilization.

(3) Control economic scale and optimize water use structure

Adjust the industrial structure and layout, prohibit the construction of enterprises that have high pollution to the water environment, promote the concentration of industrial parks, and strengthen the concept of clean industrial production. Municipalities should attach great importance to and accelerate the construction of sewage pipe networks and sewage treatment facilities to fully realize pollutant discharge control: formulate relevant discharge standards to make the discharge sewage standards higher and more stringent; the government should strictly supervise and ensure pollutant inspections Discharge after qualified and qualified; establish a total pollutant control system, and adjust the charging standard for discharged sewage within a reasonable level, and reduce pollution through market means.

(4) Coordinate multiple forces to improve water conservation awareness

Intensify publicity efforts in communities, sub-district offices, and rural areas, recruit volunteers to carry out various forms of publicity, and set up exhibition boards and posters to let people fully understand the current situation of water resources in Taiyuan City and related policies. Promote water-saving appliances. In this regard, the government can provide appropriate subsidies to increase people’s enthusiasm for use. The government should also actively change its concepts and coordinate the relationship between economic development, resource utilization and environmental protection so that it can develop in the long run. With the joint efforts of multiple forces, people’s awareness of water saving will definitely be improved.

5. Conclusion

Due to the limitation of my professional academic ability, although in this article I have conducted research and evaluation on the water resources carrying capacity of Taiyuan City, there are still many shortcomings that need to be continued.

(1) The overall research of Taiyuan City was emphasized in the research process, but the situation of each area of Taiyuan City was not analyzed in detail, so the evaluation result is relatively rough.

(2) Due to the limitation of data source channels, it is difficult to obtain more persuasive and representative indicators, which will affect the overall evaluation results, and there will be certain errors.

(3) Due to the lack of accurate index standard values, it has caused some influence on how to determine the classification standard of Taiyuan City. More information and data need to be further studied to specify an exact standard.

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