Study on The Characteristics of Temporal and Spatial Changes of Regional Water Resources

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Abstract. In order to accurately reflect the basic characteristics of the water quality of the different reaches of the Weihe River (Shaanxi section), this paper selects ammonia nitrogen, CODcr, total phosphorus, and total nitrogen, which are more serious and concerned about exceeding the standard in the surface water of the Yellow River basin based on a large number of survey data, draw the curve of four water pollution indicators along the Weihe River (Shaanxi section) in different water periods, and grasp spatially the environmental changes of different parts of the Weihe River (Shaanxi section), different upstream and downstream parts. And the contrast of quality changes, so that the river water quality evaluation is typical and representative, provide a basis for the comprehensive management of the Weihe River basin, and promote the sustainable development of the Guanzhong region.

1. Introduction

Water is an irreplaceable, indispensable natural resource for human life, social stability, and economic development. It is also an important part of the ecological environment. However, with the rapid development of the social economy, the scarcity of water resources and pollution have become increasingly serious and have become the “bottleneck” that restricts socio-economic development in many regions [1-2]. Therefore, rational use of environmental resources, reduction and control of environmental pollution has become one of the major issues that countries should consider in their economic development.

The Weihe River Basin is an important industrial, agricultural, scientific research and production base in Shaanxi Province with a dense population. However, the water quality of the dry and tributary rivers of the Weihe River has been deteriorating, and the living and production water of urban residents have been seriously affected. Therefore, the prevention and control of water pollution cannot be delayed. According to statistics, the amount of waste water flowing into the Weihe River accounts for about 80% of the Yellow River Basin in Shaanxi [3-5]. In order to ensure yellow water quality and water supply security, his paper selects ammonia nitrogen, CODcr, total phosphorus, and total nitrogen, which are more serious and concerned about exceeding the standard in the surface water of the Yellow River basin based on a large number of survey data, draw the curve of four water pollution...
indicators along the Weihe River (Shaanxi section) in different water periods, and grasp spatially the environmental changes of different parts of the Weihe River (Shaanxi section), different upstream and downstream parts. And the contrast of quality changes, and thus accurately reflects the basic characteristics of the water quality in different reaches of the Weihe River, and has important scientific value for the water environment management, water pollution control and water resources protection planning of the Weihe River in Shaanxi.

2. Evaluation section and indicators

2.1. Evaluation section selection
Weihe River pollution mainly occurred in Shaanxi province, Shaanxi linjia village section upstream canyon, shoal, water flow is urgent, less industrial and agricultural pollution, river water quality is good. Therefore, in order to reflect the water environment pollution of Weihe River, 13 monitoring sections of Shaanxi section of Weihe River were selected as evaluation sections. These sections fully consider the distribution of water systems, the location of major pollution sources and river functional zoning in the Weihe River basin, and can accurately represent the water quality status of the Weihe River mainstream.

2.2. Evaluation index selection
This paper focuses on the increasingly intensified pollution in the Shaanxi section of the Weihe River basin, and uses the Statistical Yearbook and the Environmental Statistics Yearbook of Shaanxi from 2005 to 2014 as the basic data. At the same time, according to the principle of selection of water quality assessment parameters, refer to relevant sections of Shaanxi Provincial Environmental Protection Bureau from 2005 to 2014. Analysis of water quality monitoring data found that the water pollution of the Weihe River is mainly organic pollution [6-7]. In this paper, four water quality parameters of ammonia nitrogen, CODcr, total phosphorus and total nitrogen were selected to draw the concentration variation curve of pollutant concentration along the main stream of the Weihe River. On the one hand, these four indicators are the most serious and most concerned water pollution indicators in the surface water of the Yellow River Basin. On the other hand, the four indicators that the country requires to focus on improvement.

3. Analysis on the Changes of Main Pollutants Along the Main River of the Weihe River
Fig. 1, Fig. 2, Fig. 3 and Fig. 4 show the variation curves of ammonia nitrogen, CODcr, total phosphorus and total nitrogen in the different stages of the Weihe River. From Figures, it can be seen that the concentration of ammonia nitrogen in the cross section of the Weihe River from Wushan to Huaxian gradually increases; the concentration of CODcr in the Weihe River's main stream exceeds the standard, and its concentration values in the Wen Feng, Xianyang Highway Bridge, Geng Town, and Huaxian County are relatively high. The trends of total phosphorus and total nitrogen are similar, and the cross sections of Chinese peak to north road, Linjia village to Yu town show an upward trend, and those of Tuoshi and Linjia village have the lowest values.

Through the statistical analysis of the indexes in the whole year, flood season, and non-flood season, the concentrations of ammonia nitrogen, CODcr, total phosphorus, and total nitrogen are all highest in the non-flood season, and the proportion of the poor V class is much higher than the flood season. The highest concentration of ammonia nitrogen in non-flood season and flood season is 2.80 times, while CODcr is 1.82 times, total phosphorus is 1.19 times and total nitrogen is 2.06 times. Based on the analysis of the pollution sources in each section of the basin, the non-point source pollution in the river basin is considered to be the main cause of ammonia nitrogen pollution. The amount of ammonia nitrogen discharged accounts for 76.54%, while the ammonia nitrogen emitted from point sources accounts for only 23.46%. CODcr, total phosphorus, and total nitrogen are mainly caused by point source pollution, that is, the pollution of industrial wastewater and urban domestic sewage is dominant.
(1) Ammonia nitrogen

![Ammonia nitrogen concentrations along Weihe River](image1)

**Figure 1.** The different water period ammonia concentration changes along the curve of Weihe River

(2) COD

![COD concentrations along Weihe River](image2)

**Figure 2.** The different water period COD along the curve of Weihe River
(3) Total phosphorus

![Total phosphorus graph]

**Figure 3.** The different water period total phosphorus concentration changes along the curve of Weihe River

(4) Total nitrogen

![Total nitrogen graph]

**Figure 4.** The different water period total nitrogen concentration changes along the curve of Weihe River

4. **Conclusion**

Through the analysis of the change of ammonia nitrogen, CODcr, total phosphorus, and total nitrogen concentration in different water phases of the Weihe River, the four pollution indicators are all highest in the non-flood season, and the proportion of the poor V category is much higher than that of the flood season, causing the pollution to increase. This is due to the reduction in the amount of ecological water in the river channel and the decrease in self-purification capacity, i.e., the pollution in the non-flood season is even more serious. Through the analysis of the pollution sources in each section of the basin, the non-point source pollution in the river basin is considered to be the main cause of ammonia nitrogen pollution, while CODcr, total phosphorus, and total nitrogen are mainly caused by point source pollution, i.e., the pollution of industrial wastewater and urban domestic sewage is the Lord.

The basic requirement of river water quality assessment is to understand the law of movement of major river pollutants [8-9]. Therefore, it is necessary to master the dynamic changes of pollutants in different periods and seasons in time; in the space, it is necessary to grasp the environmental changes...
of different river sections, different parts of upstream and downstream, and the contrast of quality changes. Only by understanding and mastering these basic laws can the river water quality evaluation be typical and representative, so as to accurately reflect the basic characteristics of different river water quality.

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