

# Quantitative Assessment Method and Application of Human-Water Harmony

Qiting Zuo<sup>1,2,\*</sup>, Xing Li<sup>1</sup> and Zengliang Luo<sup>1</sup>

<sup>1</sup>School of Water Conservancy & Environment, Zhengzhou University, Zhengzhou 450001, China

<sup>2</sup>Zhengzhou Key Laboratory of Water Resource and Environment, Zhengzhou, 450001, China

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## 1. Abstract

Since the effect of human activity and climate change, water resources and environment are getting worse over the world. Human-water contradiction and its associated ecological and environmental problems have become an important obstacle to sustainable development of human beings [1]. Under these circumstances, how to quantify the relationship between human and water has become a hot topic of study for supporting the regional and global sustainable development. For example, the China Water Week held in 2004 set “Human–Water Harmony” as the theme. Therefore, forming a quantitative method for assessing the harmonious relationship between human and water is very important for the harmonious development between human and water [2-5].

The human-water quantitative assessment method of harmony (HWHQ), which is proposed by Zuo in 2009. HWHQ is constituted of a set of methods for studying the harmonious development of complexed human-water system based on the theories of human-water harmony, sustainable development, scientific outlook on development, construction of ecological civilization, connecting strategy of river and lake system, including the methods of harmony identification, harmony assessment and harmony regulation (**Figure 1**). The HWHQ can effectively evaluate the harmonious relationship between human and water interaction for revealing the impact of human activities on the change of water system. Finally, the HWHQ method can help to develop a series of optimization methods for promoting the harmonious development of regional human and water. The application and development of the HWHQ method is important to alleviate the contradiction of human-water system and promote the scientific management of water resources in basins.

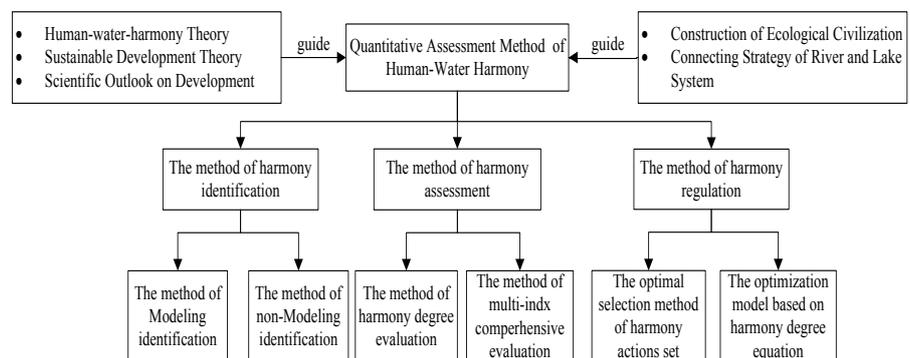


Figure 1: The method system of human-water harmony quantification

\*Corresponding Author (s): Qiting Zuo, School of Water Conservancy & Environment, Zhengzhou University, 100 Kexue Avenue, Zhengzhou, 450001, Henan, People's Republic of China. zuoqt@zzu.edu.cn

The HWHQ method has currently been widely used in studying human-water relationships and achieved satisfactory results. First, it was used to assess the harmonious development level between human and water. The main applications include human-water harmony assessment at the large and small scales in basins and regions. These applications can provide some valuable experience for the harmonious development of human and water in basins and regions [6]. Second, the method can be used to solve problems such as transboundary river water division and water resource optimal allocation. Third, the method has been successfully applied to assess the harmonious development between water resources and social economy by analyzing quantitatively the balanced state among economy, society and water resources. Particularly, the application of the method in Henan Province and Xiangyang City show that the evaluation results are consistent with the actual situation of study areas [7-8]. Fourth, the method also can be used to assess the shortage of water resources and the status of river water environment. We believe that the HWHQ is an important method for assessing the relationship between human and water.

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