**Water Conservation Function and** **Sustainability Assessment of the Yellow River Source Region in China**

Du Y.H. 1,2, Long T.F. 1,2, Jiao W.L. 1,2\*

1 Aerospace Information Research Institute, Chinese Academy of Sciences (CAS), China

2 University of Chinese Academy of Sciences, China

\*jiaowl@aircas.ac.cn

***ABSTRACT***

The Yellow River Source Region (YRSR) is located in the northeastern part of the Qinghai-Tibet Plateau in China, covering the area above the Tangnaigai hydrological station. It is an important water-producing area and water conservation area in the Yellow River Basin, as well as an important ecological barrier for China's ecological security and regional sustainable development. As a vital component of the Qinghai-Tibet Plateau, known as the "Water Tower of China," the source region of the Yellow River has consistently played an essential role in water conservation and ecological regulation. An objective, scientific, and quantitative evaluation of the water conservation function and sustainability at the YRSR provides a robust scientific foundation for regional ecosystem planning, development, and ecological management decisions. Based on data from ecosystem runoff, precipitation, and evapotranspiration, this study assesses the water conservation in the YRSR from 2015 to 2022 via the water balance equation, and quantitatively analyzes its spatial distribution and change from multiple perspectives. The results indicate that the water conservation capacity in the YRSR exhibited a spatial distribution characterized by higher values in the south and lower values in the north in both 2015 and 2022, with significant spatial autocorrelation of high and low values clustering respectively. The water conservation capacity is relatively high in the administrative units located along the Yellow River in the southern part of the source area, with the grassland ecosystem contributing the most to water conservation. Over the 7-years period, both the area and capacity of water conservation in the YRSR increased. Wetland and grassland ecosystems contributed the highest water conservation capacity, while the increase in artificial ecosystems had a negative impact on water conservation capacity. Based on the "Pressure-State-Response" model and the analytic hierarchy process, a comprehensive assessment of the impacts of human activities, natural conditions, and ecosystem functions on the ecosystem health was conducted. The ecosystem health exhibited a pattern of lower values in the north and higher values in the south in both 2015 and 2022. Compared to 2015, the overall average health score increased by 0.0035 in 2022, indicating an improvement in the overall ecosystem health of the source region.

**Keywords:** Yellow River Source Region, water conservation, water balance equation, sustainability, ecosystem health assessment