

## Study on Horizontal Ecological Compensation Mechanism in Yangtze River Economic Belt Basin: Based on Evolutionary Game Analysis and Water Quality and Quantity Model

**Authors :** Tingyu Zhang

**Abstract :** The horizontal ecological compensation (HEC) mechanism is the key to stimulating the active participation of the whole basin in ecological protection. In this paper, we construct an evolutionary model for HEC in the Yangtze River Economic Belt (YREB) basin with the introduction of the central government constraint and incentive mechanism (CGCIM) and explore the conditions for the realization of a (Protection and compensation) strategy that meets the social expectations. Further, the water quality-water quantity model is utilized to measure the HEC amount with the characteristic factual data of the YREB in 2020-2022. The results show that the stability of the evolutionary game model of upstream and downstream governments in the YREB is closely related to the CGCIM. If (Protection Compensation) is to be realized as the only evolutionary stable strategy of the evolutionary game system composed of upstream and downstream governments, it is necessary for the CGCIM to satisfy that the sum of the incentives for the protection side and its unilateral or bilateral constraints is greater than twice the input cost of the active strategy, and the sum of the incentives for the compensation side and its unilateral or bilateral constraints is greater than the amount of ecological compensation that needs to be paid by it when it adopts the active strategy. At this point, the total amount of HEC that the downstream government should give to the upstream government of the YREB is 2856.7 million yuan in 2020, 5782.1 million yuan in 2021, and 23166.7 million yuan in 2022. The results of the study can provide a reference for promoting the improvement and refinement of the HEC mechanism in the YREB.

**Keywords :** horizontal ecological compensation, Yangtze river economic belt, evolutionary game analysis, water quality and quantity model research on territorial ecological restoration in Mianzhu city, Sichuan, under the dual evaluation framework

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