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Assessment for water resources bearing capacity based on Entropy model and EFAST weight algorithm in the Yellow River basin

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It is of great practical significance to analyze water resources load carry and clarify the bearing capacity of water resources in the Yellow River basin for the ecological protection and economic and social development with high quality of the Yellow River. The Entropy model and EFAST weight algorithm is coupled and employed to assess the water-resources bearing capacity in the Yellow River basin based on the double index of water quantity and quality. The results show that there are 78 groundwater overdraft areas existing, the total area and ultra-picks quantity of which is 2.26×10^4 km² and 14×10^8 m³, respectively. Massive cones of depression are developing like Yinchuan and Dawukou in Ningxia province; Fengdong, Xinghua, Lvqiao and Weibin in Shaanxi province; Songgu, Taiyuan and Yuncheng in Shanxi province; Wuzhi, Wenxian and Mengxian in Henan province. Moreover, 47 of 70 assessed prefecture cities are in the state of overload or severe overload, in which, there are 24 severe-overload prefecture cities and the proportion is 34.3%, and the number of overload prefecture cities is 23 accounting for 32.9%. The overload and severe-overload regions concentrate in Gansu, Ningxia, Inner Mongolia, Shaanxi, Shanxi and Henan provinces at the upper and middle Yellow River. In conclusion, the current water supply has exceeded its water-resources bearing capacity in the Yellow River basin. Strengthening water saving, the construction of main-stream controlled reservoirs and water diversion are the effective ways to relieve the overload state.