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#### Research papers

A leader-follower-interactive method for regional water resources management with considering multiple water demands and eco-environmental constraints

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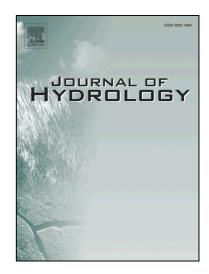
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## ACCEPTED MANUSCRIPT

A leader-follower-interactive method for regional water resources management 1 2 with considering multiple water demands and eco-environmental constraints 3 Yizhong Chen<sup>1</sup>, Li He<sup>1, 2</sup>, Hongwei Lu<sup>1, 2, \*</sup>, Jing Li<sup>1</sup>, Lixia Ren<sup>1</sup> 4 5 <sup>1</sup> School of Renewable Energy, North China Electric Power University, Beijing, 6 7 102206, China. <sup>2</sup>State Key Laboratory of Alternate Electrical Power System with Renewable Energy 8 Sources, North China Electric Power University, Beijing, 102206, China. 9 10 \* Corresponding author: Tel: +86-10-61772416; Fax: +86-10-61772416; Email: 11 12 luhw@ncepu.edu.cn 13 **Abstract:** This study presents the mathematical formulation and implementations of a 14 synergistic optimization framework based on an understanding of water availability 15 and reliability together with the characteristics of multiple water demands. This 16 17 framework simultaneously integrates a set of leader-followers-interactive objectives established by the different decision makers during the synergistic optimization. The 18 19 upper-level model (leader's one) determines the optimal pollutants discharge to satisfy 20 the environmental target. The lower-level model (follower's one) accepts the dispatch 21 requirement from the upper-level one and dominates the optimal water-allocation 22 strategy to maximize economic benefits representing the regional authority. The

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