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Development and Application of Dualistic Model in the Haihe River Basin

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Abstract: In order to completely resolve the "natural – artificial" dualistic characteristics of water cycle in the Haihe River Basin, which are caused by high intensity of human activities on water resources and water environment of the basin, the dualistic model is developed. The dualistic model is established by coupling a distributed hydrological and water quality model (WEP-L), a water resources allocation model (ROWAS) and a multi-objective decision-making analysis model (DAMOS). In the simulation and calculation of the model, two-hierarchy coupling and mutual feedback is adopted for the three models to simulate the "natural – artificial" dualistic water cycle process affected by intensity human activities in Haihe River Basin. In the process, the Haihe river basin is subdivided into 11752 hydrological simulation units and 125 planning and management units, and debugging and simulations of 50 years from 1956 to 2005 are carried out. The result shows that the simulation accuracy of established dualistic model is acceptable. Based on the acceptable accuracy, 9 scenarios are analyzed and simulated in the dualistic model, and the paper gives the results of the basin-level seven total amount control index including controls of withdraw on surface water and underground water, controls of water use for national economy and ecological environment, controls of pollution outlet, controls of evapotranspiration (ET) and water into the sea, and so on.
Key words: dualistic model; distributed hydrological model; water allocation model; multi-objective decision model; ET management, total amount control