

Water demand forecasting under changing environment: a System Dynamics approach

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Abstract A System Dynamics (SD) approach, focusing on water demand forecasting, was applied and developed based on the analysis of dynamic interactions among physical elements (natural runoff, groundwater recharge), environmental (water quality, ecosystem preservation) and socio-economic (population growth, water consumption, policy and management) aspects of water management elements in a regional water resources system. Through the analysis of multi-feedbacks and nonlinear interactions among system elements, a complex SD model was developed and applied in Tuwei River in the middle reaches of the Yellow River using water demand theory. The practical verification of the model shows that the relative error is small; therefore the model is reasonable structured to mimic the actual situation. Furthermore, total water demand of the whole basin can be also forecasted under the future changes of population, economic and climate scenario, and then propose the sustainable strategy for water demand management to achieve the goal of sustainable development in the whole basin.

Key words system dynamics; water demand forecasting; water management; climate change; Tuwei River