Optimal Operation of Conjunctive Surface Water and Grondwater in Tehran Metropolis

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Now days there are a lot of problem in supplying water recourses for different usage. This problem is because of the nonuniform spatial and temporal distribution of precipitation and fresh water resources from one side and explosion population in all over the world and especially in our country, Iran, from another side. In this study, Tehran metropolitan basin with more than 9 million populations and 500 square km has been applied to conjunctive surface and ground water resources. Tehran water resources, which meet the potable, agricultural, industrial, environmental and urban water demands, include five reservoirs and several aquifers. Surface water resources are the main resource of Tehran metropolitan water demands. Annually demand in Tehran metropolitan is more than 1000 MCM and based on historical data, in drought year, surface water resources couldn't supply all of demands. Recently, conjunctive use of surface water and groundwater has been one of the efficient ways in optimal management of water resources. Using conjunctive optimal use and conjunctive management, we can compensate the shortages of demands using interaction between different water resources as cyclic storage systems. In Cyclic storage systems there are two main resources including surface water system (reservoir or river) and groundwater (aquifer or groundwater storage). Besides the hydraulically and physically interaction between the resources, there are close relation among them through predefined operation policy.

Conjoint using of optimization and simulation techniques is one of efficient and powerful ways in defining conjunction management strategy and developing the management model for conjunctive optimal use of surface water and ground water. Without

recent advances in computer hardware and software technology such as geographic information system (GIS) and data base management system technology (DBMS), it is not possible to develop a computer base conjunctive management of groundwater and surface water model. In this research a Decision Support System which is based on effective graphical use interface, DBMS and a developed method for solving large scale water resource management problem has been developed. In this research for incorporating of simulation results to management model of conjunctive system, embedding approach has been used. Developed network flow models for analyzing optimal management of conjunctive use of surface water and groundwater have been used. The real physical system is represented in this system as a network system including nodes and links. Nodes are used for representing storage and non-storage points and links represent the natural channels or canals as connecting elements. Dynamically designing of this model allows the user to interactively develop the given water resource system. A mixed integer linear programming is used for optimum conjunctive operation of groundwater and surface water systems. Results obtained show the ability of the developed tools and optimization model in conjunctive optimal management of large scale water resources systems.