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Water Demands Management

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STATEMENT

This dissertation is submitted to Ain Shams University for the Degree of Master of Science in Civil Engineering.

The Work included in this thesis was carried out by the author in the Department of Irrigation & Hydraulics – Ain Shams University from 1999 to 2005.

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Abstract

The water budget situation in Egypt is a critical and attracting an increasing attention. Serious challenges are facing Egypt for future concerning with this issue. So, The Ministry of Water Resources and Irrigation has many projects and studies for the water demands management, to reduce the gap between supply and demand to meet the national and regional development objectives.

Demand Management (DM) is a policy for water sector, which stresses for making better use of existing supplies, rather than developing new ones, like waste reduction, economy in water use, the development of water use efficiency and the greater use of economic instruments (prices, markets). Also, it is useful to have accurate methods for predicting future water demands, to know the water demands in certain period in the future, implementing new policies by the decision makers to get water demands management based on many alternatives scenarios and then get the target.

Accordingly, one of the objectives of this research is to use a demand model to obtain demand projection, based on time series of historical data for water demand in a pilot area. The model, used in this research, called water demand forecasting model which has two modules in projection, short-term model (up to 5 years) and the long-term model (long data extrapolation) programming with Oracle Software.

On the other hand, Microsoft Excel spreadsheets is used to prepare the data collected from many sources concerning with the historical data about water demands for various usage. Also, the same program used for getting the final output of the analysis results.

About the case study which has applied in this research, Gharbia Governorate and all the administrative centers in it, were chosen to achieve the objectives from all analysis concerning with the major sectors of water demand (municipal, agriculture, industrial, fish Farming and livestock).

In this research, several developing methodologies were suggested through the applications of the case study, based on the availability of collected data and its accuracy for the present and future water demand, for obtaining the procedure of forecasting to be followed according to the reliability of the collected data as high or low reliability estimation for each sector of water demand.

One of the research results is the application of the water demands forecasting, on level of the administrative centers in Gharbia Governorate. Therefore, using the fuzzy logic system for water demands forecasting considering effects (water pricing, technology change, population growth...etc.) gives a useful tool to get several alternative scenarios, which are applied on all the administrative centers and with specific analysis for Tanta and El-Mahala Elkobra, applying suitable comparative analysis based on the different scenarios whether considering effects on water demands or not, in order to have a clear view for the difference in water demand along the duration of the predicting (up to year 2017), and achieving better water demands management, with taking the available water resources and their limitation in mind.

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