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## A pilot Simulation System Study on Kuwait Groundwater

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### Abstract:

The aim of this study was to design a conceptual system to provide a sustainable water source at a feasible cost. The conceptual design system was developed to address the problem of water scarcity and sustainability in general, and specifically to represent the Kuwaiti water quality and quantity limitation problem. The conceptual design system consists primarily of utilizing brackish groundwater in conjunction with treated wastewater augmentation and a reverse osmosis unit for plant production. This paper presents a part of the study that directed to test the physical and climatic performance, and the durability of the conceptual design system. Visual basic, lump, model simulation approach was simulated for different ranges of hydrologic, hydrogeologic, and climatic parameters to determine the total power and treated wastewater consumption. From the performance test results, the increase in evapotranspiration had the highest increase effect on the system total power consumption per unit area and the highest increase effect on the treated wastewater consumption per unit area. On the other hand, the increase in the aquifer porosity had the least increase effect on both the total power consumption and the treated wastewater consumption by the system. In contrast, the hydraulic conductivity increase had no direct effect on either the total power consumption or on the treated wastewater consumption per unit area.

**Keywords:** Groundwater, Groundwater model, Treated wastewater Injection, Reverse Osmosis, Evapotranspiration, Porosity, Hydraulic conductivity, Water table head, Groundwater salt concentration.