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# Integrated water resources management of the Ichkeul basin taking into account the durability of its wetland ecosystem using WEAP model

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The Conservation of coastal wetlands in the Mediterranean area is generally faced with development issues. It is the case of Tunisia where the precipitation is irregular in time and space. For the equity of water use (drinking, irrigation), there is a planning at the national level allowing the possibility of water transfer from regions rich in water resources to poor ones. This plan was initially done in Tunisia without taking into account the wetlands ecosystems and their specificities. The main purpose of this study is to find a model able to integrate simultaneously available resources and various water demands within a watershed by taking into account the durability of related wetland ecosystems. It is the case of the Ichkeul basin. This later is situated in northern of Tunisia, having an area of 2080 km2 and rainfall of about 600 mm/year. Downstream this basin, the Ichkeul Lake is characterized by a double alternation of seasonal high water and low salinity in winter and spring and low water levels and high salinity in summer and autumn that makes the Ichkeul an exceptional ecosystem.

The originality of this hydrological system of Lake-marsh conditions is related to the presence of aquatic vegetation in the lake and special rich and varied hygrophilic in the marshes that constitutes the main source of food for large migrating water birds.

After the construction of three dams on the principle rivers that are feeding the Ichkeul Lake, aiming particularly to supply the local irrigation and the drinking water demand of cities in the north and the east of Tunisia, freshwater inflow to the lake is greatly reduced causing a hydrological disequilibrium that influences the ecological conditions of the different species.

Therefore, to ensure the sustainability of the water resources management, it's important to find a trade off between the existing hydrological and ecological systems taking into account water demands of various users (drinking, irrigation fishing, and ecosystem sustainability). All these particularities of the Ichkeul watershed are modeled through the use of WEAP model (Water Evaluation and planning system). This model aims to incorporate supply, demand, water quality and ecological considerations into a practical yet robust tool for integrated water resources planning. For surface water supply, WEAP requires among other data head flow, and evaporation rate for every reach. For quantifying demands, a GIS water resources and uses was implemented on the watershed. Many studies were done to prepare the input data. WEAP results show that the pressure on Ichkeul water resources is increasing leading to greater problems of unsatisfied demand. Different solutions were tested and evaluated. This study illustrates that WEAP offers the possibility to compare several scenarios of water management concerning dams, aquifers and demands. Therefore it could be used to negotiate and discuss water sharing between all stakeholders to improve integrated water resources management.