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Anthropogenic Impact on Surface and Groundwaters Quality in the Western Part of the River Nile, Elsaff Village, Giza

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Abstract : The study area is located in the southern part of Giza Governorate at both side of the Nile Valley. A combination of major and trace elements have been used to classify surface- and ground-waters in El Kurimat village, Egypt. The main purpose of the project is to investigate the surface-and ground-waters quality and hydrochemical evaluation. The situation is further complicated by contamination with lithogenic and anthropogenic (agricultural and sewage wastewaters) sources and low groundwater management strategies. The Quaternary aquifer consists of sands and gravels of Pleistocene age intercalated with clay lenses and overlain by silty clay aquitard (Holocene). The semi-pervious silty clay aquitard of the Holocene Nile sediments cover the Quaternary aquifer in most areas. The groundwater flows generally from southwest to northeast. To achieve this target, thirty five and seventy three samples were collected from surface– and ground-waters within summer and winter seasons 2009-2010). Total dissolved solids (TDS), cations, anions, NO2, NO3, PO4 , Al, Ba, Cd, Co, Cr, Cu, Fe, Mn, Ni, Pb, Zn, As, F, Sb, Se, Sn, Sr and V) were determined in water samples. Grain size analysis was achieved to eight soil samples and measured the organic matter percent in different fractions. The TDS concentration is high in Arab El Ein canal by lithogenic and anthropogenic sources. The average concentrations of TDS in the River Nile are 245 (summer) and 254 ppm (winter). NO3 content ranges from 1.7 to 12 mg/l (summer), while in winter it ranges from 0.4 to 2.4. Most of the toxic metal concentrations are below the drinking and irrigation guidelines except Mn, V, Cr, Al, and Fe, which are higher than the guidelines in some canals and drains. The TDS concentration in groundwater increases toward northeastern and northwestern part of the study area (i.e. toward limestone plateau). It is due to hydrogeological interconnection between Quaternary and Eocene aquifer (saline water), wastewater dump and recharge from wadi El Atfihi wastewater. There is a good match between the hydrogeology and the hydrogeochemistry. Total dissolved solid in groundwater increases toward southwestern part, may be due to hydrogeological interconnection between Quaternary and Eocene aquifer and leakage from agricultural waste water of El Mohut drain. Fe, Mn, Cr, Al, PO4 and NO3 concentrations are high due to anthropogenic sources, therefore they are unsuitable for drinking. The average concentration of Cr, Cu, Fe, Mn &Zn are higher in winter than those in summer due to winter drought. The organic matter content in soil are increases in the northeastern and southwestern part, with different fractions, sue to agricultural wastewaters. Reused of contaminated surface- and ground-waters samples by mixing with fresh water (By AquaChem) was estimated to increase the income per capita.

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