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## Extended Abstracts

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title: **Hydrogeophysical study of well fields for drinking water supply for the city of Damascus**

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This research aims to evaluate the ability for pollution of the quaternary aquifer, which directly recharge the well-fields for drinking water supply of the city of Damascus under the geological and hydrogeological conditions of the aquifer and the pollution sources spreading nearby.

To achieve this aim, a geological, hydrogeological and hydrogeophysical studies were carried out using the available geological data of boreholes, the geophysical measurement, the results of water level monitoring, the chemical analysis of ground-water and the pumping tests analysis. A surface geo-electrical sounding (VES, R.VES, SP, EP) and geophysical well logging were executed, groundwater samples for chemical analysis were collected and field survey of pollution sources, affecting the aquifer, was carried out.

Data analysis and interpretation as well as data correlation were done, using an advanced package of computer software. As a result the following deductions were reached:

- Neogene–Quaternary sediments in Damascus plane form a complex aquifer system consists of several water bearing horizons of different depths and different thickness.
- Alluvial deposits and partly proluvial (a – ap Q iii – iv) are dominant in the area of drinking water well field. The thickness of these deposits exceed 300 m, but the effective and productive thickness is in the range of 40–100 m, which is due to the increase of clayey facies with depth.
- The zone of aeration in the studied area is loamy to clayey with sands and gravels; its thickness varies between 1 m up to 29 m.
- The aquifer in the well field is inhomogeneous and the coefficient of permeability is widely variable. It changes from 0.5 m/day up to 146 m/day, which reflects a variable water productivity presented by changing in the value of transmissivity that is ranging from 500 m<sup>2</sup>/day up to 6000 m<sup>2</sup>/day.
- A preliminary assessment of the productivity of the well fields has been done through calculation of the mathematical formula that simulates the discharge as a function of draw down in each field. A rating of the studied fields could be done according to their productivity, starting with Ibin-Asaker (Al-Talae & Baitara) as the most productive field followed by Joubar, Kadam (Sikka), Kaboun, Amawieen and ending by Madina Jameieah.
- Indications of high pollution has been noticed in the surface water which recharge the aquifer in the area of well-fields, also high nitrate pollution has been noticed in the ground water, with some heavy metals pollutants still under the permissive limit.
- Sources of pollution surrounding the studied well-fields were located including the following pollutants: Nitrate, lead, Chromium, Cadmium, Arsenic, Zinc, Mercury, Copper, Iron. Those sources of pollution are endangering the ground water to be polluted in the future.
- A calculation of DRASTIC indices has been done for each well field, and as a result it was possible to classify the well-fields area for drinking water supply of Damascus City into three groups, according to its ability to pollution.

As a result, the study has proved, depending on geological and hydrogeological characteristics of the aquifer in the area of drinking water well-fields in Damascus city, that this aquifer is highly vulnerable to pollution, and the existence of pollution sources spreading in the surrounding area increases the danger of pollution of the aquifer. Immediate measures should be taken

to establish zones of protection surrounding the well fields to ensure sustainable and healthy source of drinking water.

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