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Spatial Variations in the NORMs, Trace Metal Concentrations and Physicochemical Parameters in the Groundwater of Qatar- A Comparative View between the Past and Present

This study presents a recent overview of the status of Qatari groundwater (QGW) in terms of its NORMs, trace element content and physicochemical parameters. This study was necessitated because the last comprehensive study on groundwater characteristics of Qatar was conducted and presented by Schlumberger Water Services (SWS) in 2009 and since then there has not been a study conducted to give a holistic view of the QGW covering the entire State of Qatar. Hence the present study, is a follow-up to the SWS findings, 10 years apart. This study will report on spatial variations in NORMs concentration in the QGW. It will discuss the physicochemical parameters and trace metals content of the QGW. QGW samples were collected and analyzed from 80 locations around Qatar. The trace elements concentrations in the groundwater were evaluated using ICP-MS and ion chromatography. The analysis of the GW has shown some alarming results. The NORMs analysis on the sampled groundwater showed some values exceeding the internationally recognized standards such as WHO and US-EPA. While the pH values were within the standards set by the WHO, USEPA and Qatar guidelines for drinking water; conversely, the electrical conductivity and the TDS values exceeded these standards. The TDS concentrations of the QGW varied across Qatar. The highest TDS value was 29,890 mg/l whereas the lowest and the mean values were 705.9 mg/l and 7,481 mg/l, respectively. Moreover, 42, 29 and 46 QGW wells exceeded Qatar guidelines for drinking water, Qatar guidelines for irrigation and USEPA, respectively. Moreover, the comparison of the results from this work to Schlumberger's results have shown that quality of the Qatari groundwater is deteriorating due to the extreme over pumping and the low recharge rate. The level of Boron, Molybdenum and Lithium were significantly higher than the Qatar Guidelines, WHO and USEPA for drinking water and irrigation. The concentrations of boron in five samples exceeded Qatar and WHO drinking water guideline of 2.4 mg/L. Likely, 42 samples exceeded the Lithium level set by Qatar guidelines for drinking water. Furthermore, three samples exceeded the Molybdenum level set by Qatar Guidelines and WHO whereas 10 samples were above the USEPA irrigation standard. The results from this work can help in better understanding and managing the groundwater resource in Qatar, which is extensively used in agriculture, in order to extend its presence as a strategic, clean and vibrant resource for water for the country.

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