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The Phenomenon of the Seawater Intrusion with Fresh Groundwater in the Arab Region

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Abstract : In coastal aquifers, the interface between fresh groundwater and salty seawater may shift inland, reaching coastal wells and causing an increase in the salinity of the water they pump, putting them out of service. Many Arab coastal sites suffer from this phenomenon due to the increased pumping of coastal groundwater. This research aims to prepare a comprehensive study describing the common characteristics of the phenomenon of seawater intrusion with coastal freshwater aquifers in the Arab region, its general and specific causes and negative effects, in a way that contributes to overcoming this phenomenon, and to exchanging expertise between Arab countries in studying and analyzing it, leading to overcoming it. This research also aims to build geographical and relational databases for data, information and studies available in Arab countries about seawater intrusion with freshwater so as to provide the data and information necessary for managing groundwater resources on Arab coasts, including studying the effects of climate change on these resources and helping decision-makers in developing executive programs to overcome the seawater intrusion with groundwater. The research relied on the methodology of analysis and comparison, where the available information and data about the phenomenon in the Arab region were collected. After that, the information and data collected were studied and analyzed, and the causes of the phenomenon in each case, its results, and solutions for prevention were stated. Finally, the different cases were compared, and the common causes, results, and methods of treatment between them were deduced, and a technical report summarizing that was prepared. To overcome the phenomenon of seawater intrusion with fresh groundwater: (1) It is necessary to develop efforts to monitor the quantity and quality of groundwater on the coasts and to develop mathematical models to predict the impact of climate change, sea level rise, and human activities on coastal groundwater. (2) Over-pumping of coastal aquifers is an important cause of seawater intrusion. To mitigate this problem, Arab countries should reduce groundwater pumping and promote rainwater harvesting, surface irrigation, and water recycling practices. (3) Artificial recharge of coastal groundwater with various forms of water, whether fresh or treated, is a promising technology to mitigate the effects of seawater intrusion.

Keywords : coastal aquifers, seawater intrusion, fresh groundwater, salinity increase, Arab region, groundwater management, climate change effects, sustainable water practices, over-pumping, artificial recharge, monitoring and modeling, data databases, groundwater resources, negative effects, comparative analysis, technical report, water scarcity, groundwater quality, decision-making, environmental impact, agricultural practices
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