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Efficacy of managed aquifer recharge to reduce the impact of climate change on coastal aquifers

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The best fit of tide-gauge measurements of two monitoring stations, located along Puglia coast (Southern Italy), provided local sea level rise (LSLR) rate of 8.8 mm/y during 2000-2014 years. This local rate matches 21st and 22nd century projections of the rate of mean global sea level rise, which includes ocean thermal expansion, glaciers, polar caps, Greenland and Antarctica's ice sheets melting and by including changes in soil water storage. Under the assumption that this sea rise rate will remain constant, an increasing of seawater intrusion will be produced into the Puglia and others Mediterranean coastal aquifers. Model simulations have been applied to the Ostuni (Puglia) groundwater in order to quantify seawater encroachment in fractured coastal aquifers due to LSLR. The model implemented the Ghyben-Herzberg's equation of freshwater/saltwater sharp interface in order to determine the amount of the decrease in groundwater discharge due to the maximum LSLR during 22nd century. Since model results have foreseen an impressive depletion (over 16%) of groundwater discharge, MAR actions have been tested to prevent the seawater intrusion. The study has confirmed the suitability of MAR for enhancing the integrated water resources availability by reducing future groundwater depletions. MAR recovered 80L/s of groundwater as a new source of water supply during summer at the Ostuni area. Therefore, MAR can be a useful measure to mitigate the impact of climate change on coastal aquifers as a direct measure, due to reducing salt water intrusion, and as an indirect one, due to increasing water resource.

Biography

Michele Vurro is the Head of research and is Scientific Coordinator of Integrated Water Resources Management at IRSA-CNR. He has been involved in research on mathematical models of flow, transport and diffusion in groundwater and in unsaturated zone, groundwater artificial recharge. He is carrying out research on impact of climate change to water resources and adaptation strategies to combat climate change condition. He has published more than 30 papers in international peer-review journals.

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