A HYDROGEOLOGICAL STUDY TO SUPPORT THE OPTIMIZED MANAGEMENT OF THE MAIN SEA LEVEL AQUIFER OF THE ISLAND OF MALTA

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The Maltese Islands are located in the central Mediterranean area, on the Malta-Sicily Platform. The archipelago consists of three main islands, Malta, Gozo and Comino, and several small uninhabited islets. Malta, the largest of the three islands, has an extent of 246 km^2.
The islands present a typical central Mediterranean semi-arid climate with hot dry summers and mild wet winters. The mean-annual rainfall stands at around 550 mm but with high inter- and intra-annual variability. The size of the islands precludes the formation of significant bodies of surface water and therefore the main natural water resources of the islands are the groundwater aquifer systems, in particular the sea-level aquifer systems present in the two larger islands. These aquifer systems are sustained in a carbonate formation (the Lower Coralline Limestone) and take the typical shape of a Ghyben-Herzberg freshwater lens.
The high population density of the islands is also reflected in a high level of urban development, where around 25% of the total land area of the islands has been built up. This has altered the physical characteristics of the landscape by significantly increasing the quantity of impermeable surfaces, thereby reducing infiltration processes to groundwater, and increasing the generation of rainwater runoff following rain events.
The islands thus present a mixed land-use scenario where domestic, agricultural and commercial activities are operating side by side and depending on the same type of water resources. Of particular reference is the islands' highly developed tourism and recreational sector which places added strain on the water supplies during the dry summer months. Groundwater use for municipal supply is supplemented by the use of sea-water desalination by reverse osmosis. The agricultural sector is mainly dependent on groundwater resources, although water re-use is currently being introduced on a wide scale to supplement (and replace) groundwater use. The use of alternative water resources has thus, in recent years, reduced the pressures on groundwater resources.
The aim of this paper is to describe the collaboration between CNR and EWA aimed at the undertaking of a hydrogeological study to support the eventual development of management tools for optimizing the use of Malta's groundwater resources, with specific focus on the main sea-level aquifer system in the island of Malta. As part of this collaboration a review of the hydrogeological environment of the aquifer systems has been undertaken and important data gaps have been identified and are being addressed. The eventual groundwater body

management tool to be developed under this collaborative initiative will enable the formulation and testing of updated groundwater exploitation strategies which ensure the protection of the groundwater bodies from regional and localized sea-water intrusion, whilst taking full consideration of the potential effects of climate change, including the variability of recharge, sea level and seawater salinity.