

AN APPROACH TO ASSESSING AQUIFER-RIVER INTERACTIONS AT MARBELLA-ESTEPONA PLIOQUATERNARY AQUIFER (SOUTHERN SPAIN)

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Résumé/Abstract

The Marbella-Estepona aquifers are located at the southwest of the Malaga province, in the coastal area comprised from Estepona (to the west) to Cabopino dunes (to the east), with a permeable outcrop of about 80 km². From a geological point of view, aquifers are made up by two main lithological domains: the lower one (Pliocene) and the upper one (Quaternary) that lie over a basement formed by peridotites and gneisses of the Alpujarride Complex and shales and graywackes of the Malaguide Complex.

The coastal zone of the study area presents topographic heights that do not overcome 200 meters of altitude and it is limited, north, for higher reliefs. This mountain range constitutes the headwaters of several intermittent streams, as the Padron, Guadalmanza, Guadalmina, Guadaiza and Real rivers. Most of them are regulated by dams to supply population and agricultural water demands.

By means of a series of differential flow rate measurements carried out between January 2013 and March 2014, there has been possible to determine the great seasonal and spatial variability of the aquifer-river interactions. These interactions are directly related to the water quantity status of the aquifers prior to the rainfall events. In general, first rainfall episodes at the beginning of the hydrological year give rise to the major values of aquifer recharge to recover the depletion produced during dry season. Thus, the aquifers improve its quantity status, owing to a rise of the piezometric heads, the groundwater flows tend to move toward the streams. This functioning is more obvious close to river mouth.

Finally, it has been performed a conceptual hydrogeological model about aquifer-river interactions based on streamflow measurement and hydrochemical and isotopic information.