

Hydrogeological characterization of peculiar Apenninic springs

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Abstract In the northern Apennines of Italy, springs are quite widespread over the slopes. Due to the outcropping of low-permeability geologic units, they are generally characterized by low-yield capacities and high discharge variability during the hydrologic year. In addition, low-flow periods (discharge lower than 1 L s^{-1}) reflect rainfall and snowmelt distribution and generally occur in summer seasons. These features strongly condition the management for water-supply purposes, making it particularly complex. The “Mulino delle Vene” springs (420 m a.s.l., Reggio Emilia Province, Italy) are one of the largest in the Apennines for mean annual discharge and dynamic storage and are considered as the main water resource in the area. They flow out from several joints and fractures at the bottom of an arenite rock mass outcrop in the vicinity of the Tresinaro River. To date, these springs have not yet been exploited, as the knowledge about the hydrogeological characteristics of the aquifer and their hydrological behaviour is not fully achieved. This study aims to describe the recharge processes and to define the hydrogeological boundaries of the aquifer. It is based on river and spring discharge monitoring and groundwater balance assessment carried out during the period 2012–2013. Results confirm the effectiveness of the approach, as it allowed the total aliquot of discharge of the springs to be assessed. Moreover, by comparing the observed discharge volume with the one calculated with the groundwater balance, the aquifer has been identified with the arenite slab (mean altitude of 580 m a.s.l.), extended about 5.5 km^2 and located 1 km west of the monitored springs.

Key words groundwater; discharge monitoring; hydrogeological balance; northern Apennines, Italy