



Assessment of the impact of human activities on karst aquifers in Salento (southern Italy)

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Karst environments are particularly susceptible to negative impacts from human activities, due to a number of geological, morphological and hydrogeological features. The intimate connection between surface and underground drainage, and the rapidity with which surface water (and the potential contaminants as well) may enter and percolate down through the carbonate rocks, result in an overall fragility of the karst landscape, and in high vulnerability of the karst aquifers. The present contribution describes a case study in the Salento Peninsula (Apulian karst of southern Italy): the Burgesi area has been intensely used to quarry limestones, and later on become site of several illegal landfills where solid and liquid wastes were dumped, with serious consequences for the groundwater resources. In the very flat landscape of the study area, the most typical karst feature is represented by dolines with a well-defined circular shape, deep less than 10 meters. They can be mostly considered as collapse dolines, being originated from sinking of vault caves. Some of them were originally filled, usually for most of their depth, by residual soils, but these materials have been extracted in the past, and the initial landform consequently changed. Heavy changes occurred in fact in the last years because of anthropogenic activities such as stone clearing, removal of the soil cover, and intense quarrying activities. Multi-year aerial photo interpretation, integrated with recent field surveys, allowed to assess the areal distribution of the quarrying activity during the last 30 years. Besides quarrying activity, further serious environmental problems occurred when the sites began to be used to dump solid and liquid wastes. Since 1980, several episodes of pollution had to be registered, the most serious of which consisted in heaping in the quarries of some hundreds of drums containing highly contaminated waste industrial oils. The possibility of ground water contamination at Burgesi has been analysed by considering a number of factors,

including the characteristics of the landscape, the unsaturated (vadose) zone and the aquifer (or saturated zone). To evaluate the impacts of quarrying stones on the aquifer vulnerability, two levels of geological analyses have been performed. The first coincides essentially with the assessment of the pollution potential, that is the intrinsic vulnerability of ground water at the site. The second level consists of detailed geological mapping addressed at the identification of stratigraphy, tectonic features, and surface and underground karst landforms. In addition, this second level of geological analysis represents an attempt toward evaluation of the more likely propagation of polluting substances by means of a combination of real observations and characteristics of the karst system. A significant increase in the intrinsic vulnerability of the aquifer as a consequence of the quarrying activity has been assessed. Nevertheless, fast drainage from the landscape to the aquifers through discontinuities in the rock mass, and development of karst systems can be hypothesized. As a consequence, pollutants may be drained from the ground surface to the aquifers in a very short time. This paper intends to remark the high fragility of karst and the need to correctly manage such environment, aimed at the preservation of the natural landscape and of the quality of karst aquifers.