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Determination of nitrate pollution due to agricultural activities in the Ionian coastal plain aquifer (Basilicata, Southern Italy).

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The study deals with the groundwater quality of the Ionian coastal plane of the Basilicata Region (Southern Italy). Various hydrochemical surveys, carried out from 2003 to 2006, indicate that nitrate pollution is a serious problem affecting the groundwater.

Many factors, connected to the geological and tectonic evolution, are relevant in the hydrogeological setting and characterisation of the coastal plain. In spite of a compressive tectonics between the Apennine chain on the W side and the Apulian platform on the E side of the Bradanic foredeep, in the late Pleistocene a very important extensional or trans-tensional tectonics took place. The morphology of the lower part of the Bradanic foredeep is marked by a number of marine terraces, which develop parallel to the Ionian coastline.

The coastal aquifer system is defined by the sequence of five alluvial estuarine riverbeds, up to 120 m deep, alternating with alluvial and marine terraces and coastal sediments, transgressive over the blue clay basement, well delimited inland by the same blue clays and vanishing seaward under sea level. Moreover, inland, coarse sediments in the terraces of higher elevation constitute separate aquifers, always confined in their lower part by the blue clays.

In the last 20 years, great part of the land in the Ionian coastal plain, was devoted to

intensive agriculture, greatly increasing the use of nitrogen (N)-fertilizer.

Nitrate pollution risk in groundwater is related to the excessive application of agricultural nitrogen fertilizer, anthropogenic activities, and to the hydrogeological setting. Fertilizers and human activities are the principal nitrogen sources, while aquifer features, groundwater flow system and climate control the accumulation patterns of nitrates.

During the monitoring surveys, field water samples were collected from 100 wells, homogeneously distributed in the whole plain, to determine the water chemistry and the nitrate concentrations.

High concentrations of nitrates, occur in groundwaters especially in the terraces but also in the vicinity of urban areas and locally in other parts of the plain. In some places, the nitrate concentration exceeds the maximum of 50 mg/l, prescribed by law. Relatively high nitrate concentrations are found as well in a few springs located at the foot of the terraces area.

The N-E area and the coastal zone close to the coastline are characterized by low nitrate pollution risk because of the minor density of agricultural activities and prevalence of tourist structures. In these areas, nitrate concentrations are less than 25 mg/l.

In the alluvial aquifer seasonal variations in nitrate concentration occur.

With reference to each survey, a groundwater nitrate concentration map was reconstructed. Map comparison evidences the determining role of the groundwater flow system and a dilution effect on nitrate concentrations during precipitation season. Moreover the coastal plain is greatly washed by waters coming from irrigation. Instead, near the principal urban center and in the inland region, where the land use recognition shows intense agricultural activities, the dilution is not relevant.