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Evaluation of the groundwater quality in the Alcochete area using GIS tools

V. Cavaleiro⁽¹⁾, C. Casinhas⁽²⁾, A. Albuquerque⁽¹⁾, A. Carvalho⁽¹⁾, F. Silva⁽¹⁾

⁽¹⁾ Departamento de Engenharia Civil e Arquitetura, Universidade da Beira Interior. Tel. +351(275)319700, Email: cavaleiro@ubi.pt, ajca@ubi.pt, antonio.j.j.carvalho@gmail.com, flora@ipb.pt

⁽²⁾ Técnico Superior, Divisão de Obras Municipais e Rede Viária, Câmara Municipal de Alcochete. Tel: +351(21)2348600, Email: claudiocasinhas@gmail.com

1. Introduction – Most of the water needed for domestic, agricultural, recreational and industrial activities in the municipality of Alcochete (Portugal) comes from groundwater sources. However, doubts remain on the state of their quality and suitability for current uses. The study of the hydrogeochemistry allows establishing relations between the aqueous and geological environment, reflecting the influence of local geology and soil water quality.

Given the amount and complex information that was necessary to collect, calculate, analyze and interpret the use of Geographic Information Systems (GIS) was of great use to georeference data, create relational databases and generate maps of suitability for use of groundwater [1].

This study aims to contribute for assessing the groundwater quality in the municipality of Alcochete, warning against the risks of contamination and degradation of the quality of the aquifers, and pointing out the need to implement preventive measures such as planning the location of abstraction point, restriction of land use and water quality monitoring.

2. Experimental – Water samples were collected from 67 points (26 wells and 41 holes) and were georeferenced (Figure 1). The sampling campaign involved the collection of biweekly samples during 4 months to determine the water level, alkalinity, bicarbonates, calcium chlorides, copper, lead, chromium, electrical conductivity, hardness, iron, phosphate, magnesium, mercury, nickel, nitrate, dissolved oxygen, potassium, pH, redox potential, resistivity, salinity, total dissolved solids, sodium, silica, sulfates, and temperature. The sampling was performed after continue pumping of the water during 15 minutes. A hydrological study was developed and is presented in [1].



Figure 1. Location of the sampling points

3. Results and Discussion - The water from wells are mainly calcic chlorinated, but has no minimum quality to be used for the production of drinking water, while 70.7% of the origins of water coming from holes, mainly sodium chlorinated type, present minimum quality for that use. Both types of water present quality for use in agricultural irrigation, but few samples meet the recommended values for such use. Thus, it is imperative to implement a strategy for managing water resources in the county, in order to better protect these water sources.

4. Conclusions - The municipality of Alcochete has enough groundwater that could satisfy the most common uses (agricultural irrigation and public and industrial supplies). However, most of the water from wells do not present minimal physical and chemical quality for the production of potable water, while most of the water drawn from hole presents minimum quality for this use.

5. References

[1] C. Casinhas, “Contribuição para a avaliação da qualidade das águas subterrâneas no concelho de Alcochete”, Tese de Mestrado em SIG, UBI, Covilhã, Portugal, 2009.