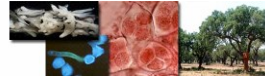


Project POCI/AGR/57719/2004 – Diffuse pollution

“Methodologies for a better rural land use planning and management considering aquifer vulnerability to diffuse pollution”



Financial support: Fundação para a Ciência e a Tecnologia; LNEC.

Duration: 2005 - 2008

Institutions: Laboratório Nacional de Engenharia Civil, Instituto de Ciências Agrárias e Mediterrânicas, Instituto do Mar e Instituto Superior Técnico.

Responsible researcher: [Teresa E. Leitão](#)

Main Objectives

The purpose of this study is to stimulate the use of more sustainable agriculture practices, in order to help a better prevention and control of diffuse pollution.

This project concentrates efforts in gathering and integrating the knowledge of the processes that interfere in the migration of pollutants originated by soil fertilization, for the different media (soil, vadose zone and groundwater), encouraging the future utilization of environmentally more sustainable crops and fertilizer practices.

Main activities

The Project includes an interdisciplinary and integrated approach that consists of:

- Selection of the study area in the irrigated plots of Ferreira do Alentejo (Fig. 1).
- Agro-Hydrosystem Characterisation - Inventory and quantification of diffuse pollution sources, inventory of crops, identification of associated fertilizers and treatment techniques, irrigation schemes for each crop, and after all the movement of pollutants in the soil, vadose zone and groundwater associated with each crop.
- Soil and Vadose Zone Characterization and Modelling - Characterisation of soil and unsaturated zone hydraulic properties and mass flow and transport modelling calibration through the unsaturated zone using deterministic models for nitrate and pesticides.
- Aquifer Monitoring and Modelling - mass flow and transport modelling, interactions between groundwater and surface water; water balance modelling; recharge assessment; and groundwater seasonal monitoring (nitrates, pesticides, phosphates, and water level).
- Optimisation of the more adequate land use practices for the studied region. A decision-aid tool will be built to maximize the net benefits from land use, considering the different soils present in the area, the fertilization practices for each crop, the groundwater availability and vulnerability, the costs of land use changes, socio-economic aspects in such a way that agricultural practices can be compatible with water consumption and respecting the ecological status of associated surface water.

Results

The sites selected are three different irrigated plots, one in Monte da Mancoca (Fig. 5) and the other two in Monte do Pinheiro. The effects of corn and sunflower crops were monitored during 2006, and in 2007 the crops analysed were corn, melon and water melon. The field results allowed gathering data on the effects that different crops associated fertilizers and irrigation schemes have on the runoff water (Fig. 2) and the movement of pollutants in the soil (Fig. 6), vadose zone (Fig. 3)

and groundwater (Fig. 4). These three media were analysed for different depths and periods of time along the whole experiment. These analysis were complemented with the physico-chemical characterization of soils and water in the vicinity of the filed experiment, both for groundwater and surface water.

The results obtained to date allow confirming the influence of the agricultural practices in the quality of water and soils placed downgradient. The bibliographic references below referred present in more detail the results obtained.

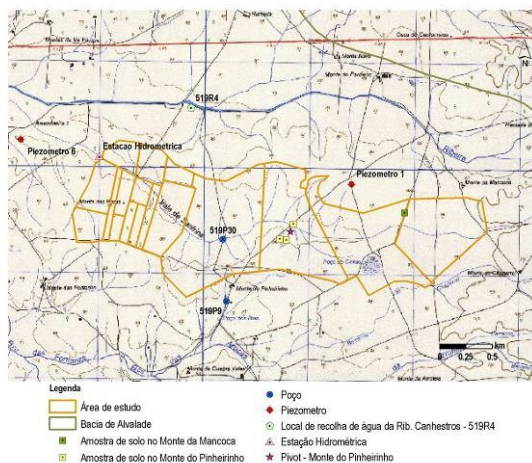


Fig. 1 - Ferreira do Alentejo selected watershed



Fig. 3 - Vadoso zone water sampling facility

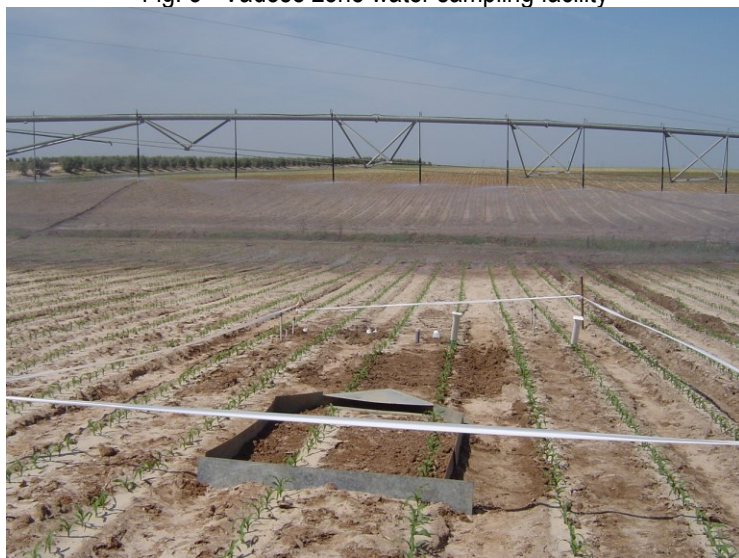


Fig. 5 - Monte da Mancoca field site



Fig. 2 - Runoff sampling ring



Fig. 4 - Piezometer for groundwater sampling



Fig. 6 - Soil water tension measurement

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