

Studies on the quality of the waters of Morocco and training in environmental geochemistry

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Abstract The collaboration of the Department of Earth Sciences of the University of Cagliari, Italy, with the Ministry of Energy and Mines of the Reign of Morocco initially, and later with the University Mohammed V of Rabat-Agdal, started in the mid 1990s. The objective of the collaboration project was two-fold: (i) the hydrogeochemical characterisation of the qualities of Morocco's surface and groundwaters, and (ii) the training of technicians and researchers in Environmental Geochemistry, in particular in the protection of water resources. Morocco faces a serious challenge in terms of water resources management over the near- and medium-terms, both in terms of quantity and quality. The Sebou River basin holds 30% of the country's surface water resources and 20% of its underground water. Although it represents only 6% of the total land area of Morocco, 18% of the country's population live in the basin. It is therefore very densely populated and polluted. The basin is very rich in water resources, agricultural land and forest reserves, with the Middle Atlas as its highlight. It also has great tourism and economic potentials and contains some major economic hubs, such as Fès, Meknes and Kenitra. All of these activities result in significant wastewater discharges from household, industrial and agricultural sources. In the catchment of Oued Sebou, the most important watercourse of northern Morocco, the Sebou River is the primary source of water for a variety of purposes (i.e. drinking, agriculture, industry, recreation). However, it receives waste from vast rural areas and several large cities along its banks. We analysed different physico-chemical parameters to determine the level of pollution of the Sebou River basin. The results indicate that sites located close to the most urbanized and industrialized areas are severely impaired. This often condemns tens of kilometres of the Sebou and leads to a threat and an important handicap for some reaches of water located downstream of the towns of Fès and Meknés. At times the groundwater presents anomalous values which can be attributed to the fertiliser and antiparasite compounds used in agriculture, in the case of NO₃ and some metals (Cu, Hg).

Key words Sebou; surface water; underground water; wastewater; downstream; untreated wastewaters; pollution; Fès and Meknés, Morocco