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Environmental Impact of Casablanca Landfill on Groundwater Quality, Morocco

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ABSTRACT

The Casablanca landfill is one among many uncontrolled dumping sites in Morocco with no bottom liner. About 4000 tons/day of solid wastes from mixed urban and industrial origins are placed directly on the fifteen old sandstone quarries. At the site of this landfill, the groundwaters circulate deeply (<10 m) in the fractured aquiferous quartzites, the site has never been sealed before its opening. The aim of this study is the characterization the groundwater quality around the landfill, to delimit the contaminated zone and the factors controlling the extent of groundwater contamination. To evaluate groundwater pollution due to this landfill, piezometric level and geochemical analyses have been carried out on 19 wells. The results of geochemical analyses show an important qualitative degradation of the groundwater, especially in the parts situated in the down gradient area and in direct proximity to the landfill. In these polluted zones, we have observed the following values: higher than 11 mS/cm in electric conductivity, 1400 mg/L in bicarbonates, 275 mg/L in chemical oxygen demand, 2616 and 100 mg/L respectively in chlorides and sulfate, 269.5 mg/L in nitrates, 50 - 100 mg/L in cadmium, and 40 - 230 µg/L in chromium. These concentrations widely exceed the standard values for potable and irrigation water. Several determining factors in the evolution of groundwater contamination have been highlighted, such as: depth of the water table, permeability of unsaturated zone and lineaments, effective infiltration, absence of a system for leachate drainage. So, to reduce the pollution risks of the groundwater, it is necessary to set a system of collection, drainage and treatment of landfill leachates and to emplace an impermeable surface at the site of landfill, in order to limit the infiltration of leachate.

KEYWORDS

Groundwater Pollution; Landfill Leachate; Uncontrolled Landfill; Lineament; Morocco

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