Contamination of Groundwater in Irrigated Areas under Arid Climate (Souss-Massa Aquifer, Morocco)

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The Souss-Massa basin is one of Morocco's most important economic regions. It has significant agricultural activities based mainly on early fruits and vegetables productions and contributes about 60 % of national exports. During the three last decades, the region showed the important changes in agricultural production systems. Several hectares are developed for irrigation, fertilizers replaced largely animal manure as a source of nitrogen and monocultures substituted often diversified cropping systems. These drastic improvements had an impact on the environment aspects, specifically on groundwater quality.

Thus, the objective of this study is to show the current status of alluvial water tables in the Souss-Massa basin, where the nitrate contamination of groundwater is increasing. Also, it is to identify the potential sources of pollution. Inverse Distance Weighting (IDW) interpolation method was used to map the areal distribution of nitrate contents in 295 waterholes.

High contents of nitrate occur mainly in the central and southwestern parts of the study area. Chtouka-Massa water table seems to be most affected by nitrate pollution. Indeed, more than 40% of the sampled waterholes exceed 50 mg L- 1 which constitutes the maximum limit value for nitrate contents in drinking water Moroccan standards set on World Health Organization (WHO) standards. The Souss aquifer is relatively less polluted. Only 7 % of the waterholes exceed this level.

The widespread distribution of high nitrate contents agrees with the distribution of irrigated zones which explain the major origin from agricultural fertilizers. However, the sporadic nitrate anomalies near some agglomerations may be explained by liquid and solid waste disposals and the effect of gravewards.

Key words: Contamination, Groundwater, Fertilizers, Irrigated areas, Souss-Massa.