



Assessing the well water pollution problem by nitrates in the small scale farming systems of the Niayes region, Senegal

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Human activities exert many pressures on the quality of groundwater, and advanced assessment programmes are needed to design sustainable water management strategies. To contribute to this challenge, we assessed the nitrate pollution problem of groundwater wells in the small scale farming systems of the Niayes region in Senegal and explained this water pollution problem in terms of well characteristics and land use properties. A fast rural appraisal was performed in 2007 to collect basic background data of the small scale farming systems and well water was analysed in 131 wells for nitrate content, pH and electrical conductivity. For a subset of wells, soil analyses were made of the well environment for assessing the attenuation properties of the protecting soil. Cluster analysis was used to define a well typology, while principal component and multiple correspondence analysis was used to explain the nitrate pollution in terms of well characteristics and other physico-chemical properties of the wells, and land use.

The study confirms that the wells are seriously affected by the nitrate pollution problem. Wells can be classified in three well classes, which are characterized by a geographical gradient. Nitrate pollution increases from north to south, while the salinity affects particularly the wells in the northern area of the region. The nitrate levels exceeding 50 ppm are more common in residential areas than in the horticultural fields. The results further show that, even if direct pollution problem of wells cannot be excluded, pollution from leaching out of the root zone of vegetable crops to the groundwater is likely. This is confirmed by the assessment of the farming activities in this area and this is consistent with the low attenuation properties of the soils characterizing this region.

Considering the nitrate pollution threshold, we further distinguish very few non-polluting crops in this region, which calls for an urgent adoption of agriculture management to protect water resources from further deterioration.