

# Groundwater vulnerability assessment in the southern coastal sedimentary basin of Benin using DRASTIC, modified DRASTIC, Entropy Weight DRASTIC and AVI

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## Abstract

The importance of groundwater has long been recognized, but the ground water potential to become contaminated as a result of human activities has only been recognized in recently. Before 1980 it was thought that soils served as filters, preventing harmful substances deposited at the surface from migrating into groundwater. Today it is known that soils have a finite capacity to protect groundwater. It can be contaminated from divers sources. Therefore, Assessment of aquifer vulnerability to pollution is essential for the protection and management of groundwater and land use planning.

In this study, we used DRASTIC and AVI for groundwater vulnerability to contamination assessment. the different methods were applied to the southern coastal sedimentary basin of Benin and DRASTIC method was modified in two different steps. First, we modified DRASTIC by adding land use parameter to include the actual pollution sources (DRASTIC<sub>LcLu</sub>) and second, classic DRASTIC weights was modified using Shannon's entropy (Entropy weight DRASTIC). The reliability of the applied approaches was verified using nitrate (NO<sub>3</sub><sup>-</sup>) concentration and by comparing the overall vulnerability maps to the previous researches in the study area and in the world. The results from validation showed that the addition of landcover/land use parameter to the classic DRASTIC helps to improve the method for better definition of the vulnerable areas in the basin and also, the weight modification using entropy improved better the method because Entropy weight DRASTIC<sub>LcLu</sub> showed the highest correlation with nitrate concentration in the study basin. In summary the weight modification using entropy approach reduced the uncertainty of the human subjectivity in assigning weights and ratings in the standard DRASTIC.

**Keywords :** AVI, DRASTIC, Entropy weight DRASTIC, groundwater vulnerability, nitrate pollution

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