



Mapping the groundwater vulnerability for pollution at the pan African scale

Issoufou Ouedraogo, Pierre Defourny, and Marnik Vanclooster

Université catholique de Louvain (UCL), Earth and Life Institute. ELIE-Croix du Sud 2, Box 2, B-1348 Louvain-la-Neuve, Belgium

We mapped the pan-African intrinsic and specific vulnerability of groundwater systems towards pollution. We compiled the most recent continental scale information on soil, land use, geology, hydrogeology and climate in a Geographical Information System (GIS) at the resolution of 15kmx15km and the 1:60,000,000 scale and implemented an indicator vulnerability model based on the DRASTIC method. The intrinsic vulnerability map reveals that groundwater is highly vulnerable in Central, West and some areas of North Africa, where the watertable is very low. The intrinsic vulnerability is very low in the large sedimentary basins of the African deserts where groundwater situates in very deep aquifers. The specific vulnerability is obtained by overlaying the intrinsic vulnerability with current land use. The specific vulnerability is high in North, Central, and West Africa and strongly related to water table depths and development of agricultural activities. Subsequently, we performed a sensitivity analysis to evaluate the relative importance of each indicator parameter on groundwater vulnerability for pollution. The sensitivity analysis indicated that the removal of the vadose zone impact, the depth of the groundwater, the hydraulic conductivity and the net recharge causes a large variation in the vulnerability index. The pan African assessment of groundwater vulnerability presented in this paper is expected to be of particular value for water policy and for designing water resources management programmes. We expect, however, that this assessment can be strongly improved when pan African monitoring data on groundwater pollution will be integrated in the assessment methodology.

Keywords: groundwater vulnerability, pan-Africa, DRASTIC method, Sensitivity analysis, GIS