



3RD International Conference On African Large River Basin Hydrology (ICALRBH)

Impact of climate changes on the groundwater quality of eastern Mitidja (Northern Algeria)

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Abstract:

Climate change poses uncertainties to the supply and management of water resources. The present study concerns the assessment of the physicochemical quality of groundwater in the eastern Mitidja plain (northern Algeria) in relation to piezometry under the effect of climate change. For this reason, a diagnosis of the state of piezometric level and hydrochemistry of this aquifer has been realized over a period of 44 years (1968-2012). We have processed the data collected since the end of the 1960s. The results for the forty (40) samples are presented in the form of maps and diagrams. The evolution of the piezometry of the aquifer system of the eastern Mitidja shows a continuous decrease since the year 1968. This decrease was very small (about 5 m) because of the low exploitation of the water table. Conversely, during the period 1980 to 2012, there was a significant drop in the level of the water table that exceeds 30 m due to over-exploitation of the aquifer. These piezometric data show a fluctuation of the water table according to the successions of dry or wet years. The important database of physicochemical analyzes obliges us to make an analysis by the method of multidimensional analysis (CPA) which is perfectly adapted to this type of data. However, the analyzed parameters are: Ca, Mg, Na, Cl, SO₄, CO₃H, NO₃, electrical conductivity and dry residue. We found that the chemistry of aquifer increases in the direction of groundwater flow. Its spatio-temporal evolution is from the calcium chloride pole in 1985 to the calcium bicarbonate pole in 2012. Finally, it can be concluded that the evolution of the piezometry and chemistry of the eastern Mitidja aquifer is directly related to the effect of climate change: rainfall variations, overexploitation of the aquifer, geological nature of the lands crossed, pollution anthropogenic, domestic and industrial discharges, and agriculture (nitrates).

Keywords: Climate change, Groundwater, Piezometry, Quality, Chemistry.