Impact of climate change on groundwater (the Mitidja plain)

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Abstract

Algeria and in particular the northwestern region has experienced several droughts during the last century. The last one was characterized by its intensity and significant impact on water resources and crop yields.

Most methods of drought assessment try to determine the probability of finding abnormal sequences in rainfall distribution on the regional scale.

Major droughts have affected all the plains of Central and Western Algeria, the most significant ones were recorded in the years 1944, 1981, 1989, 1990, 1992, 1994, 1996 and 1999 for all studied plains. The Mitidja plain has experienced the biggest rainfall deficit during 1966, with 123%.

The evolution of rainfall regime shows that over the last century, Northern Algeria has experienced alternating dry and wet periods. In general, there is an upward trend covering the 30s and 50s. However, the early 40s and mid 70s were characterized by a decrease in rainfall. The reduction in rainfall exceeds 20% in Central Algeria (the Mitidja plain). The drought experienced during the last two decades has no equivalent either in duration or in intensity, throughout the study period. The test on the sequential trends confirmed the existence of three major trends during the last century. An increase from 1945-46, following a relatively dry phase and a decrease in precipitation from the 70s.

This decrease had a significant impact on water resources in the Mitidja plain (surface and groundwater).

The impact of this decrease in rainfall on groundwater resources has been made on the basis of the evolution of the static level of the Mitidja groundwater. Generally, in the two analyzed piezometers representing the region of Blida and Arba, changes in the piezometric groundwater levels fairly reflects changes in rainfall in the region's stations, with a certain time lag. The response of the groundwater level to climate change requires a time limit, depending on the hydraulic conductivity and the aquifer storage, and also the distance between the recharge area and the observation point. The piezometric level in Blida shows a decrease of about 34 m, while that of the Arba knew a reduction of about 40 m of the piezometric groundwater level of the Mitidja. This decrease has resulted in a decrease in the borehole yields of about 50%. On the Mediterranean coast, the problem of saltwater intrusion was recorded. This situation requires a quick solution to deal with this environmental and economic deterioration by artificial groundwater recharge in the Hammam Melouan region by the Wadi Hammam El Ouane waters.