

Delimitation of the Perimeters of Protection of the Wellfield in the City of Adrar, Sahara of Algeria through the Used Wyssling's Method

Authors : Ferhati Ahmed, Fillali Ahmed, Oulhadj Younsi

Abstract : delimitation of the perimeters of protection in the catchment area of the city of Adrar, which are established around the sites for the collection of water intended for human consumption of drinking water, with the objective of ensuring the preservation and reducing the risks of point and accidental pollution of the resource (Continental Intercalar groundwater of the Northern Sahara of Algeria). This wellfield is located in the northeast of the city of Adrar, it covers an area of 132.56 km² with 21 Drinking Water Supply wells (DWS), pumping a total flow of approximately 13 Hm³/year. The choice of this wellfield is based on the favorable hydrodynamic characteristics and their location in relation to the agglomeration. The vulnerability to pollution of this slick is very high because the slick is free and suffers from the absence of a protective layer. In recent years, several factors have been introduced around the field that can affect the quality of this precious resource, including the presence of a strong centre for domestic waste and agricultural and industrial activities. Thus, its sustainability requires the implementation of protection perimeters. The objective of this study is to set up three protection perimeters: immediate, close and remote. The application of the Wyssling method makes it possible to calculate the transfer time (t) of a drop of groundwater located at any point in the aquifer up to the abstraction and thus to define isochrones which in turn delimit each type of perimeter, 40 days for the nearer and 100 days for the farther away. Special restrictions are imposed for all activities depending on the distance of the catchment. The application of this method to the Adrar city catchment field showed that the close and remote protection perimeters successively occupy areas of 51.14 km² and 92.9 km². Perimeters are delimited by geolocated markers, 40 and 46 markers successively. These results show that the areas defined as "near protection perimeter" are free from activities likely to present a risk to the quality of the water used. On the other hand, on the areas defined as "remote protection perimeter," there is some agricultural and industrial activities that may present an imminent risk. A rigorous control of these activities and the restriction of the type of products applied in industrial and agricultural is imperative.

Keywords : continental intercalaire, drinking water supply, groundwater, perimeter of protection, wyssling method

Conference Title : ICHGR 2023 : International Conference on Hydrogeology and Groundwater Resources

Conference Location : London, United Kingdom

Conference Dates : February 16-17, 2023