Thesis title: Hydrogeological conditions and dynamics of groundwater in the Hilly Plain of Jijia and Bahlui

Scientific coordinator: prof. univ. dr. Constatin Rusu

PhD student: Daniel Boicu

Abstract

At the international level, the decrease in the level of underground water resources is felt more and more strongly in the last hundred years, especially in countries where the pressure of the anthropic factor is more and more pronounced. This decrease results in the reduction of the water supply capacity of the population and other socio-economic activities (Treidel et al., 2011; Famiglietti S., 2014).

On the territory of Romania, underground water resources are distributed irregularly and are distributed according to the seasonal and annual variation of the amounts of precipitation. Underground water resources are already a national problem, their storage capacity being relatively higher than that of neighboring countries, but at the regional level they sometimes fall to a critical threshold in certain periods of the year. In this way, the population's water needs are not met.

The eastern part of Romania is such an area that faces critical periods and areas, this being caused by the fact that the eastern area is characterized by lower precipitation compared to the country's average, but also by the fact that over 50% of the population that comes from the rural environment has as its main source of supply underground water (Minea I., 2020). The human footprint on underground water resources is intensified by the impact produced by the increasingly accentuated climate changes in the region, in recent decades (Croitoru Adina, Minea I., 2015).

The present work addresses the daily issue regarding the variations and diminishing of groundwater and proposes, through the use of classical and modern research methods and spatial analysis techniques within geographic information systems, the identification of areas with problems from the point of view of temporal dynamics and social vulnerability. The applicability of the study is given by the possibility of use in planning projects in order to reduce the social vulnerability induced by groundwater, as well as in management plans in order to reduce uncontrolled overexploitation by socio-economic factors or in the expansion plans of the observation system hydrogeological.

The main objective of the thesis is the analysis of the hydrogeological conditions and the temporal and spatial dynamics of underground water resources in the Hilly Plain of Jijia and Bahlui. This objective was attempted to be achieved by combining classical and modern methodologies, regionalization of simulations and predictions on the conditions of regeneration / decline / evolution / state of underground water resources.

At the same time, we wanted to identify the relationships between underground water resources and the natural components on the surface and highlight the influence of the anthropic factor on them. The results of the analysis can provide a basis for identifying practical solutions in the knowledge, enhancement, protection and sustainable use of underground water resources.

Following the analyzes carried out, it was found that the analyzed area is facing a decrease in underground water resources, a decrease that took shape in the last two decades, especially in the last decade. The current situation is a consequence of the annual decreases determined by the effects of climate change, which are manifested by dry periods and precipitation that do not respect the pattern of past decades, by the anthropogenic impact induced by the increase in water consumption, and last but not least due to the lack of implementation of management plans with practical solutions. The overexploitation of underground water resources in the last decade has generated a "domino effect" that continues from one year to the next. An evolution at this pace, in which the quantitative analysis between overexploitation and recharge is in favor of the latter, may generate a sharp decrease in water resources and a "water crisis" in the next decade, in the analyzed area.

Keywords: piezometric level trend, groundwater recharge capacity, social vulnerability, temporal dynamics, AHP, CT