

Manifestations of climate influence on the change of groundwater status within the Tatarbunary district of Odessa region

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SUMMARY

Ukraine's climate has been changing in recent decades. The combination of the negative effects of urbanization and climate change poses a direct threat to environmental, economic and social stability both in the world as a whole and in individual countries. Throughout Ukraine, the question of the availability of both drinking water and water for technical and domestic purposes is beginning to arise. Especially the lack and quality of water is felt in the Tatarbunary district. To determine the hydrochemical and level status of groundwater, a number of studies were conducted in wells and wells in the settlements of the district, and maps were compiled.



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Introduction

The climate of Ukraine has been changing over the last decades (temperature and some other meteorological parameters differ from the values of the climatic norm) and according to the simulation results - for the future of Ukraine the air temperature will continue to rise and rainfall will change during the year. [Shevchenko, 2014]. The combination of the negative effects of urbanization and climate change poses a direct threat to environmental, economic and social stability both in the world as a whole and in individual countries [United Nations Human Settlements Program, 2011].

The main potential negative effects of climate change that may occur include: thermal stress, flooding, declining areas and disturbances of the species composition of green areas, natural hydrometeorological phenomena, reducing the amount and deterioration of drinking water, increasing the number of infectious diseases and allergies, dysfunction energy systems of the city and settlements. [Shevchenko, 2014].

Instead, while the problems of large cities are addressed, small towns and rural settlements are left out. Especially the problems of rural areas are not taken into account after the implementation of the decentralization process by the authorities, as the budget of the united territorial community is not designed to overcome the consequences of harmful waters or other dangerous engineering and geological processes, or funds are completely absent. [Miedviedieva, Dyniak, 2019b].

Theory

The most important component of human life is water. Society already has some consequences of its negligence, as a result of which the climate is changing, which leads to changes in the quality and quantity of water. The quality and quantity of groundwater first from the surface of aquifers is currently of paramount importance. Throughout Ukraine, the question of the availability of both drinking water and water for technical and domestic purposes is beginning to arise. The central, northern and western regions of Ukraine suffer from heavy rains, which in turn manifest themselves in the form of floods. At the same time, the southern and eastern regions of the country are "dying" from drought, water scarcity and rainfall shortages.

To detect any changes associated with negative natural and man-made processes, it is necessary to establish a certain scheme of observations and monitoring at the sampling points of the study to be able to detect a certain change in groundwater level, chemical composition, etc.

Until the end of December 2017, this work was carried out by hydrogeological and reclamation expeditions and parties in Tatarbunary district. Since January 2018, these services have been deactivated, and currently they are almost non-existent, and therefore monitoring work is almost not performed. If the inspection of the objects is over, it will lead to an inevitable catastrophe, which will lead to terrible consequences. That is why it is so important for humanity to know about the state of the environment and all its components.

Examples

In recent years, the country has been warm, on some days hot weather, mostly with a deficit of precipitation. Precipitation fell in the form of short-term rains and local torrential rains with uneven distribution. Thus, as a result of water balance disturbance, the chemical composition of water also changes significantly: mineralization increases as a result of insufficient moisture and replenishment of groundwater with precipitation.

For the territory of southern Ukraine, the issue of the impact of climate change and, as a consequence, the lack of moisture is particularly acute. The southern territories of Odesa oblast, namely



Tatarbunary, Tarutyn, Kiliya, Saratsky and Izmail districts, mainly suffer from water shortage and deterioration. The hydrogeological situation of Tatarbunary district is investigated in more detail in the work.

The occurrence of groundwater levels and their chemical composition were studied by "public" sources. All observation points were evenly located in different geomorphological conditions and reflected almost all intervals of depths and thickness of aquifers. The following components were determined in water samples: carbonates, bicarbonates, sulfates, chlorides, calcium, magnesium, sodium, hydrogen index (pH), total mineralization. [Miedviedieva, Dyniak, 2019a) Sampling of water was carried out according to standardized generally accepted research methods. [Guide to quality control of water resources, 1994].

As a result of processing annual field observations, the materials of observations for 2015-2019 were analyzed and maps of groundwater level and mineralization were built, which allow to visually and quickly learn the situational condition of the district (Fig. 1-2).

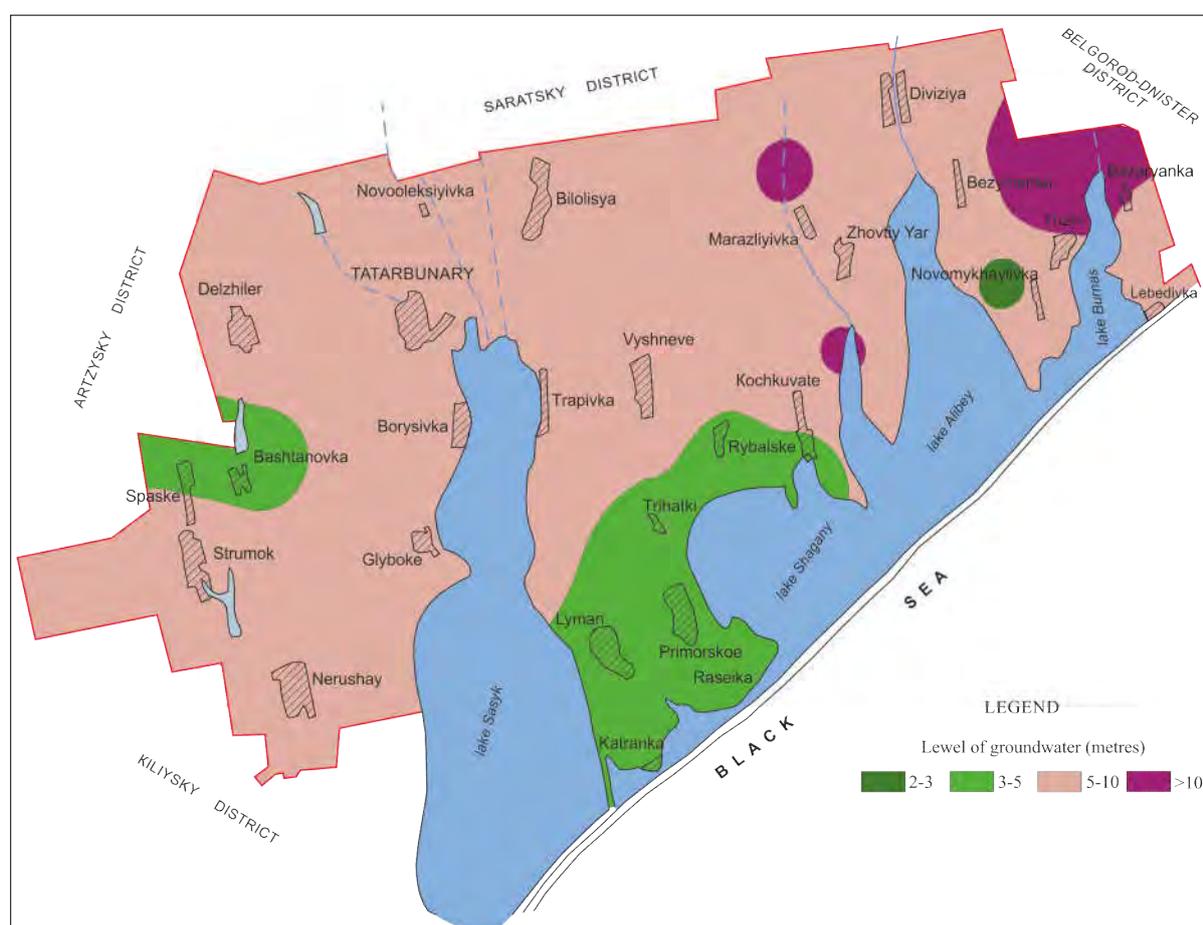


Figure1 Map of groundwater level within the Tatarbunary district

In each settlement, groundwater levels varied in a wide range with variations from 3 to 13 m or 0.5-9.0 m. Measurements of level measurements in 1,020 wells and 16 wells were used to map the area of settlements. Constant observations were made at 341 points (16 wells and 325 wells).



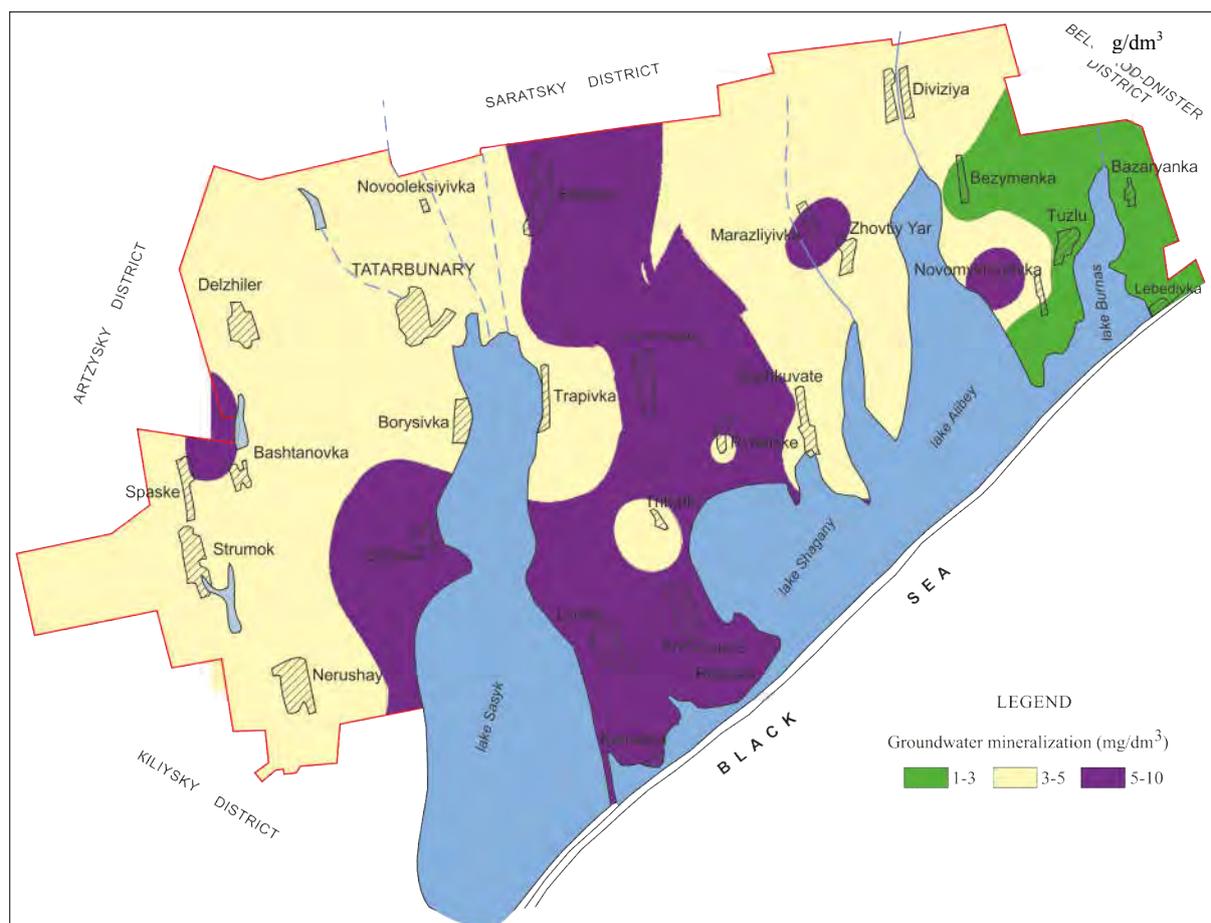


Figure 2 Map of mineralization(g / dm^3) ground water in the Tatarbunary district

Despite the fact that in most settlements there is a water supply network, the population of the district suffers from a lack of quality water, both for drinking and for household needs. At the same time, the population uses imported or rainwater, or uses wells. 437 “wells” of “general” use were used to detail and identify the hydrochemical state of the ground aquifer. Chemically, groundwater is heterogeneous, variegated, within one locality occurring from 2 or more water types. A total of 51 types of water were identified within the district - 28 with a predominance of chloride ion, 21 - with a predominance of sulfate ion and 2 - with a predominance of bicarbonate ion. Within the NP, water (44.8%) with the content of sulfate ion and water with the predominance of sulfate and chloride ions predominate in percentage. The values of mineralization varied widely, even within one locality, and average 1.04-9.05 g / dm^3 , with maximum values in the range of 1.59-20.6 g / dm^3 ; minimum - 1.04-3.18 g / dm^3 . Waters in the vast majority of cases (44.8%) belong to the highly brackish group. Another 37.9% of the water within the settlement is weakly and strongly brackish. [Stock materials of SE "BLACK SEA CENTRAL", 2019].

Conclusions

Every year there is a change in the direction of deteriorating quality and reduction of drinking water, while increasing the number of dangerous engineering and geological phenomena which causes economic damage and social tension in society



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In order to provide some guidance on site protection and hazard prevention, detailed monitoring is needed to provide a basis for creating informative media, such as maps, to help identify critical areas and direct public attention.

The maps obtained in the process of work can be used by the state administration of the Tatarbunary region and the united territorial communities to ensure the provision of the population with quality drinking groundwater.

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