

ABSTRACT

thesis for the degree of doctor of philosophy (PhD) for
specialty 6D075500 - «Hydrogeology and engineering geology»

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Theme: «Ecosystem going near estimations and use of resources of underwaters of Kazakhstan in terms climatic and the anthropogenic conditioned changes of environment»

Modern environmental problems, from global to regional and local, are associated with the increasing year-by-year interaction of man with the natural environment.

Currently, it acquires the features of a global technogenic process with its inherent fundamental ecological patterns and problems of environmental instability, requiring solutions at all levels of organization of ecosystems.

The main characteristic of the ecosystem is the presence of relatively closed, stable in space and time flows of matter and energy between its biotic and abiotic parts, where hydrosphere occupies the most important place. At the same time, the interaction of mankind with the environment, as in all its history, remains anthropocentric.

The relevance of the research. Underground water is the most important component in the ecosystem which ensures its stability. It is characterized by features of formation and functioning, as well as the need to protect it from depletion and pollution.

Taking into account the unity of natural waters, it is necessary to recognize that hydrogeoecological problems, as well as ecological problems in general, are characterized by a certain hierarchical structure, which is divided into:

- GLOBAL: climate change (decrease in precipitation, increased evaporation, intensive melting of glaciers), desertification and land degradation, reduction of biodiversity;

- SUBGLOBAL: interstate water allocations and water distribution within the regional basins of Central Asian flows, use of water-intensive technologies;

- LOCAL: domestic environmental policy, which determines both positive and negative contributions.

Purpose and objectives of the research. The study of the influence of various aspects of technogenesis on the hydrogeological situation in solving environmental problems of all ranks and levels of organization of ecosystems is primarily aimed at improving the methodological basis for research of technogenesis. It includes assessment of the state and forecast of functioning,

ranging and zoning of hydrogeoecological processes to manage technogenesis based on the ecosystem approach.

Scientific and practical importance of research. The importance and necessity of the ecosystem approach in hydrogeological research is primarily conditioned by the fact that natural groundwater resources together with surface waters form the basis of sustainable ecosystem functioning, provide reliable water supply to cities, rural settlements, mining enterprises, and agro-industrial complexes.

Area of application - hydrogeology, geoecology, agriculture, extreme events of floods and droughts, replenishment of groundwater resources.

The approbation of research results. 9 scientific papers have been published, including 3 articles with the impact factor in the Scopus database, 3 articles in journals recommended by the Committee for Control in Education and Science of the Ministry of Education and Science of the Republic of Kazakhstan, 3 reports at international scientific and practical conferences.

The results of the research were reported and approved at the International Scientific and Practical Conference dedicated to summarizing the results of the UN declared Decade for Water "Water for Central Asia and its Utilization" (Almaty, 2016); VIII International Conference "Science and Technology" (London, 2017g.); XIII International Scientific and Practical Conference "Issues of Modern Science: Problems, Trends and Prospects" (Moscow, 2017).

The researcher's personal contribution. The researcher obtained the following results that were published in the open press and are as follows:

- an estimate of natural resources of groundwater in the amount of 44.95 km³ / year;

- an assessment of the reserve of the underground waters of the Republic of Kazakhstan reaching 50% of the river flow. The assessment conducted based on the differential equation analysis of the water balance of the interrupted period;

- established a contrast distribution of natural resources of groundwater;

- an assessment of the available water resources of Kazakhstan in the volume of 26.0 km³/year. Thus, for the long-term (up to 2040) limit of groundwater abstraction in the volume of 1.91 km³/year, there is a 13.6-fold reserve of water supply in Kazakhstan with groundwater resources;

- the balance equation "pollution-depletion of the hydrosphere freshwater resource" received scientific grounds;

- the evaluation of the intensity of water exchange in the infiltration phase of the hydrogeological cycle of the near-Tashkent transboundary Upper Cretaceous aquifer of the Sarygash deposit was theoretically justified and carried out;

- the forecast of changes in the water and resource potential of the southern and south-eastern Kazakhstan in connection with the climatic transformations of the Central Asian glaciers;

- zoning of the territory of Kazakhstan was carried out according to the degree of disturbance of landscapes and ecosystems, with the allocation of lands of ecological well-being, risk, crisis, disaster, and catastrophe;

- theoretically and methodologically grounded principles of groundwater resources management and operational depletion of groundwater resources caused by an imbalance between the volume of replenishment of natural resources of groundwater and their operational extraction;

- the "General Scheme of the Organization of the Territory of the Republic of Kazakhstan" was considered as an optimal ecosystem basis for sustainable development of Kazakhstan for the near future, which implies the widespread use of groundwater resources of a wide range of application.