# ABSTRACT

"Scientific and methodological principles of exploitation and monitoring of groundwater deposits using GIS technologies and computer modeling"

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One of the obstacles to rapid development of the Republic of Kazakhstan and the use of its abundant natural resources is the lack of major sources of fresh water. Most of the territory of Kazakhstan is located in the arid zone, facing with the problem of water sources scarcity. The problem of water supply of with fresh drinking water in many areas is particularly acute, and one of the ways to solve it is the increasing use of groundwater resources. In the course of water resources study, research, evaluation and monitoring, as well as for a number of other applications, nowadays widely used methods of GIS technologies and mathematical modeling.

**The relevance of the work.** The above suggests that, despite the progress made in the development of hydrogeological monitoring system still relevant the task of creating new methods and algorithms for simulation of hydrodynamic processes and the development of appropriate software to allow within geoinformation approach to evaluate and predict the state of groundwater.

**Purpouse of research.** The main aim of the thesis is the development of modern methods of information processing for monitoring, and how the underground water treatment and a number of hydrogeological problems.

**Research methods.** The methodology of research was to identify the principles of design and structure of GIS and database development, describing the geological environment and a set of hydrological and geochemical parameters. On the basis of the developed method of constructing a GIS composed hydrogeological model and optimization of water intakes in the field. The works were performed with the use of modern software ArcGIS, ModFlow, Quantum GIS, Visual Modflow. Research methodology based on systems analysis, numerical modeling and analytical solutions hydrogeological problems.

**The results of operations.** Developed research principles are successfully used and implemented during the work commissioned by the Committee of Geology of the Ministry of Investment and Development of the Republic of Kazakhstan in the framework of the work on further exploration for the purpose of reassessment of operational stocks of underground waters Kaskelen, Boraldai, East Talgar, Uzynagash and Narynkol groundwater deposits. The results obtained in this work, the results can be applied in various fields, by modernizing and accumulation of GIS, as well as to address the many problems of hydrogeological, geological and hydrogeological study database for future research, the rational choice of safe locations for water intake facilities.

Validity and reliability of research results also confirmed the publication of the research results (of more than 10 publications, including publications in Russia, Ukraine, Georgia), and participation in conferences and workshops (including the International Geological Congress, Brisben, Australia).

**Application area**- hydrogeology and engineering geology.

**Scientific importance.** The studies proved that modern GIS in conjunction with the construction of mathematical models can not only visualize the structure of the hydrogeological object, changing its properties in space and time, but also to predict these changes. Application of the developed method of "intake-GIS model" compared with the traditional approach allows you to get on the mentioned hydrogeological objects more complete, holistic and consistent view, and also allows you to perform optimization of the intake. To implement formulated the theoretical concept of building GIS and modeling developed a set of tools, as well as the technique and technology of its use.