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**RESEARCH METHODS AND GEOINFORMATION MODELS
OF CHANGES IN LAND RESOURCES OF ALMATY REGION
UNDER THE INFLUENCE OF HOUSEHOLD WASTE****Abstract**

This article deals with the solution of scientific problems, including the development of holistic conceptual models for presenting, processing and analyzing geographic information, and comprehensively assesses the extent of the impact of regional systems on many dangerous natural and artificial processes. This makes it possible to resolve the contradiction between the need to analyze the state of various territorial systems in order to prevent the occurrence of emergencies due to the influence of natural and man-made processes. On the one hand, providing information and support in decision-making, and on the other, ensuring the provision of cartographic models of transport systems risk assessment of dangerous natural and man-made processes and their mapping. Integrated environmental assessment and modeling of industrial systems. A method for mapping payment systems and assessing the health of the population. Since the city of Almaty is a large metropolis, the ecological situation is very poor. This directly affects the ecology of the City, Public Health. We manage, process data by processing GIS data. In solving upcoming environmental problems, in developing new solutions, a special data card will come to the rescue. This will lead to solving problems from this point of view. It is possible to create monitoring maps by combining space surveys and statistical data. One of the most effective aspects of GIS data is that it allows you to optimally consider problems and work in any area. From this point of view, the GIS industry is developing rapidly. In the country, this industry is developing rapidly and is gaining a lot of demand.

Key words: GIS, ArcGIS, cartography, household waste, programming, verification.

Introduction

The Almaty region is an area rich in natural resources, contributing to a high level of economic development. However, natural and economically managed resources-resources and monocultural

systems established in history have occurred without considering natural conditions, and national traditions have formed many throughout the Republic and the Almaty region.

The country's experience in the transition to a market economy, as well as analysis of the socio-economic and environmental conditions of the region, shows that the region has the opportunity to solve this problem:

- ♦ A process is underway to improve the legal and regulatory framework;
- ♦ The role of local self-government has been strengthened;
- ♦ There are conditions for economic incentives, environmental activities and resource conservation reserves;
- ♦ Create conditions for new technologies;
- ♦ The process of Environmental Education has improved [1].

The use of these and other mechanisms to encourage environmental activities will enable the region to achieve balanced and sustainable development and ensure that people have good living conditions [2].

As the experience of the Republic of Kazakhstan and other countries in organizing environmental work shows, one of the main documents determining the main directions of Nature Conservation and public health activities on the territory of the Republic is the Comprehensive Plan for Environmental Protection in the region [3].

An environmental plan is an environmental audit that aims to comprehensively determine the environmental impact of previous activities and lay the foundation for the implementation of a set of restoration measures. It contains the following documents: analyze the geography, climate, Natural Resources and socio-economic conditions of the region or city; determine the priority areas of environmental activities in the next 3–5 years, and in the future explain specific tasks, goals and objectives, deadlines for implementation, the main potential performers and planned sources of funds [4].

Literature review

The natural environment of the Almaty region of *vivendo* is experiencing a very high labor load from energy companies, mining and processing companies and agricultural complexes. Very unfavorable environmental conditions are developing in many areas [5]. The most dangerous symptoms of this condition are desertification, soil degradation, degradation and pollution of the water resource, and degradation and destruction of biodiversity. Under current conditions, it takes more than a year and a lot of financial resources to solve various environmental problems. To make effective and rational use of financial resources, it is necessary to determine local and priority environmental activity strategies [6].

Unfortunately, the accounting and management of man-made changes in the environment has not yet been established. It has become a dangerous system for the preservation of the «production environment» in assessing the environmental impact of production, mainly the formation of many characteristics that are man-made negative on the environment [7].

Air pollution due to limited emissions or temporarily agreed concentrations belongs to the primary pollution category and is calculated and paid according to current legislation. Polluting companies are not responsible for these changes due to economic activity. With rainwater or melt water on the soil surface, impurities are washed into surface water and groundwater, so pollution of water bodies is not taken into account. Therefore, polluting companies only pay for the storage (disposal) of solid waste, and the negative environmental impact generated during the storage (disposal) process is not subject to accounting and payment constraints.

When they enter the soil and water source, impurities accumulate and pass through the link of the nutrient chain «water-soil– plant-animal-human».

Similar photos add cleared land, which the earth users are not responsible for at all. In this regard, it is necessary to use qualitatively different accounting methods to assess anthropogenic impacts and normalize environmental quality [8].

To this end, it is necessary to conduct comprehensive regional monitoring of the environment, improve the information and methods of environmental quality control, including all objects that adversely affect environmental quality in the process of economic supervision, thereby increasing the number of natural users and thereby increasing the means of environmental protection. Relevance and inadequate research on the global environmental assessment of human environmental impacts led to the selection of topics for thesis work, the definition of research goals and objectives, taking into account the regional characteristics of secondary pollution and natural management [9].

Main provisions

Objectives and objectives of the study. The main purpose of the article is to improve the global environmental assessment system of human environmental impact, take into account the regional characteristics of secondary environmental pollution and natural management, and enhance management decision-making in the field of land use and environmental protection [10].

The set goals determine the need to solve the following tasks:

- ♦ Research on the quality of information collected and analyzed on sources of anthropogenic environmental impacts;
- ♦ Assessment of environmental conditions in the Almaty region;
- ♦ Describe the sources and recipients of primary and secondary pollution and map their flow;
- ♦ Study the development of soil erosion processes in the Almaty region;
- ♦ Analyze the regional structure of the incidence of irregular artificial structures;
- ♦ Study soil and grain response to man-made pollution and corrosion processes;
- ♦ Establish methods of normalizing the state of the environment [11].

Water and soil impurities were installed, and the flow chart was formulated, taking the source and receiving source of primary and secondary air in the Almaty region as an example. Under the influence of soil erosion, the effects of pollution and leaching on its fertility, productivity and agricultural production quality have been identified. This paper analyzes economic mechanisms for improving environmental management based on the principle of «polluter (spoiler) payment» and economic incentive tools for reducing pollution, and shows that their implementation has increased the interest of companies that make environmental investments at their own expense [12]. The theoretical significance of this study is to deepen our understanding of the negative environmental effects of anthropogenic activities. On this basis, the concept of the relationship between environmental quality-forming factors has been proposed so that the proportion of individual sources of anthropogenic impact to the total environmental load can be determined [13].

Methods and materials

Research results can be used by government agencies at the federal and regional levels. At the federal level, recommendations on improving environmental statistics and a radical approach to global environmental assessment that takes into account the human impact of secondary environmental pollution in the EIA process are presented [14].

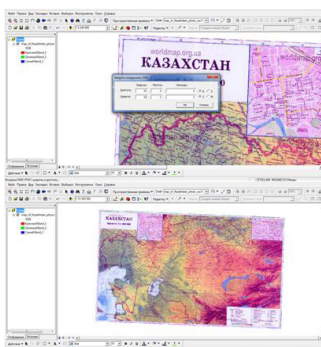


Figure 1 – Binding a map to a coordinate system

- Collect, analyze and evaluate sources of information;
- Study the occurrence of the area to be mapped in the map material; the process of compiling the first vector layer (shapefile) and starting editing work is shown in Figure 3.

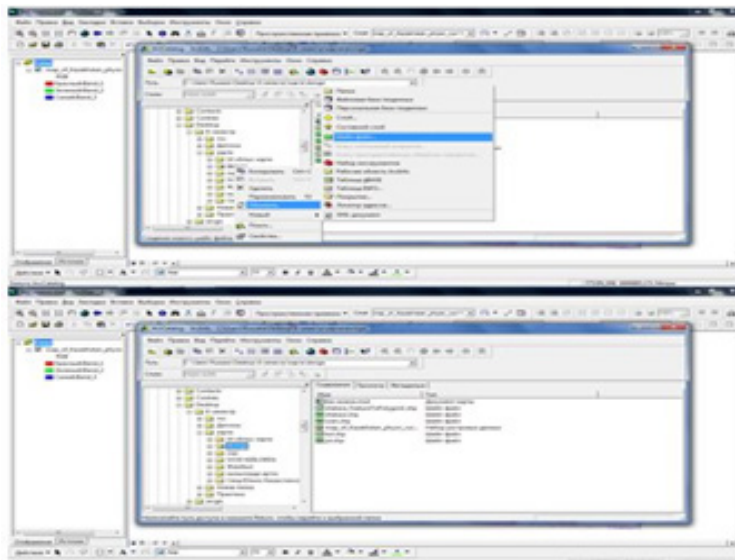


Figure 2 – Development and editing of vector layers

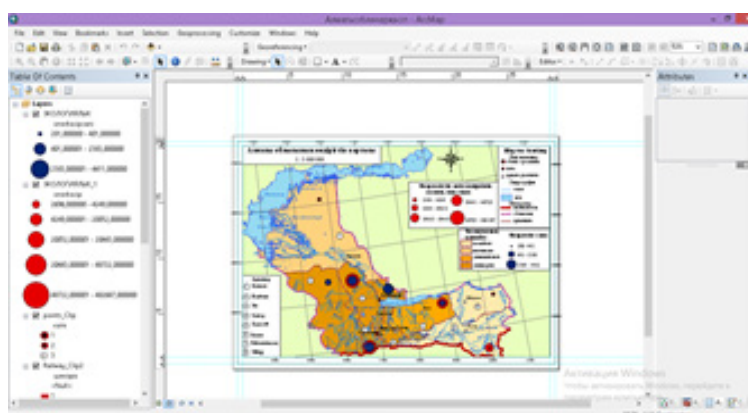


Figure 3 – Preparing the card for printing

Results and Discussion

If the first version of the finished paper does not meet the customer's requirements, another version will be developed. At the stage of preparing the same paper for printing, small printing works begin [15]. All this work on preparing the map concerns the stage of preparing the map for printing. In other words, it is the use of printing or other methods of processing or copying the finished paper. This step includes preparing the print version and the parts used to print the card [16]. The results obtained in the implementation of these steps on the diploma are shown in Figure 5. In cartographic production, maps are developed by several teams of specialists, and therefore this task requires scientific and technical guidance, called map editing. The process of checking the work at all stages is called proofreading [17].

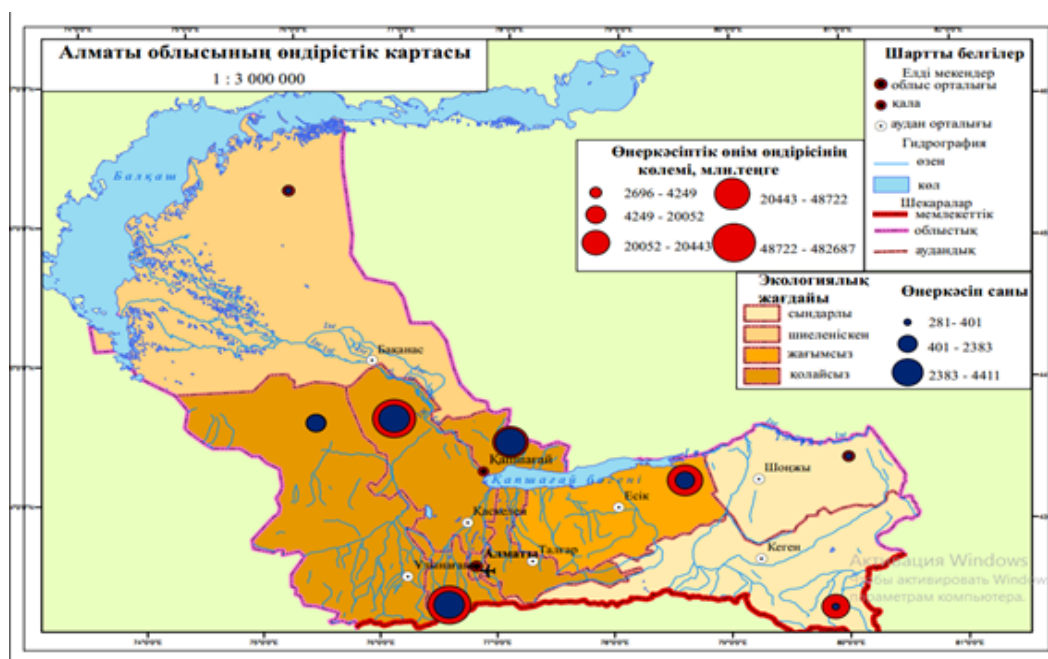


Figure 4 – Production map of Almaty region

1. Timely and reliable information should be used as a scientific basis for decision-making regarding public facilities [18].

Medical data is useless. They become important only if they are carefully analyzed, explained and serve as the basis for balanced and informed decisions. This situation indicates the need to create a soft algorithmic DBK that plays an important role in the development of eHealth and aims to ensure continuous improvement of medical information systems [19].

- Cartogram method (used to represent the population density of administrative districts, and the higher the accuracy of the cartogram, the smaller the range of cells;

- Separation method (lines of the same population density (isodem) are not used much, and a linear diagram of the sedimentation field potential is widely used to show the mutual proximity (distance) of the population in a given area) [20].

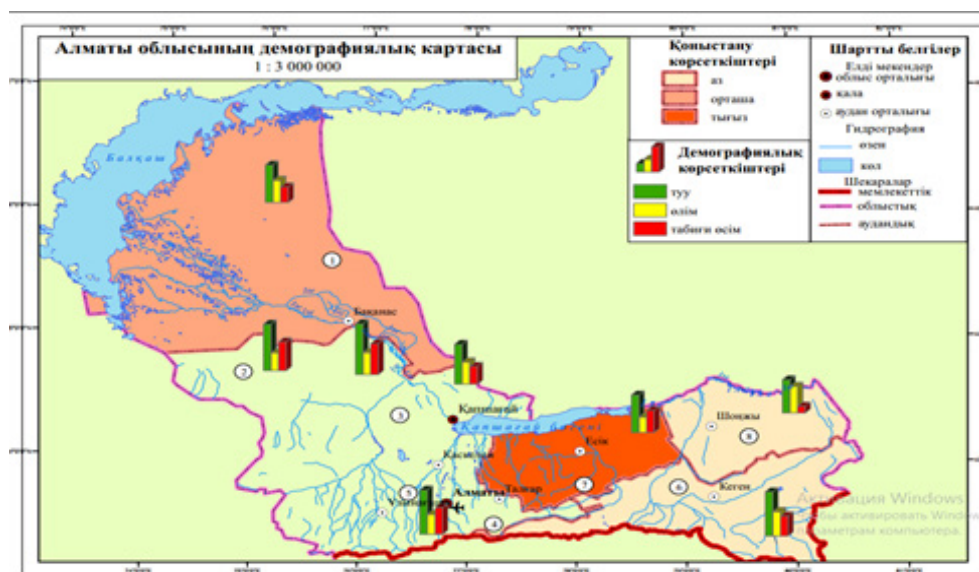


Figure 5 – Demographic map of Almaty region

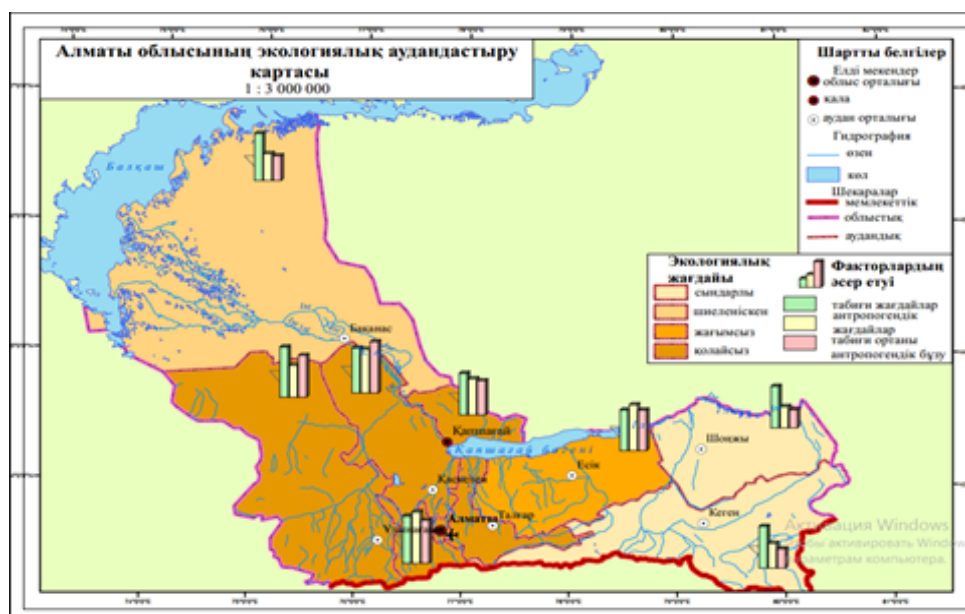


Figure 6 – Map of environmental zoning of Almaty region

Conclusion

The article is devoted to the development, analysis and development of general conceptual models for solving scientific problems, including for a comprehensive assessment of the regression of a number of hazardous natural and technological processes in the Astrakhan region. This allows you to resolve conflicts, provide information and support in making administrative decisions, and also provides an analysis of the state of various territorial systems affecting natural and technological processes.

1. The road leading to the Almaty region passes using geographical information. An assessment of its significance and impact on natural and technological risks has been carried out.

2. A map of the development of animal husbandry, vegetable growing and vegetable growing in the region has been developed. The process of mapping statistical data in the form of charts and histograms to display data.

3. The natural and technological condition of the territory was analyzed. A map of natural minerals has been compiled. When developing the field, we will use information from the National Atlas of the Republic of Kazakhstan. In this regard, we are conducting research.

4. An industrial map of the Almaty region has been created. In the short term, the company conducts statistical analysis of industry data and manufactured products.

5. Natural and technological threats have a huge impact on human health. Accordingly, in the last part we have plotted the state of health, morbidity, population development and environmental conditions based on statistical and geometric data.

REFERENCES

- 1 Antonova Zh.A. Soil cartography: an educational and methodological guide. Ul'janovsk, 2014, 102 p.
- 2 Konovalova T.I. Landscape and interpretive mapping, 2005, 424 p.
- 3 Trubina L.K. Geoinformation systems. Siber, 2002, 69 p.
- 4 Burrough P.A. Principles of Geographical Information Systems. Oxford University Press, New York, 2016, 190 p.

- 5 Sabirova A.I. Land relations in the Republic of Kazakhstan: Analysis and recommendations. Almaty, 2001, 174 p.
- 6 Kapralov E. G. Publishing center "Academy", 2005, 480 p.
- 7 Berljant A. M. Doctor of Cartography: teacher for universities, 2003, 477 p.
- 8 Berljant A.M. Cartography: Textbook for universities, 2002, 336 p.
- 9 Dubinin M. Ju. Web GIS. Computer, 2008, 749 p.
- 10 Abdullin R.K. Perm State National Research University. Perm, 2020, 132 p.
- 11 Marcin L. Conversion between cartesian and geodetic coordinates on a rotational ellipsoid by solving a system of nonlinear equations, 2021, 145 p.
- 12 Hofmann-Wellenhof B. GPS theory and practice, 2018, 282 p.
- 13 Brad A.K. Brief History of Human Computer Interaction Technology, 2015, pp. 44–54.
- 14 Lur'e I.K. Introduction of GIS in the field of legal statistics in Kazakhstan, 2019, 115 p.
- 15 Bultanov D. Introduction of GIS in the sphere of law statistics in Kazakhstan, 2021, 154 p.
- 16 Berlyant A.M., Vostokova AV., Kravcova V.I. Cartography: a manual for higher education institutions, 2020, 477 p.
- 17 Berlyant A.M. Cartography: a manual for higher education institutions, 2002, 336 p.
- 18 Nikolaev V.A. Fundamentals of the doctrine of agricultural landscapes. Agro-landscape research, 2000, pp. 4–57.
- 19 Perelman A.I. Geochemistry of landscape, 2018, 242 p.
- 20 Ramazanov N.G. Geoinformation modeling and assessment of land, 2017, 34 p.

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АЛМАТЫ ОБЛЫСЫ ЖЕР РЕСУРСТАРЫНЫҢ ТҰРМЫСТЫҚ ҚАЛДЫҚТАР ӘСЕРІНЕН ӨЗГЕРУІН ЗЕРТТЕУ ӘДІСТЕРІ МЕН ГЕОАҚПАРАТТЫҚ МОДЕЛЬДЕРІ

Аңдатпа

Бұл мақала географиялық ақпаратты ұсыну, өңдеу және талдау бойынша тұтас тұжырымдамалық модельдерді әзірлеуге арналған ғылыми мәселелерді шешуге, аймақтық жүйелерге көптеген қауіпті табиғи және жасанды процестердің әсер ету дәрежесін жан-жақты бағалауға бағытталған. Бұл зерттеу табиғи және техногендік үрдістердің әсерінен төтенше жағдайлардың пайда болуын болдырмау үшін әртүрлі аумақтық жүйелердің жағдайын талдау қажеттілігін шешуге мүмкіндік береді. Бір жағынан, шешім қабылдау үрдісінде ақпаратпен қамтамасыз ету және қолдау көрсету, екінші жағынан – көлік жүйелерінің картографиялық модельдерін ұсыну арқылы қауіпті табиғи және техногендік үрдістердің тәуекелдерін бағалау және оларды картаға түсіру маңызды. Сонымен қатар, өнеркәсіптік жүйелерді кешенді экологиялық бағалау және модельдеу, төлем жүйелерінің карталарын жасау және халықтың денсаулығын бағалау әдістері қарастырылады.

Тірек сөздер: ГАЖ, ArcGIS, картография, тұрмыстық қалдықтар, бағдарламалау, тексеру.

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МЕТОДЫ ИССЛЕДОВАНИЯ И ГЕОИНФОРМАЦИОННЫЕ МОДЕЛИ ИЗМЕНЕНИЙ ЗЕМЕЛЬНЫХ РЕСУРСОВ АЛМАТИНСКОЙ ОБЛАСТИ ПОД ВОЗДЕЙСТВИЕМ БЫТОВЫХ ОТХОДОВ

Аннотация

Данная статья посвящена решению научных проблем, включая разработку целостных концептуальных моделей представления, обработки и анализа географической информации, и всесторонне оценивает степень влияния региональных систем на многие опасные природные и искусственные процессы. Это позволяет разрешить противоречие между необходимостью анализа состояния различных территориальных систем с целью предотвращения возникновения чрезвычайных ситуаций вследствие влияния природных и техногенных процессов. С одной стороны, предоставление информации и поддержки в принятии решений, а с другой – обеспечение предоставления картографических моделей транспортных систем, оценка рисков опасных природных и техногенных процессов и их картографирование. Комплексная экологическая оценка и моделирование промышленных систем. Метод картографирования платежных систем и оценки состояния здоровья населения.

Ключевые слова: ГИС, ArcGIS, картография, бытовые отходы, программирование, верификация.

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