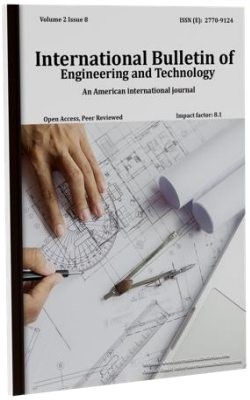

FORMATION OF ECOLOGICAL MAPS DATABASE USING GEOINFORMATION PROGRAMS

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https://doi.org/10.5281/zenodo.17440775

Abstract.

This article highlights the convenience, efficiency, flexibility, compactness, and similar possibilities of creating a database based on the ecological situation in the Republic of Uzbekistan and using accurate statistical data based on geoinformation technologies, creating ecological maps in electronic form using geoinformation technologies, and quickly updating the information in the database by receiving timely information.

Key words

Ecology, map, ecological map, geoinformation technologies (GIS).

Introduction. In accordance with the Regulation of the Cabinet of Ministers of the Republic of Uzbekistan dated January 15, 2019 No. 29 "On the State Committee of the Republic of Uzbekistan for Ecology and Environmental Protection", a number of important works are carried out in our country, such as the protection of ecology and the environment and reports on the work carried out in this regard, the collection, processing and formation of a database of statistical data based on observations of the state of ecology and the environment. According to the Regulation, the components of the State Committee of the Republic of Uzbekistan for Ecology and Environmental Protection, the tasks assigned and the organization of work, as well as their stages, are determined. Based on the tasks, all work on ecology and the environment in our republic is carried out by the State Committee of the Republic of Uzbekistan for Ecology and Environmental Protection (abbreviation - the State Committee for Ecology) [1]. The number of enterprises and organizations operating in the territory of the Republic of Uzbekistan increased by 366,275 from 2001 to 2024 and currently amounts to 485,024. The number of permanent residents by the beginning of 2024 amounted to 36,799,800 people. This indicates an increase of 7,676,400. As of January 1, 2024, the number of vehicles owned by individuals amounted to 4,020,744 units. This is 383,625 more than in 2023. [2]. Also, maps of ecological systems are being created, divided into different parts. Although each of the above data is included in the statistical database, the demand for electronic maps that show exactly in which regions it has grown and ecological maps with a single piece of information still remains.

Issue: As in all areas, in the field of ecology and environmental protection, the need to obtain new information, integrate it into a single database and create electronic maps of it is growing. Over time, some of the important information becomes obsolete and new information must take its place. In this process, speed and accuracy take the most important places in accordance with the requirements of the modern age of technology. It is no secret that today, working on paper or manually has become outdated. Therefore, the process of transferring all the information we have, and even maps, into electronic form, using technical capabilities, is one of the urgent problems.

Analysis. Automated systems are used to obtain the necessary information in the field of geodesy and cartography at high speed and high accuracy. Such a system should have a large number of graphic and thematic databases, and to make quick decisions, form knowledge about the world for the user and provide various spatial data, geoinformation systems, i.e. sectoral GIS, have been created.

Registration of factories, enterprises, and organizations operating in the Republic of Uzbekistan is carried out through the Unified State Cadastre System. The State Committee for Ecology monitors the amount of harmful gases emitted into the environment and all work related to environmental protection, and the State Committee for Statistics collects statistical data on vehicles, population, and other things.

Solution A geographic information system (GIS) is a modern information system that allows you to store, collect, organize, compile, study, reformat, map and predict each event and process by layer.

The formation of a database of geographic information systems occurs in the following form and includes the following stages:

1)Collecting, compiling, and analyzing geographic information: raster data such as topographic maps, satellite images, aerial photographs, and simple tabular information;

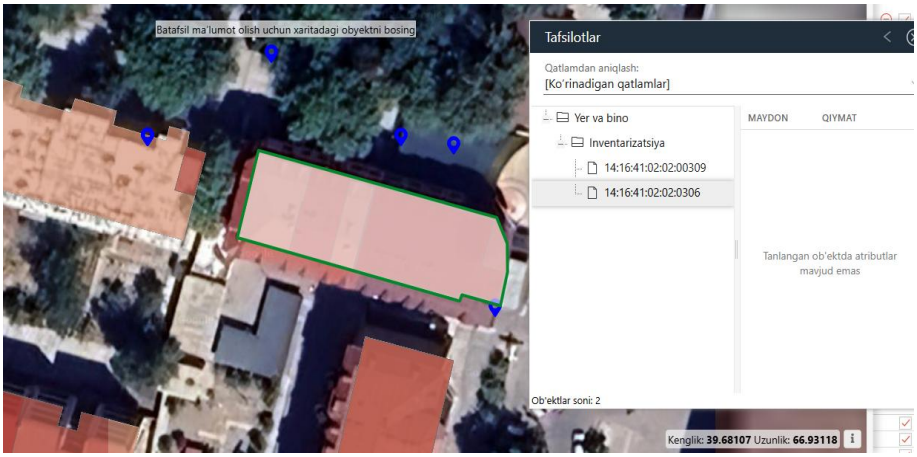
2)Exporting all collected information to computer technology;

3)Forming geoinformation layers by processing information on a computer;

4)Obtaining digital maps by combining the formed layers.

The concept of a geographic information system can also be used in a narrow sense. A geographic information system is a digital map of the earth with the ability to perform detailed analysis and independent editing, as well as collect additional information about real estate objects.

Registration and inclusion in the database of organizations and enterprises that continue their activities is carried out mainly using reliable and accurate data from the Building and Construction Cadastre. GAT is widely used in this process. If we also create the amount of gases emitted into the air from factories, organizations and enterprises using electronic maps in this created database, and combine them with transport and human factors, we can have the necessary electronic database and ecological map.



1-rasm. Bino vbino vaa inshootlar davlat kadastrini ro‘yxatdan o‘tkazishda GAT

The obligation to conduct state registration of buildings and structures is also imposed on the owner of the property or a person who has additional rights to the building and structure. They may also impose all obligations for state registration of a building or structure on third parties. The implementation of these rights and obligations is carried out in accordance with legislative acts.

The maps and plans of the cadastres of buildings and structures depict the location of buildings, number of storeys and sections (liters) of buildings. The type of construction of buildings and structures, cadastral value, year of construction are indicated [5]. Information is also included on the presence of engineering communications serving the building. These are electricity, gas, water, sewage, heat energy, elevator (lift), and other information, if any.

In the ArcMAP application of the ArcGIS program of the State Committee for Housing and Urban-Rural Development, individual residential buildings are depicted in red, multi-storey residential buildings in green, and non-residential areas in red. The

non-residential buildings - organizations and enterprises - that we need are also depicted in red.

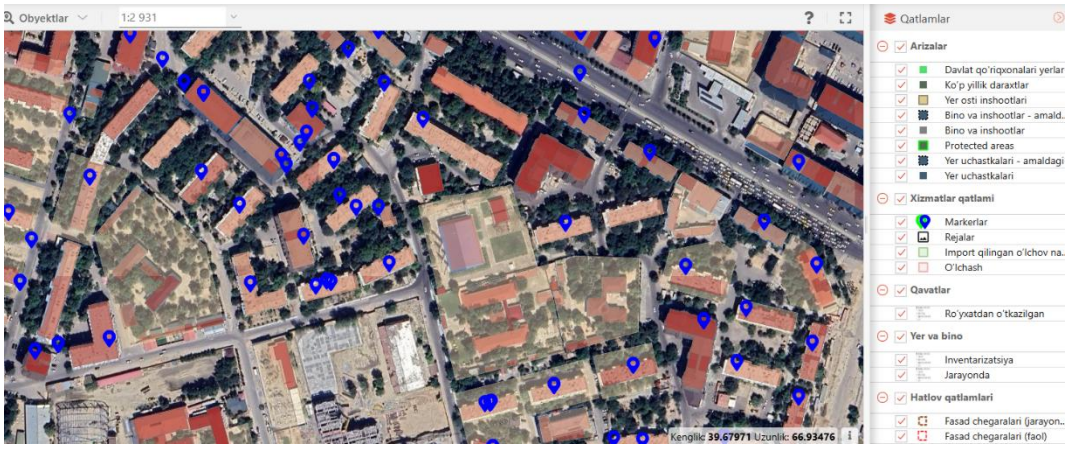
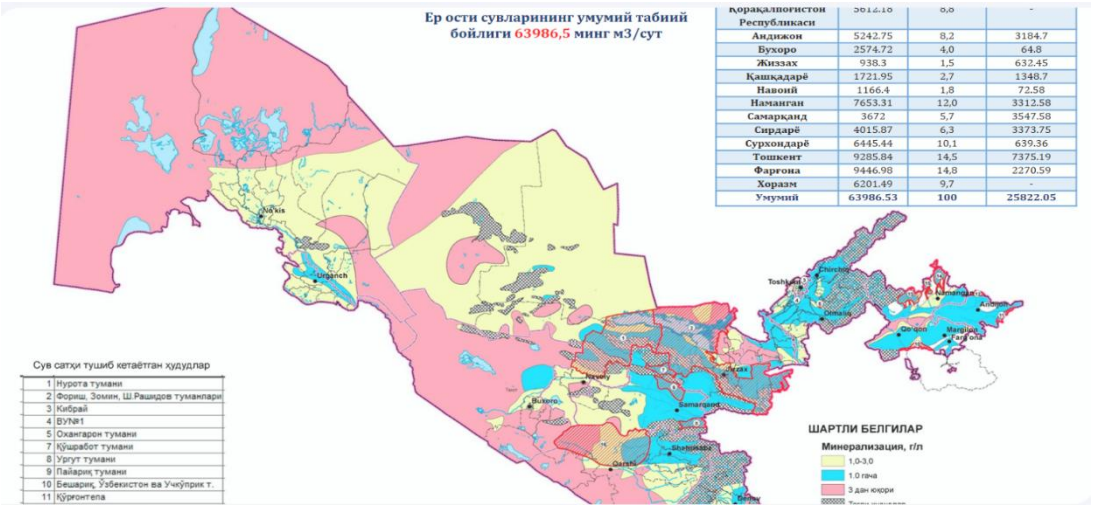


Figure 2. Database of the cadastre of buildings and structures formed in the UZKAD program

Based on the basic principles of maintaining state cadastres, it is recommended to use scales of 1:100, 1:500, 1:1000, 1:2000 and 1:5,000 for the state cadastre of buildings and structures of the State Land Management and Construction Administration. These are the scales that we can also recommend for the map we are going to create.

Figure 3. Map of harmful gases emitted into the atmosphere in 2020



Республикаси			
Андижон	5242.75	8,2	3184.7
Бухоро	2574.72	4,0	64.8
Жиззах	938.3	1,5	632.45
Қашқадарё	1721.95	2,7	1348.7
Навоий	1166.4	1,8	72.58
Наманган	7653.31	12,0	3312.58
Самарқанд	3672	5,7	3547.58
Сирдарё	4015.87	6,3	3373.75
Сурхондарё	6445.44	10,1	639.36
Тошкент	9285.84	14,5	7375.19
Фарғона	9446.98	14,8	2270.59
Хоразм	6201.49	9,7	-
Умумий	63986.53	100	25822.05

Figure 4. Map of total groundwater resources

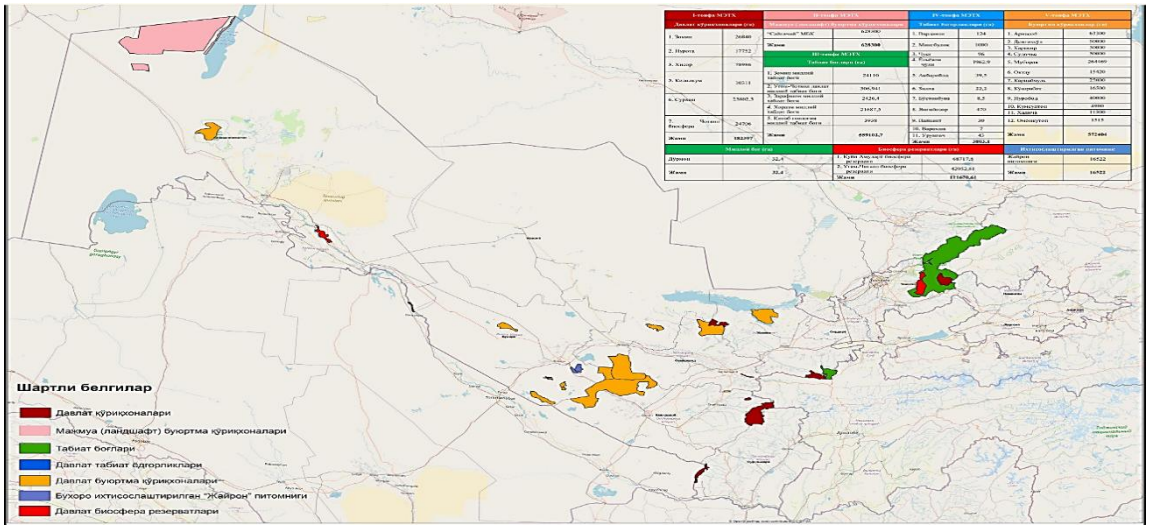


Figure 5. Map of protected natural areas of the Republic of Uzbekistan

The process of creating the ecological map database that we are creating is also carried out and prepared in this sequence, although not in exactly the same order. The necessary scales are also prepared in our own way.

The above pictures are examples of only certain parts of the ecology of the Republic of Uzbekistan. However, we know that the concept and elements of ecology are very broad and require a new approach based on modern requirements. We need to create a single geoinformation database that incorporates the above parts of ecology and implement constant updates.

In the ecological maps we want to create, the legends and symbols of cartographic images that provide information about buildings and structures, densely populated areas, areas with a high concentration of harmful gases emitted into the atmosphere, areas with the most traffic, areas with the cleanest air, and many other such information should be created in accordance with State standards and in a way that is easy to understand for the general public.

Using the capabilities of the ArcGIS program to enter attributive data and form an electronic map allows us to combine classical methods of map creation and modern GIS technologies. This is exactly what is required today.

The process of collecting ecological data, geodesy and cartography, statistical data, and the creation of all types of maps is regulated and protected by the laws and by-laws of the Republic of Uzbekistan.

Conclusion Ecological map databases created in the ArcGIS program guarantee the visibility of the scale, visibility, level of modeling, ease of updating, efficiency, flexibility, compactness and other convenient features of the created map. Also, the ecological map database provides the ability to quickly obtain information about buildings and structures, the ecology of the territories, the number of inhabitants and vehicles, annual indicators of harmful gases emitted into the atmosphere, and the level of environmental pollution. Another unique feature of this database is that it allows you to know in advance in which regions of the Republic of Uzbekistan environmental hazards will occur and take measures to prevent them.

References:

1)Regulation of the Cabinet of Ministers of the Republic of Uzbekistan dated January 15, 2019 No. 29 “On the State Committee of the Republic of Uzbekistan for Ecology and Environmental Protection”.1
2)Official website of the State Statistics Committee: www.stat.uz
3)www.lex.uz
4)https://oz.sputniknews.uz/
5)https://eco.gov.uz/uz