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The Importance of Orthophotoplans in Cadastre Work

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Abstract This article is devoted to the creation of a scientific basis for the use of orthophotoplans and the use of geographic information systems (GAT) in the conduct of cadastral work.

Keywords: Cadastre, orthophotoplan, land resources, geographic information systems, database, agricultural lands, orthophoto

Today, special attention is paid to targeted scientific research aimed at developing effective technologies for the registration of cadastral objects, the design and construction of their digital maps, methods of geodetic and cartographic support of the cadastral sector on the basis of modern geographical information systems. In this regard, one of the pressing issues is the development of modern technologies for updating digital maps, including the improvement of methods for creating and updating orthoftoplans of cadastral works.

At a time of rapid development, great attention has been paid to the field of cadastre in our country, and a lot of scientific and practical work has been done. In particular, in accordance with the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated April 23, 2018 No 299 "On measures to further define the boundaries of administrative-territorial units, inventory of land resources and geobotanical research in pastures and hayfields." It is carried out by the Uzdaverloyikha Institute and its regional divisions on the basis of high-quality orthophotoplans with the help of satellite imagery and drones, with the involvement of important modern technologies.

Including

- delimitation of administrative-territorial units;
- inventory of all categories and types of land resources in the country

Due to the effectiveness of the inventory of land resources on the basis of orthophotoplans, it was necessary to hold this event today

Firstly. The demarcation of administrative-territorial units began in 1924 with the establishment of the Republic of Uzbekistan, and in 1938 the demarcation of regions and districts began. To date, demarcation has been linked to fixed elements, such as rivers, canals, roads, hills, ravines, and other topographic elements. If it is not possible to link the boundary to these elements, the boundary line is defined only on the basis of the boundary description of the area and maps larger than 1: 100,000. According to the Resolution of the Cabinet of Ministers No. 299 - electronic maps at scales of 1:10 000, 1:25 000, 1:50 000 and 1: 100 000 will be created with the boundaries of administrative-territorial units connected to the state coordinate system on the basis of space images. Most importantly, a separate coordinate catalog is created at the turning points of each administrative-territorial boundary.

Secondly. The inventory of land resources began at the same time as the demarcation of the administrative-territorial units, and as a result of the initial inventory, a land report was formed, which reflects all categories and types of land resources in the country.

Since then, there has been no simultaneous general census of all categories and types of land resources, only census of different types of land at different times**.**

Now, on the basis of the new order - all categories and types of land resources of the republic will be fully recorded on the basis of satellite images. At the end of the census, electronic maps of scales of 10,000, 25,000, 50,000 and 100,000 scales will be created, connected to the state coordinate system, which will integrate all categories and types of land resources.

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Most importantly, in our country, as in developed countries, it is possible to conduct online land registration and create an information system for regular monitoring of the use of all types of land and illegal situations. [2]

This indicates the relevance of the topic.

Orthophotoplan is often seen as an important source of information for creating digital cards and plans. It can be used as a cartographic basis and raster in GIS to describe the results of land inventory.

An orthophotoplan is a topographic photoplan composed of orthophotos. In turn, an orthophoto is an orthophototransformation, ie a photograph of a place taken as a result of the transfer of a topographic aerial photograph from a central projection to an orthogonal projection. [3]

It should be noted that, firstly, the definition of orthophototransformation is less clear, and secondly, the term is somewhat outdated and less accurate when used in modern production. In short, orthophoto is not a real orthogonal projection of space objects and space. In orthogonal projection, only the surface is depicted (relief), and objects on the surface are not depicted.

Modern production does not use photographic (optical-mechanical) methods and tools, but uses digital (computer) technology, so it would be appropriate to replace the term "orthophoto transformation" with the term "orthotransformation"

Modern digital technologies make it possible to obtain true orthophoto, which is a real orthogonal projection of space and the location of objects in it. But producing real autophotos today is more expensive than making ordinary orthophotos. Due to this, such a product is rarely produced.

Orthophotoplans are widely used as a cartographic basis in land inventory because they are very fast to build, and are cheaper than producing maps and plans. Orthophotoplans are also used to create subsequent maps and plans, but they are limited to scales, i.e. 1:10 000, and on smaller scales their effectiveness is reduced. Objects on the ground, especially tall objects (buildings) are depicted with geometric error in orthogonal projection. [3]

Therefore, orthophotoplans and orthophotos are not suitable for compiling cadastral maps of the areas where buildings are built. Because the peripheral points of buildings in the contours of built-up areas must be correctly seen on cadastral maps, orthophotoplans and orthophotos do not have such features. It is very difficult to photograph such objects, to determine their basis on the image, they require special skills from the performer, and the contouring of objects has a certain degree of relativity.

In the cadastral survey of objects, the main focus is on the boundaries of land plots. Rarely do they cross obstacles and other similar places. In orthophotoplan, it is much more difficult to see the base of the barriers, where the barriers should not be confused with the upper part. Therefore, it is recommended to use the stereoscopic method of surveying when compiling cadastral maps of built lands..

In addition to orthophotoplans, orthophotoplans showing orthophotoplans are also issued, in which objects on the ground are presented with barcode cartographic images (e.g., settlement boundaries).

Orthophotoplans can be very effective when used to create 1:10,000 scale maps of population range areas. Because in such places the main object of survey is often plots of land without objects that rise above the ground. The use of orthophotoplans in workplaces where such surveys are conducted is much cheaper and more convenient than stereoscopic surveys.

Hence, just as with orthophotoplanic imaging, the result of stereoscopic imaging is a vector model of the contour of objects. For example, when working with the Intergraph software, this vector model is displayed as a graphic file in DGN (MicroStation) format. The graphic objects in this file and the contour representations of the object elements can be linked to the GIS MGE database table. In this connection, it helps to determine which object contour in the location is the graphic object data. It is also possible to interact with graphic objects with a table of object attributes and even a clear description of the object when vectoring an orthophotoplan or stereoscopic image. However, when using a topological model of digital card data, to do this, for example, during direct vectorization or stereoscopic imaging in GIS MGE,

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not all connections must be established between graphic objects and all-terrain objects shown in the object table.

Today, a number of works are being carried out in our country to create orthophotoplans. In particular, according to the Department of Remote Sensing, Geodesy and Cartography of the Cadastre Agency, in 2018-2019, with the help of satellites KOMPSAT-3 and KOMPSAT-3A of the Republic of Korea, satellite images were taken covering the entire territory of the Republic and irrigated lands, as well as 1:10 000 5712 scales, as well as 3608 scales of 1:25 000 scales for the rest (mountain, foothill and desert), a total of 9320

Aerial photography was carried out in Kashkadarya, Tashkent, Khorezm regions and Tashkent city in order to register real estate and irrigated lands. Using aerial photographs, 6,724 orthophotoplans on a 1: 2,000 scale and 387 on a 1: 10,000 scale were created. In 2019, the Institute "Uzdaverloyiha" in accordance with the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated April 23, 2018 No 299 in 2018 in 16 districts of the Republic (Narpay, Kattakurgan, Koshrabat, Yukorichirchik, Kuyi Chirchik, Chinoz, Boka, Kibray, Zafarabad, Kagan, Vobkent, Mubarek, Guzar, Muzrabat, Nurata) In 2019 in 18 districts of the Republic (Kegeyli, Bulakbashi, Khojaabad, Karakul, Bukhara, Yangiabad, Zarbdor, Nishan, Karmana, Naryn, Samarkand, Qizirik, Havos, Sayhunabad, Akkurgan, Tashkent, Dangara , Koshkopir) land resources were recorded.

For the inventory of land resources, first of all, scaled orthophotoplans of each district were prepared, deciphering works were carried out and electronic digital maps of the regions were created and the areas of each contour were calculated, land types were set and unique numbers were given to the contours. An inventory of land resources was conducted on electronic digital maps created for each region. [2]

In order to continue this type of work more consistently, we consider it necessary to do the following:

- Scientific substantiation of the development and importance of modern methods and technologies in the creation of orthophotoplan cadastral works;
- Further improvement by creating a transparent and efficient system of land allocation.
- Aerial photography of all areas in order to ensure accurate accounting and updating of lands, the formation of a database.
- Ensuring accurate and complete formation of state cadastre data.
- Monitoring and development of orthophotons using aerospace and unmanned aerial vehicles;

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