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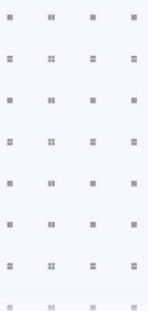
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AUTOMATION OF THE LAND ACCOUNTING SYSTEM IN THE ARCGIS SOFTWARE BELONGING TO THE GIS FAMILY

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Abstract: This article discusses issues such as creating a database in the ArcGIS software belonging to the GIS family, processing the knowledge of thematic layers, the information content of tables of relevant data, entering the results of field research into a database, and modulating an automated land accounting system.

Keywords: scale, ArcGIS, cartography, cadastre, geodesy, electronic, digital, map, state cadastres, ArcCatalog, ArcMap, application, attributes, automation, land registration, separate state cadastres, applications, layers, databases, integration.

Introduction

In accordance with the Decree of the President of the Republic of Uzbekistan dated September 25, 2013 PP-2045 "On the organization of the National Geographic Information System", a number of reforms have been implemented in the republic. In particular, the Committee "Davergeodezcadastre" created and maintains electronic digital maps of agricultural land at a scale of 1:10,000 in the ArcGIS program. In addition, on the basis of the Law of the Republic of Uzbekistan "On State Cadastres" and the Regulations "On the Procedure for Creating and Maintaining a Unified System of State Cadastres", approved by the Resolution of the Cabinet of Ministers of February 16, 2005 No. 66, the maintenance and formation of 21 state cadastres on the territory of the republic state unitary enterprise National Center for State Cadastres, Geodesy and Cartography of the Committee "Davergeodezcadastre". When maintaining and forming state cadastres, an electronic digital map on a scale of 1:10,000 serves as a cartographic basis for maintaining individual state cadastres. According to the legislation, the Committee "Davergeodezcadastre" is entrusted with the maintenance and formation of the following state cadastres:
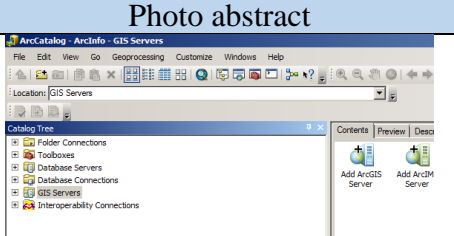
- State land cadastre,
- State cadastre of buildings and structures,
- State cadastre of geodesy and cartography,
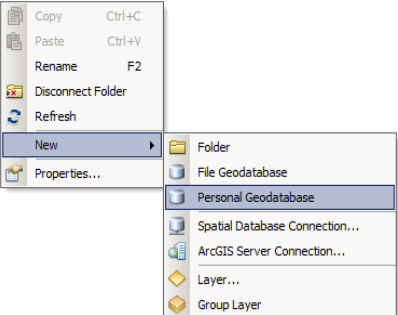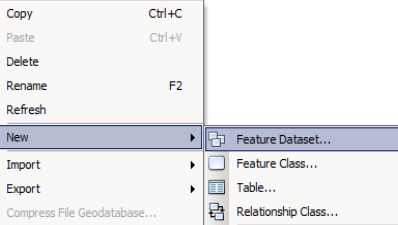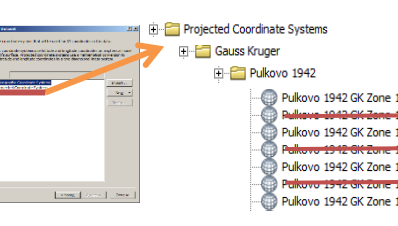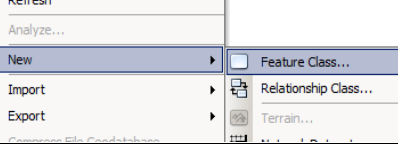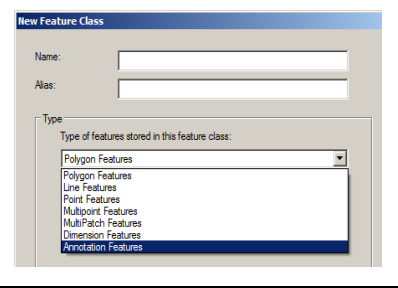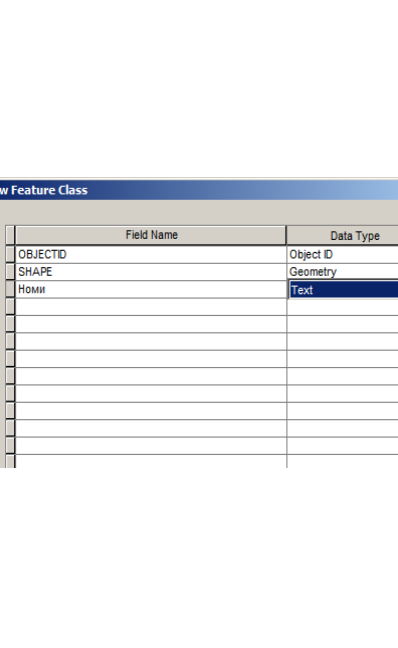- State cadastre of territories.

The importance of the land cadastre within these state cadastres is invaluable. The State Land Cadastre is attached to the State Research and Design Institute "Uzdaverloikha" of the Committee "Davergeodezkadastry". Regional branches and subdivisions of the State Research and Design Institute "Uzdaverloikha" are currently forming and maintaining a database of land types and crops in the ArcGIS program for all land users in the field of land cadastre.

Research methods

The formation of the database is carried out in the order indicated in table 1 below.

Table 1

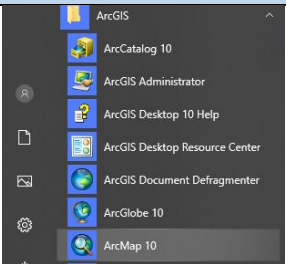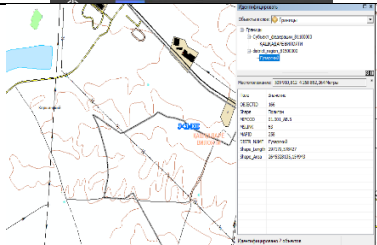| №	Photo abstract	Subsequence
1		ESRI's ArcGIS software uses the software's ArcCatalog application to create a geographic database. After opening the working window of the catalog source, using the ArcCatalog tree, the required storage disk is selected.

2		In the working window of the program, the right mouse button is pressed, as a result of which auxiliary stripes of the window are formed. From the generated auxiliary element, the New line Personal Geodatabase (personal database) is selected and a name is entered into it.
3		We enter the generated personal database and use the right mouse button to select the Feature Dataset line. The name is entered into the resulting window new Feature Dataset, and the next coordinate system is entered through the Next button.
4		The coordinate system sequence is performed in the following order. The selected area is marked with the corresponding zone, the Next button is pressed twice in a row, and the Feature Dataset window is completed by clicking the finish button.
5		We enter the generated Feature dataset and once again right-click and select the line With l and ss Feature.
6		In the resulting new Feature Class application, the name of the object is entered into the Name space, and the type of layer is selected from the lines in the Type item, depending on the type of layer. For example, Polygon Features is selected for a polygon layer, Line Features is selected for a line layer, Annotation Features is selected for a point layer.
7		After clicking the Next button, a datasheet will open containing information about the layer you want to create. If in the Field column Name, data containing information about the layer is entered, then in the Data type column, the appropriate formats are selected from the formats that appear in this column. Field column Name text data (words) is entered, then text is selected in the Data type column, if in the Field Column Name, numeric data is entered, then Double is selected in the Data type column, if in the Field column Name data about the date is entered, then Date is selected in the Data type column, if in the Field column Name data is entered in the form of an image, Raster is selected in the Data type column. The Length line of the Field Properties command, located at the bottom of the window, is 50. This

		means that the letters of the data entered in the Field Name column must not exceed 50 (50 is the number of cells). However, this number of cells can be changed to 100, 200,500, etc. (for example, the word "hectare" - occupies 6 cells, and the word length occupies 5 cells). At the end, the Finish button is pressed. Thus, the process of creating separate layers is observed.

A gradual update of the electronic digital map is required due to changes in land users and crop types. The process of updating the electronic digital map and identifying changes depends on the results of field studies in the field. At the same time, new data are entered into the database based on the results of recent field studies. This necessitates regular updating of information in the database, based on the terms of the contract concluded on the basis of the annual demand for agricultural crops.

The formation and updating of electronic digital maps is carried out in the order given in table 2 below.

table 2

№	Photo abstract	Subsequence
1		Using the Start button, the ArcMap string is selected from the ArcGIS item
2		Existing files will be opened from the ArcMap application and the information will be included or modified in the attribute database according to the results of the field research

Attributes are numeric and character descriptions contained in a database. The information stored in attributes can be of general, structure, and character types. For example, in a GIS, path information displayed on a map can be represented as an attribute as follows.
One of the main formulas for describing attribute data in the Gat database is a tabular representation. (Picture 1)

Table

FERMER_CHEGARASI

Nomi	Майдони	Пахта	Галла	Бошкалар	SHAPE_Length	SHAPE_Area
Элёржон	136,953837	61,629227	68,476918	6,847692	13276,416554	1369538,367192
Элибек ММ	50,54447	22,745012	25,272235	2,527224	3675,512149	505444,703257
Элита	220,434525	99,195536	110,217262	11,021726	7554,156759	2204345,24857
Элшод Нуробод	85,211778	38,3453	42,605889	4,260589	4304,133985	852117,776319
Энтер	33,739195	15,182638	16,869598	1,68696	3150,452524	337391,953962
Энтер	50,668003	22,800601	25,334002	2,5334	3692,291117	506680,032564
Эргаш	92,700185	41,715083	46,350092	4,635009	6430,560927	927001,845101
Эргаш ота	44,919241	20,213659	22,459621	2,245962	3197,085381	449192,414091
Эргаш ота	96,745908	43,535658	48,372954	4,837295	5390,470728	967459,076399
Эрк Шер Шароф	79,459793	35,756907	39,729897	3,97299	4021,559186	794597,931926
Эркин само	55,199467	24,83976	27,599733	2,759973	3398,355322	551994,668805
Эркин чорва даласи	93,213343	41,946004	46,606671	4,660667	4592,486134	932133,425973
Эски Бог Собир	54,542854	24,544284	27,271427	2,727143	3279,062958	545428,541362
Эсонбой ота	51,919238	23,363657	25,959619	2,595962	3191,609316	519192,382
Эхсон	160,331935	72,149371	80,165967	8,016597	7860,839366	1603319,34993
Эхсон Савоб	78,596161	35,368272	39,29808	3,929808	4646,898303	785961,608931
Эшбек Полвон	48,096553	21,643449	24,048276	2,404828	3099,53991	480965,527892
Эшбек Полвон	42,481328	19,116598	21,240664	2,124066	3041,41412	424813,283785
Эшназар ота	71,801671	32,310752	35,900836	3,590084	3875,6881	718016,710611
Эшназаров Ш	52,794345	23,757455	26,397173	2,639717	3544,90477	527943,451393
Эшназаров Шомурод	60,997201	27,44874	30,4986	3,04986	3976,74218	609972,008208
Эъзоза	129,09991	58,094959	64,549955	6,454995	6089,821932	1290999,097905
Юлчираев Ихтиёр	23,916132	10,762259	11,958066	1,195807	2791,639445	239161,32067

Figure 1. In the general layers view of the attribute data table

Attributes indicating the characteristics of an object and corresponding to the subject representation of data are stored in a tabular form. In this case, each object is placed in rows, and its attribute data is placed in columns.

All GAT programs have the ability to create, edit, and manipulate (manage) attribute data. In addition, the small programs that manage the databases in these programs also provide this capability. Only in some applications, database management is of paramount importance, while some programs place great emphasis on data analysis.

Result

Currently, the database is being formed by manufacturing organizations. This process is renewed mechanically every season. In addition, entering information into the database in the context of the land contour does not provide visualization of information in the attribute of the land user. The contour of the terrain and information about land users require the input of information in both subject layers for visualization (Fig. 2).
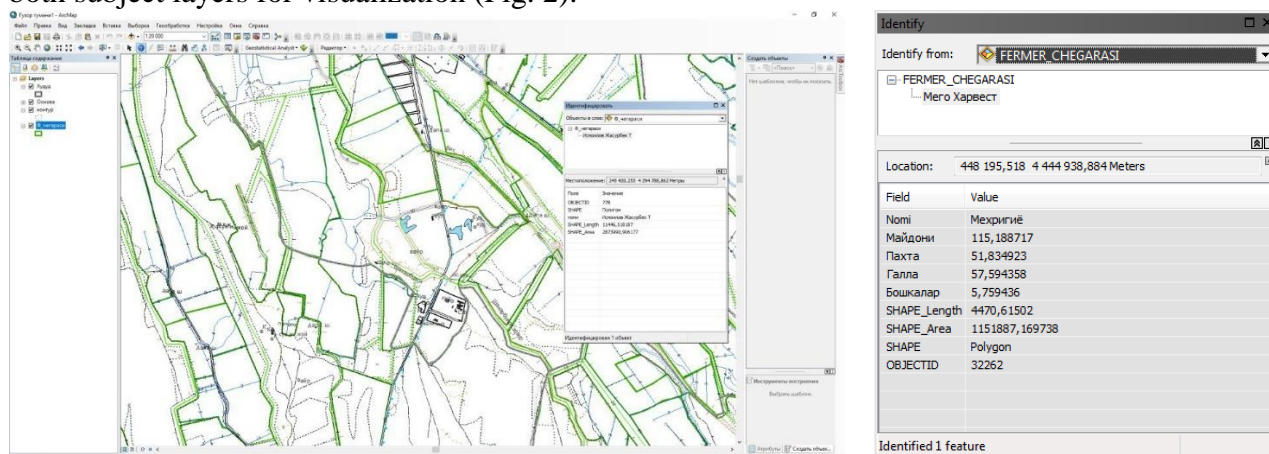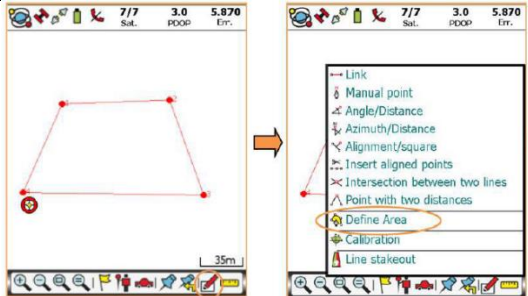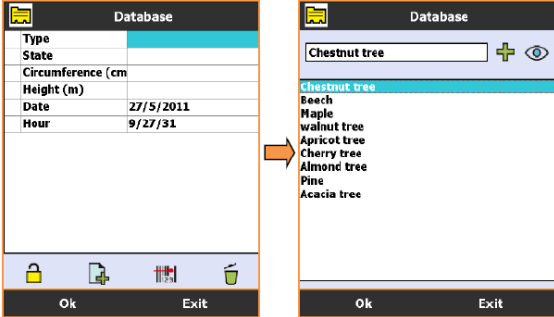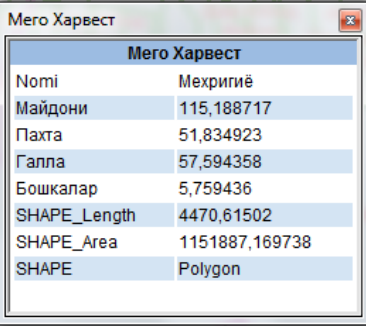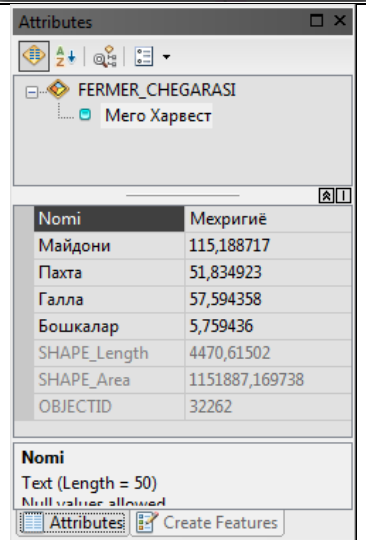
Figure 2. Working window of the apkMAP application

High efficiency can be achieved by automating and modulating this process. This requires to conduct field research using a GPS device and coding in the ArcGIS program. The information generated by the GPS device includes the following data:

- - The name of the land user,
- - Legal name,
- - Cadastral number,
- - Address,
- - contour numbers,
- - Types of crops,
- - The total area of the land plot,
- - Area of irrigated land,
- - Cost estimate,
- - A document confirming the right,
- - Lease contract,
- - Date of state registration.

Field and cameral survey work with a GPS device and the ArcGIS program is carried out in the following order:

№	Stages	Comments
1	With the help of GPS, the contours of the earth are explored in the form of a field	
2	All information obtained on the spot is entered into the device attribute table	
3	Design information is sent to machining centers. In the centers, the data is entered into a database.	

4	Information is tied to each contour of the earth	
5	Land contours are tied to land users	

In ArcGIS, linking and integrating thematic layer data using the "Relationship class...." command is used to implement an automated land accounting system. And ensuring the direct flow of information received from the GPS device directly to the database serves to modulate the automated system (Fig. 3).
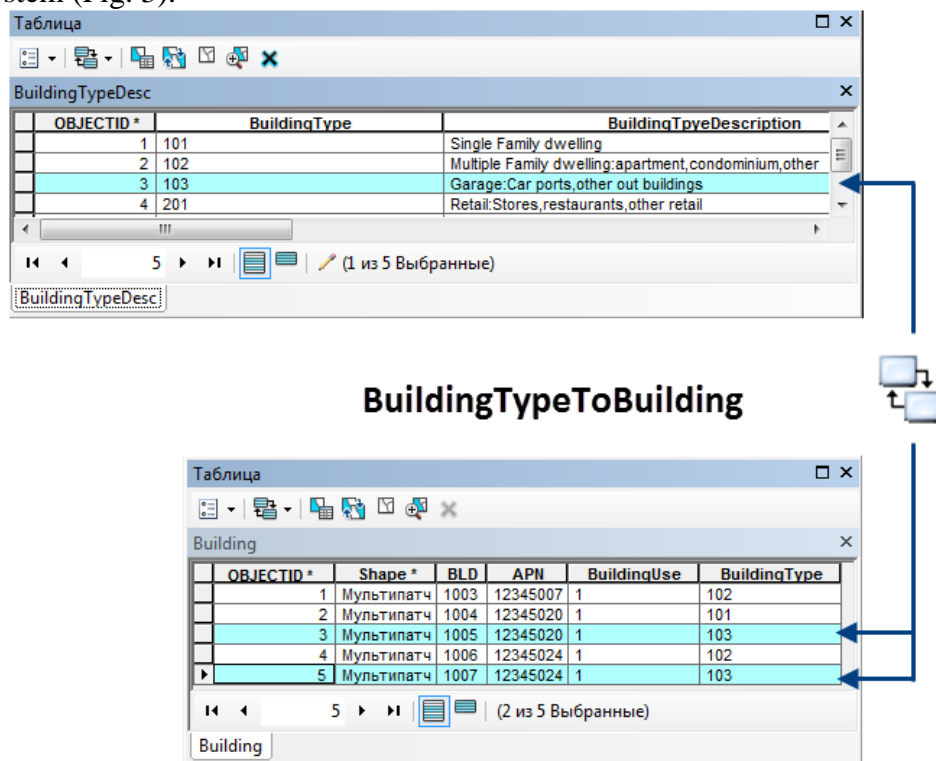

Figure 3 Linking layer attribute tables

Conclusion

By modulating the automated land accounting system, we achieve the following performance indicators:

- Increasing the use of modern equipment and technologies;
- High accuracy of results;
- Exchange of information in the short term;
- Increase in the coefficient of useful labor;
- Electronic data interchange;
- Systematization of information in the database.

The use of software belonging to the family of geographic information systems in land accounting will serve to integrate the software with modern field research equipment. The nationalization of software interfaces and the creation of additional modular capabilities in the automated system will serve to prevent violations of land control and violations of the rights of land users in the republic.

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