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# CREATING A WEB MAP OF AGRICULTURE USING THE ARCGIS ONLINE PLATFORM (IN THE EXAMPLE OF TASHKENT REGION)

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## Abstract

Nowadays, it is important to create interactive, electronic and web maps of socio-economic processes taking place on earth and in its various regions on the basis of developing geoinformation systems and technologies. At the same time, the use of cartographic methods in the study and analysis of fields related to agriculture is considered one of the main issues. In this regard, taking into account the natural, socio-economic conditions of our country, one of the main tasks is to improve the method of creating web maps describing the agricultural sector, as well as to introduce modern technologies of geographic information systems and cartographic support methods.

At the moment, there are a number of tasks defined in decrees and decisions approved by our government related to the development of the economy and agriculture of our republic. Therefore, there was a need for rational use of natural and labor resources, effective deployment of agricultural sectors, taking into account the natural and socio-economic conditions of the republic. In addition, in the Action Strategy for the further development of the Republic of Uzbekistan in 2017-2021, in particular, "... institutional and structural measures to accelerate the modernization and development of agriculture, to reduce state participation in the development of agriculture "Continuation of reforms" task is set. In the implementation of these tasks, it is important to carry out scientific research, including the improvement of cartographic provision of agricultural networks and infrastructures in the regions and the development of web maps based on geographic information systems and technologies (GIS) [1].

**Keywords:** Web map, Web GIS, Web cartography, ArcGIS online, ESRI, NextGIS, Javascript, Python.

**Introduction:** Web maps are maps created using geographic information technologies and placed on the Internet. The terms "Web map", "Web GIS" and "Web cartography" are close to each other in terms of their goals and tasks. Nowadays, there are several ways to create web maps. These include web platforms and services designed for creating cartographic works on the Internet (CartoDB, Animaps, Scribble Maps, Click2Map, ZeeMaps, UMapper, etc.), software belonging to the GIS family (ArcGIS, GlobalMapper, MapInfo, etc.) and programming languages (Javascript, Python, PHP, Java, Scala, Haskell, Swift, and Rust) are relevant. In addition, there are NextGIS and ArcGIS Online platforms, organized by private and commercial (ESRI, NextGIS) companies, which currently rank high in the list of web platforms with a large number of users for spatial data analysis and mapping, as well as creating thematic web maps. [<https://www.esri-cis.ru/about/>], [<https://nextgis.ru/about/>].

In the creation of the web map of the Republic of Uzbekistan, using the ArcGIS Online platform, as attributive data, the database created for the web map of the Tashkent region, indicators of agricultural production indicators of our republic in the cross-section of regions (districts) and thematic layers related to the territory of our republic (relief, roads, hydrography, settlements, etc.) were selected. The technology of creating and printing an agricultural web map, the process of creating a map, you can use the ArcGIS Online platform by registering at <https://www.ArcGIS.com>. Creating maps with new content on the platform can be done in 2 different ways. In the first method, the thematic layer created during the creation of a thematic map (agricultural electronic map) in the ArcGIS 10.8 software is exported in the form of a "shape" format file, and the existing point, area and line layer attribute data are directly downloaded to the platform (ArcGIS Online). In this process, it is possible to depict the platform attribute data on the map in different ways, create a system of conditional symbols, and in general, complete the map layout. After the completion of the installation process, we can save our created map as a web map in the form of a

special application or link. This process is done through the "Add" section. ArcGIS Server, WMS (OGC), WFS (OGC), WMTS (OGC) type elements from the Internet system, web cartography and mobile applications from the Internet system, and KML, SHAPE, GPX, CSV, TXT type elements from the computer can be uploaded to the section. Another option in the Resources section is to use the "custom apps" in the "build" section. Using these sample applications, we can quickly and efficiently organize our website according to its content and purpose.

**Methods:** After uploading the attributive data to the ArcGIS Online platform through one of the two methods, the overall map fitting process begins. For this, select the "Map" section on the platform's panel. This section is mainly composed of 9 elements (detail, add, equip, basemap, save, publish, measure and reference). The features of the "Details", "Add", and "Edit" sections are used to equip our web map. The "Details" section provides general information about the map, the ability to work with attribute data, equipment, and manage the wildcard system. In the "Add" section, it is possible to add additional attribute data (from the computer, internet system and ready-made sample maps) to our created map. In this process, we have the opportunity to further enrich the overall content of the map by adding additional layers to our map. In the "Edit" section, it is possible to insert attribute data of various types (point, field) using the conditional symbol library of the ArcGIS Online platform, linking it to a geographic location.

When creating the agricultural web map of the Tashkent region, first of all, the agricultural data related to the region was collected. The data was mainly obtained through the website of the statistics committee on agricultural products, production of agricultural products and other information related to the region.

Usually, these data are placed in the "word" "excel" format and are formed in the regions of the region and the types of agricultural products and years (Fig. 1).

**Results:** The resulting data is cleaned of redundant rows, columns, and data to make it easy to load into ArcGIS

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Toshkent vil	3617,8	5148,2	6484,4	7475,2	9069,2	10735,5	12034,2	15594,8	18359,1	20417,1	23875,1	28805,2
Nurafshon city						20,9	24,7	31,2	71,8	52,7	53,6	63,9
Olmalik city	11,4	19,5	27,1	31,5	41,5	42,4	61,5	76,3	37	50,8	58,6	72,2
Angren city	44,6	65	81,1	92,6	113,4	116,4	144,7	211,4	200	199,7	258,1	317,5
Bekobod city	18,7	27,6	33,3	43	58,8	68,6	93,1	118,9	175,5	222,6	296,4	344,6
Ohangaron city						25,3	31,2	42,5	38,8	49,5	45,8	54,1
Chirchik city	21,2	31,5	40,2	45,4	62,1	69,4	90,9	110	162,6	74,6	94	116,1
Yangiyul city						11,1	13,4	25,3	14,7	21,7	28	32,8
Oqqurxon	206,7	302,6	379,7	430,7	508,9	571,2	651,4	701,6	1052,3	1353,4	1794,5	2170,8
Ohangaron	148,9	216,6	282	327,8	438	501,5	539	801,4	823,3	826	1080,5	1297,8

Figure 1. Agricultural data

software. Next, the data is loaded into the software in the form of a database (Figure 2).

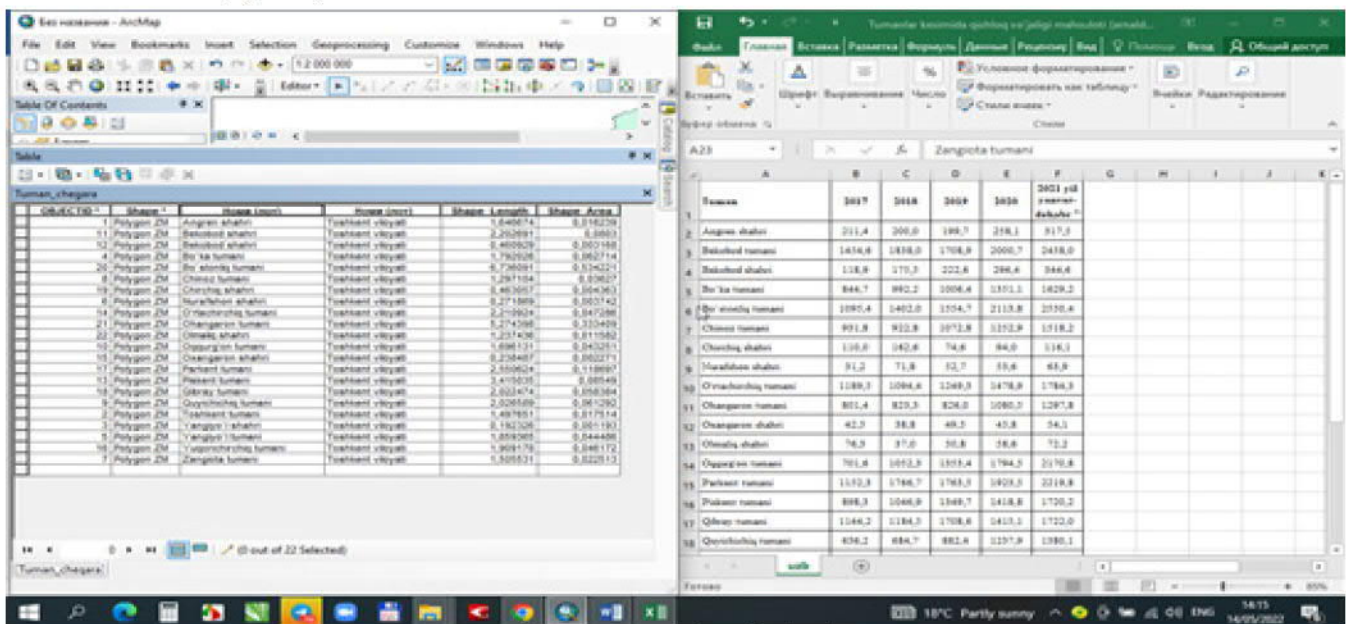


Figure 2. Formation of a database

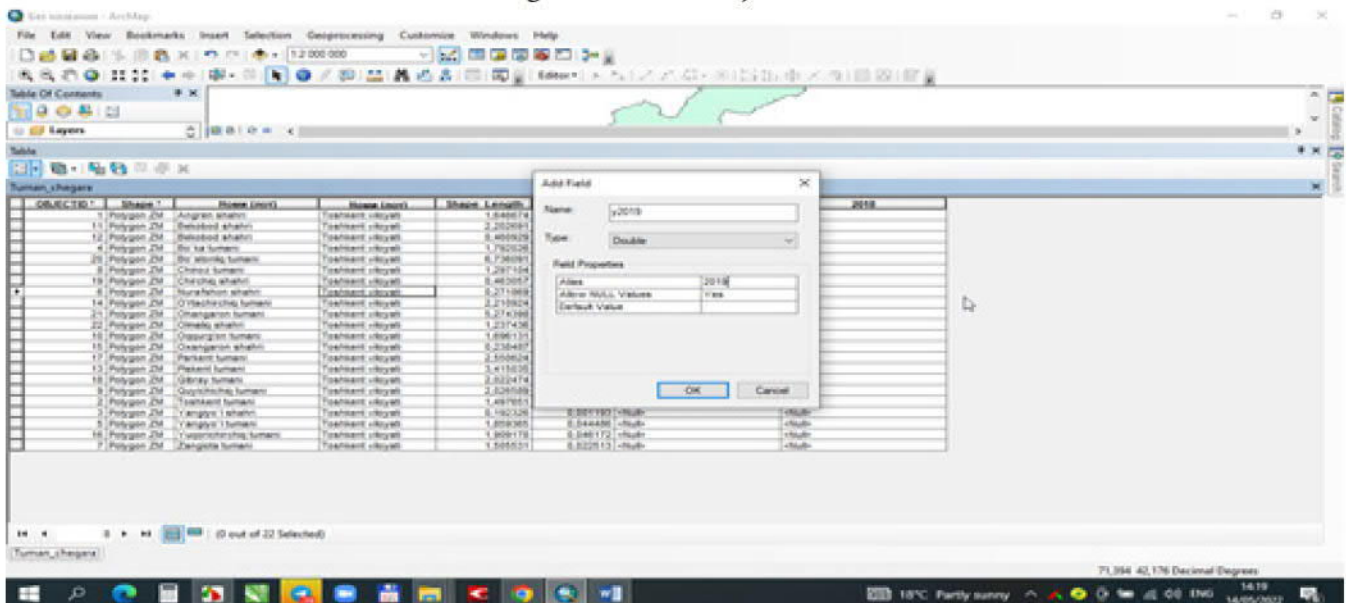


Figure 3. Database included in the program in the section of districts

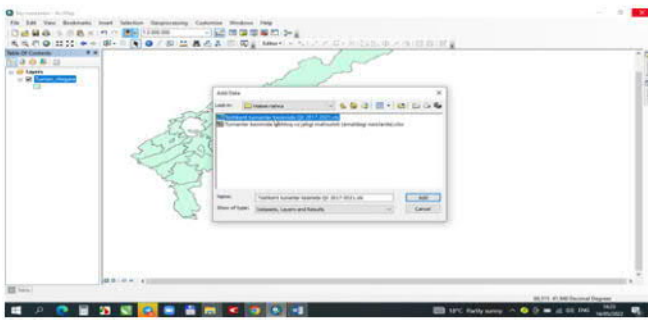


Figure 4. Adding the agricultural map to the ArcGIS online platform in the section of districts

After the layers and content elements of the agricultural electronic map of the Tashkent region are formed, we will download the layers of the map needed for our web map, which is planned to be created, to the "Resources" section of the ArcGIS Online platform. This process is done through the "Add" section. ArcGIS Server, WMS (OGC), WFS (OGC), WMTS (OGC) type elements, web cartography and mobile applications from the Internet system, and KML, SHAPE, GPX, CSV, TXT type elements were downloaded to the department.



Figure 5. Web page of ArcGIS Online platform

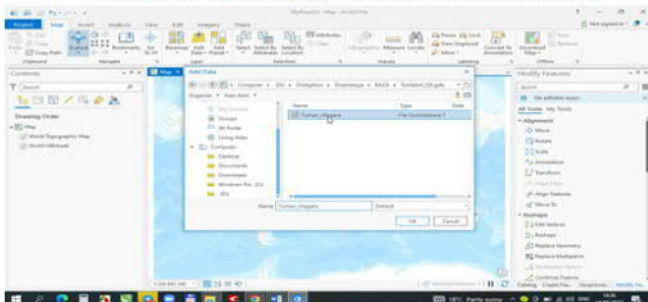


Figure 6. Upload data to the ArcGIS Online platform

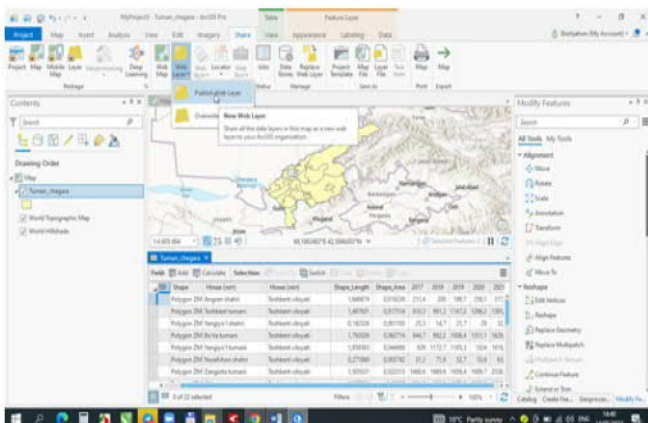


Figure 7. Manage and edit the database uploaded to the web map

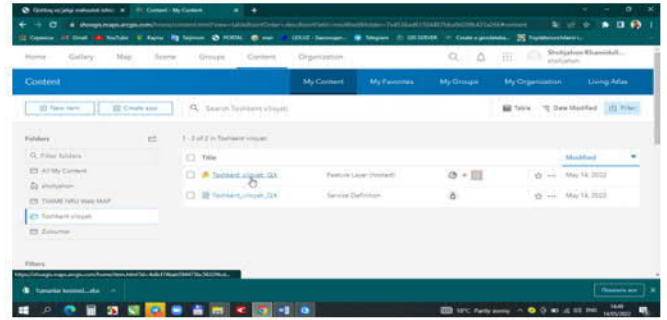


Figure 8. Resources created for creating a web map on the platform

All elements of the created web map, i.e. thematic layers, scale, system of conventional signs, are designed and prepared for publication. Based on the content of the web map, base maps are selected through the "Base map" section of the platform.

This section contains 23 types of base maps of various contents (world map, ocean map, navigation, etc.). After all the content elements and the general layout of our web map are ready, we will print our map. Map printing (displaying) is done in 2 different ways: through applications and links. According to its use, it is divided into 2 different ways: for all users and for group users.

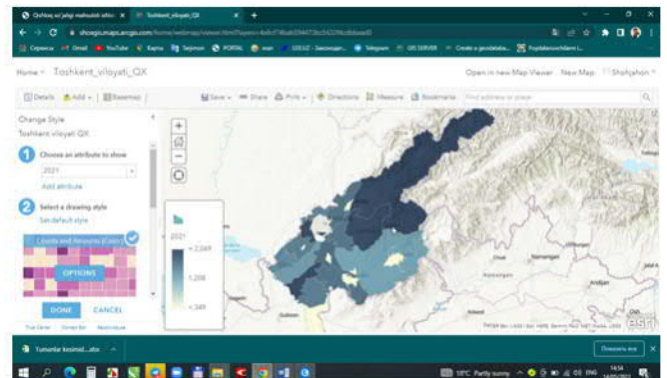


Figure 9. Agricultural web map of Tashkent region

To display the map, select the "Share" section and copy the web address for displaying the web map from the provided window. This web address can be emailed to the appropriate address. Figure 9 shows the interface of the agricultural web map of Tashkent region.

The natural conditions of the Tashkent region, existing agricultural networks and infrastructure facilities practically correspond to the agricultural characteristics of other regions of our republic and can be used as a reference for agricultural research and mapping. The use of RSE data in the study and mapping of agriculture makes it possible to effectively organize the creation of electronic maps of agriculture in a short period of time. The methods and technologies developed for creating electronic, interactive and web maps of agriculture are the basis for creating thematic maps for other regions of the Republic [5].

The electronic map of agriculture, created on the basis of advanced technology and methods, serves as a basis for creating analytical maps that visually represent the qualitative and quantitative indicators of sectors that require a small or separate study of agriculture.

Interactive and web agricultural maps of the republic created on the basis of field studies, geodetic measurements, information received from state authorities in the field, statistical and other additional and auxiliary sources in the assessment and forecasting of the economic indicators

of agricultural sectors, including web maps in the case of investments by foreign investors. plays an important role.

**CONCLUSION**

The following conclusions were presented on the basis of research on the topic "Creating a web map of agriculture using the ArcGIS online platform (in the example of Tashkent region)":

1. A system of agricultural web maps and content elements have been developed after studying the characteristics of the complete coverage of the agricultural sectors of the region and ensuring the interconnections between them;

2. The method of creating an agricultural agro-geodatabase was developed as a result of the technological system of creating an electronic map of agriculture and

the analysis and processing of RSE data, geodetic and field research, statistical data at the GIS. As a result, the creation of an online platform of agrogeodatabase with web maps and agricultural land and crops and its integration into the National Geoinformation System was ensured;

3. A technological system for creating an agricultural web map was created using the ArcGIS Online platform based on the agro-geodatabase of the region. As a result, a web map of the agriculture of the Tashkent region was developed, and an opportunity was created to obtain detailed and interactive information about the natural conditions of the region, socio-economic indicators and agricultural resources and networks, infrastructure facilities.

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