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Geographical Features of the Structure and the Content of the Fergana Valley Ecological Atlas

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ABSTRACT: In modern world "ecological-cartographic research, thematic maps are of particular importance, reflecting the negative or positive impact of natural and anthropogenic environmental factors on the living conditions of people." In order to optimize the ecological situation in the region, including the river valleys and oases of Uzbekistan, such ecological mapping involves the creation of atlases of a system collection of analytical and synthetic maps.

KEYWORDS: ArcGIS, GeoGraph, AtlasGIS, WinGIS, ArcInfo, MapInfo, Creation of atlases, ecological situation, biotechnology, state-of-the-art technologies, map modeling.

I. INTRODUCTION

In the world, environmental mapping gives preference to synchronization methods, where special atlases of maps are systematically created by interconnecting environmental characteristics that is, with simultaneous deployment of several maps on the computer screen, interactively interacting with their didactic texts in GIS software. These research programs ArcGIS, QGIS and SWAT model software focus on database creation, visualization electronic maps, modeling, analytical mapping.[1]

In various industries of the republic of GIS-technology, in particular, of the programs AtlasGIS, WinGIS, ArcInfo, MapInfo, ArcGIS, QGIS (USA), GeoDrawGeoGraph (Russia), in the Hydrus 1D models (Germany) are used in practice during creation of cards, loading of space images, during the processing of images, digitization and vectorization, creation of the database, by drawing up legends of cartographic images, creation of the chart and modeling of schemes. The Strategy for Further Development of the Republic of Uzbekistan for 2017-2021 defines important tasks to "Prevent environmental problems that may harm the environment, public health and gene pool." In carrying out these tasks, it is very important to use GIS technologies, and in mapping and modeling environmental problems in the emerging environmental situation.

II. RELATED WORK

This study serves to some extent the tasks provided for in Presidential Decree No. UP-4947 of 7 February 2017 "On the Strategy for the Further Development of the Republic of Uzbekistan" for 2017-2021, " Presidential Decree No. UP-5065 of 31 May 2017 on measures to strengthen control over the protection and rational use of land, Improving geodetic and cartographic activities and regulating State inventories, "Presidential Decision No. PP-3024 of 31 May 2017 on measures to further improve the activities of the State Committee on Land Resources, Geodesy, cartography and state inventory, "as well as other legal and regulatory documents adopted in this field. [2]

Compliance of research with priority directions of science and technology development of the republic of Uzbekistan. This study was carried out in accordance with the priority direction of development of science and technology of the Republic of V "Agriculture, biotechnology, ecology and environmental protection."



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III. TEXT IN PAINTING

Degree of study of the problem. Randel Washburne, Robin Grossinger, Charles W. Hartman were engaged in research works on development of ecological cartography, and introduction of mapping in small territories, creation of ecological atlases, from scientists of the CIS K.A. Salishchev, A.M. Berlyant, A.P. Zolovsky, E.E. Markov, L. Rudenko, V.I. Sturman, I. Zarutskaya, B.E. Kochurov, T.G. Svatkova, E.V. Tarasov, A.V. Doncheva, K.D. Dyakonov were engaged in similar researches. Direct research on the creation of ecological atlases has been carried out in works such as the Napa Valley Historical Ecological Atlas Survey (2012), the Alaska Ecological Atlas (2016), the Ecological Atlas of the Russian Federation (2002) and the Atlas of the Moscow Region (2012), and all of them have had some positive results. [3]

The aim of the study is to create the structure and content of the Fergana Valley ecological atlas and still develop proposals and recommendations for its use. [3]

Research objectives:

- Substantiation of the importance of the use of cartographic methods in scientific research of the ecological condition of the depicted territories;
- Classification of scientific and practical atlases by types, for the purpose of mapping the ecological state, determination of requirements to the database;
- Development of the structure and content of the environmental atlas using the latest GIS technologies;
- Improvement of technical and software for the creation of a territorial multimedia environmental atlas;
- Improvement of evaluation and advisory maps in the Fergana Valley ecological atlas; Assessment of cartometric environmental indicators based on GIS technologies;
- Modelling maps based on spatial data reflecting the environmental condition of the Fergana Valley; Provision of scientific and practical proposals and recommendations for the use of electronic inventory maps;

The object of the study is the environmental atlas of the Fergana Valley.

The subject of the study is the structure and content of atlas maps reflecting the ecological state of the Fergana Valley, developed on the basis of modern GIS technologies.

The work includes cartographic, aerospace, GIS-technologies, statistical methods, mathematical modeling methods, as well as ArcGIS programs, QGIS and SWAT-modeling software.

Scientific novelty of a research:

- Structure and content of ecological atlases are improved on the basis of maps of "degree of anthropogenic load on landscapes," demoecological state";
- The Fergana Valley ecological atlas (using ArcGIS, QGIS) was first developed;
- Improved digital maps depicting the environmental condition of the areas in need of protection of the Fergana Valley using TIN (Triangulated irregular network), SHAPE vector file and GRID raster files;
- Improved inventory maps using interactive maps as well as the DEM (Digital Elevation Model);

Practical results of a research:

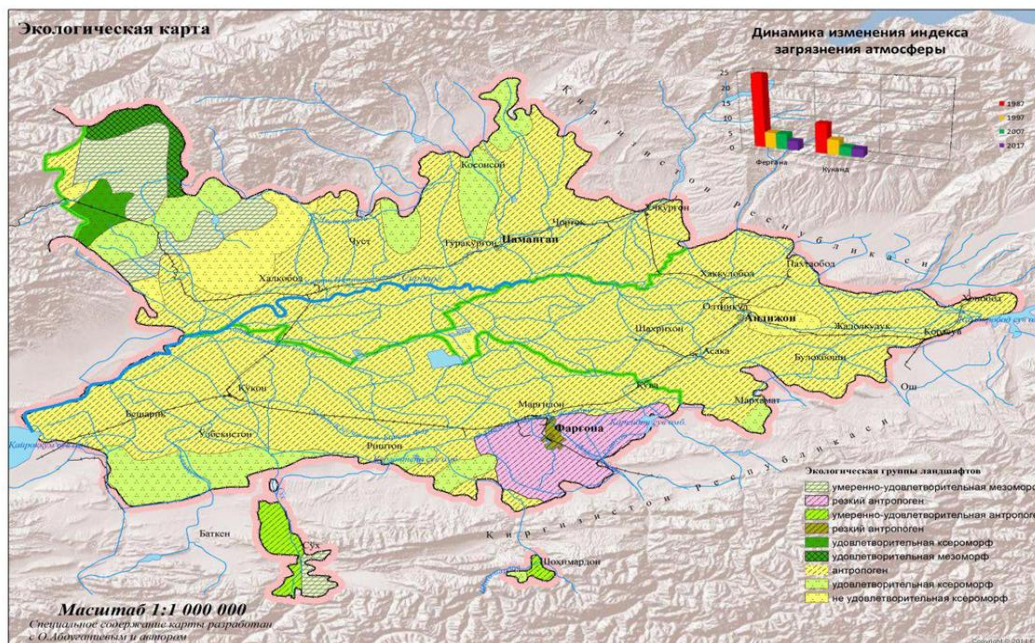
- System maps have been created that comprehensively characterize the environmental situation in the Fergana Valley;
- A database of maps of the multimedia ecological atlas of the Fergana Valley has been established;

The atlas provides maps of protected and restored territories, as well as proposals and recommendations for the development of measures to optimize the ecological state of the territory on the basis of the cartographic method.

The validity of the results of the study is justified by the fact that the materials of the State Committee on Ecology and Environmental Protection of the Republic of Uzbekistan, the State Committee on Land Resources, Geodesy, Cartography and the State Inventory and Field Observations have been used, as well as the introduction into practice of a series of thematic maps, atlases, conclusions, proposals and recommendations developed within the framework of the study, confirmation and recommendations the use. [4, 5]

IV. EXPERIMENTAL RESULTS

The scientific significance of the results of the study is determined by the fact that in mapping the ecological condition of the Fergana Valley for the first time GIS-technologies with ArcGIS software, QGIS were used, the structure and content of the ecological atlas of the Territory were developed, as well as methodological approaches to their creation were improved.



Picture-1. Fergana Valley Ecological Map

The practical significance of the results of the study is determined primarily in the use of conclusions and recommendations, thematic assessments of the irrigated lands of the valley under the Fergana region and inventory maps in the development of targeted state programs and practical measures to improve the environmental situation.[6, 7]

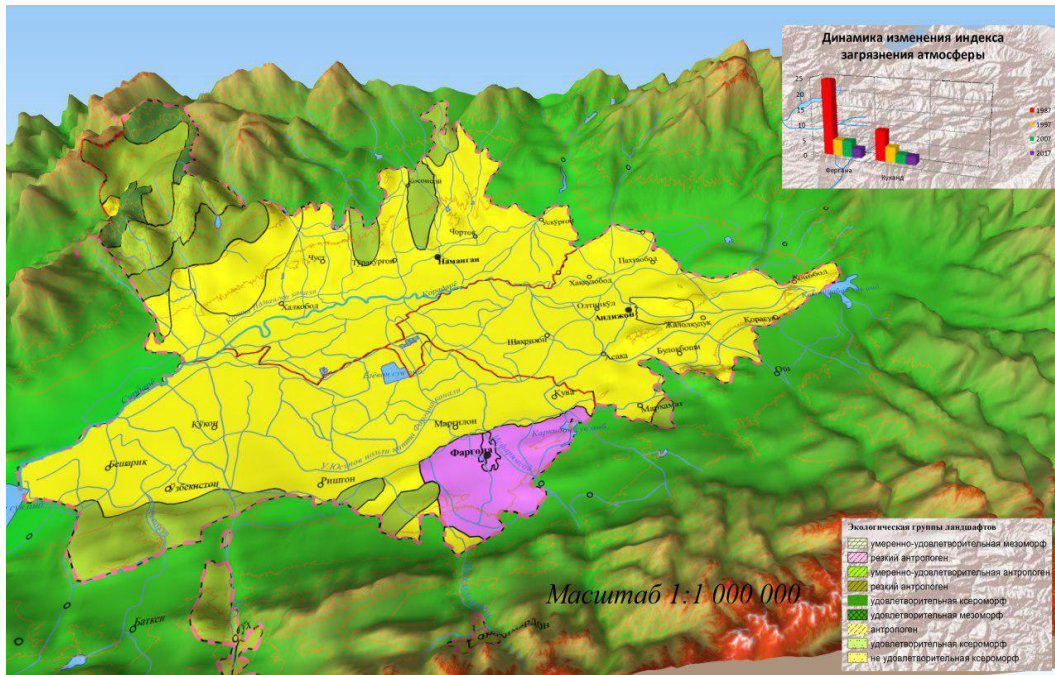
V. CONCLUSION

Implementation of research results. Based on scientific findings and recommendations to develop the structure and content of the Fergana Valley ecological atlas, Picture-1:

- the maps "Anthropogenic Load of Landscapes", "demography-state", "social-and-ecological assessment" are introduced in practice of the State committee of the Republic of Uzbekistan on land resources, to geodesy, cartography and the state inventory (the reference of February 13, 2019 No. 02-02-1182, the State committee on land resources, to

geodesy, cartography and the state inventory). As a result, the content of maps "Ecology," Agriculture, "Irrigation and reclamation" included in the educational local history atlas of Fergana, Andijan and Namangan regions was improved; [6]

- the configuration model, registration, generalization of contents of the ecological atlas of the Fergana Valley with use of software technologies of GIS ArcGIS, QGIS and extra drain in practice institutions of the State committee



Picture-2, 3D visualization of the environmental map

of the Republic of Uzbekistan on land resources, geodesy, cartography and the state inventory (reference No. 02-02-1182 issued by the State committee of the Republic of Uzbekistan on land resources, geodesy, cartography and the state inventory of February 13, 2019) is developed. As a result, it was possible to create maps "Nature Protection" and "Dynamics of Mineralization of Surface Waters of the Fergana Valley" in Andijan, Namangan and Fergana Regions, which are included in the National Atlas of Uzbekistan through GIS technologies; [6]

- advanced vector cards of ecological contents and structure of protected areas of the Fergana Valley with vector SHAPE and the raster GRID files, were introduced in the State committee of the Republic of Uzbekistan on land resources, geodesy, cartography and the state inventory (the reference of February 13, 2019 No. 02-02-1182, the State committee on land resources, to geodesy, cartography and the state inventory). As a result, it was possible to improve the content of the general geographic maps of Andijan, Namangan and Fergana regions; [6]

- advanced inventory cards on the basis of interactive model and a matrix of heights are used by the State committee of the Republic of Uzbekistan on land resources, geodesy, cartography and the state inventory (the reference of February 13, 2019 No. 02-02-1182, the State committee on land resources, to geodesy, cartography and the state inventory). As a result, it was possible to develop and inventory maps of soil and land use by area based on spatial data. All methods of geo information data include increasing the points of soil bonitettes of agricultural land. [8]

Geo-information ArcGIS mapping and QGIS-based software use the latest GIS database developments based on source data. The created system allows to solve the following tasks: collection and processing of databases; Obtaining statistical information on parameters of content structure of any mapping layer; Search for objects by their attributes, and place them on each other for comparison View port status in multiple layers simultaneously using mathematical and mapping modeling Use of different methods, images, etc., automatic mapping method.



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The latter method of using atlas maps can be shown with a gypsum color or colour that improves the readability of shadows. Gypsum painting is a set of colors used to provide additional information about the height of a hatched map. Thus, the ability to visualize the overall elevation height has been increased.

The above basic shader capabilities are available in almost all GIS software packages, but Adobe Photoshop has available advanced methods.

A triangulated irregular network - TNT (Triangulated irregular network), SHAPE vector files, and GRID raster files are based on vector data of this area and can often be used to describe concepts that can be surface-bound or surface-oriented at all. There are many adjacent triangles called TNT surfaces that do not collide with each other, and they have created electronic environmental atlas maps from numerous points using the Delacnay method. [8]

Some 3D visualizations allow only one person to explore. For example, in some vertical real-time systems, the display can be viewed by a device and used by only one person. Other devices allow multiple people to observe the display at the same time directly to have a discussion (such as CAVE software, which can accommodate multiple people).

The main findings of the study were as follows:

1. The experience of creating ecological atlases is improved every year. Methodological developments related to atlas theory and practice are not as great. Today 's environmental atlases are characterized by the fact that they are based on the system principle for updating and processing geographical information, as well as on the necessary adaptive functions.

2. Proposals for the use of a system approach in mapping the nature and ecological condition of the Fergana Valley have made it possible to create a series of analytical and synthetic environmental maps.

3. The development of the composition and content of the environmental atlas by ArcGIS, QGIS and SWAT models has enabled the creation of an environmental database. Simplified and improved multi-layered mapping sources, derived from environmental atlas maps, have been proven to be the basis for other maps.

4. The use of geo innovative technologies in atlas mapping will reduce labor and time, and increase the accuracy of the work performed. At the same time, proposals on software, mathematical basis, layout, projection, generalization of visualized maps of ecological atlas using programs of ArcGIS, QGIS and SWAT-modeling on the basis of data characterizing environmental condition of Fergana Valley have been developed and given.

5. The use of simulations of space data inventory based on objectivity and practical orientation of information, with decryption of images and aerospace image of the atlas made it possible to create interactive maps.

6. It is possible to update the operational database of information on geodesy, cartography and inventories as soon as possible with monitoring of the environmental situation and operational information in emergency situations, as well as timely access to updated information on the environmental state of the region.

7. When modeling commonly used map servers in the GIS suite using internal or additional tools, the raster and vector data model has transformed the field in which the spatial distribution of events in the Fergana Valley changes. This database serves as an important source for obtaining relevant scientific findings, assessing the environmental situation, monitoring, and identifying priority areas for the future.

8. The use of GIS technologies in the field of ecological-geographical research and the use of three-dimensional 3D automated methods of processing existing resources and ecological-geographical data in the development of content on this basis of environmental atlas maps, ensures the synchronization of maps.

9. In order to develop assessment and advisory maps with file-based indications of the environmental status of protected areas in the Fergana Valley, conclusions have been drawn on the trend of planning, assessment and consideration of environmental impacts.

10. The Fergana Valley ecological atlas and its practical thematic ecological maps will serve as a basis for assessing the environmental situation, conservation of nature and rational use of natural resources, as well as optimization of the environmental situation.

REFERENCES

- [1] АбдуғаниевО.,МахкамовҒ. Фарғонавилоятихудудидамиллийбоғташкилэтишмасалалари // Тоғватоголдихудудлариданфойдаланишнинггеографикасослари: Илмий-амалийконференцияматериаллари. 1-2 ноябр 2002.–Тошкент. 2002.-Б. 52-54.
- [2] ЎзбекистонРеспубликасиПрезидентининг “ЎзбекистонРеспубликасиниянадаривожлантиришбўйичаХаракатларстратегияситўғрисида”ги ПФ-4947-сон Фармони. 2017 йил 7 февраль. <http://lex.uz/pages/getpage>.
- [3] АбдуғаниевИ. Фарғонаводийсигеосистемалариниоптималлаштиришнингэколого-географикасослари // Фарғонадавлатуниверситетинилмийхабарномаси. –Фарғона. 1996.-№ 2.-Б. 69-73.



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International Journal of Advanced Research in Science, Engineering and Technology

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- [4] Ахмадалиев Ю.И. Ересурслариданкишлоқхўжалигидафойдаланишнингхудудийташқилэтилишинитакомиллаштириш (Фаргонавилоятимисолида) // Геогр. фан. доктр. дис. ... афторефер. –Тошкент: 2007. – 8-9 б.
- [5] Заруцкая И.П., Гусева И.Н. Согласование карт в комплексном региональном атласе. Метод указания по проектированию и составлению карт комплексных научных справочных атласов. М., МГУ, 1971. 35 с.
- [6] Берлянт А.М. Картографический метод исследования. – М.: МГУ, 1988. – 252 с.
- [7] Marupov A.A., Abdurahmanov A.A., Ahmedov B.B., “Main Ways to Improve the Efficiency of Agricultural Land Use in the Fergana Valley Sample”. ijarset.com “INTERNATIONAL JOURNAL OF ADVANCED RESEARCH IN SCIENCE, ENGINEERING AND TECHNOLOGY”. October2019. 6-10, pg no: 11211-11215
- [7] Xakimova K.R., Marupov A.A., Mirzakarimova G.M., “Maintaining Cadastral Valuation for the Effective Use of Agricultural Lands of the Fergana Region”. ijarset.com “INTERNATIONAL JOURNAL OF ADVANCED RESEARCH IN SCIENCE, ENGINEERING AND TECHNOLOGY”. October 2019. 6-10, pg no: 11022-11026
- [8] Eshnazarov D.B., Nuretdinova M.M., Ibrokhimova S.S., Abdukadirova M.A., “Ways and bargaining methods of geodescents in regional systems of the statecadastre of the Republic of Uzbekistan”. ijrcs.com, “INTERNATIONAL JOURNAL OF RESEARCH CULTURE SOCIETY”. October 2019. 3-10, pg no: 41-44