Research on the methodology of digital mapping of national natural parks

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Abstract. This scientific article envisages updating of basic electronic digital maps and their inclusion in the National Geoinformation Base, as well as their effective use for the preservation of national natural parks and maintenance of their cadaster. On the map base created, initial site geodetic work was carried out at the geographical location of the national nature parks. And also, an in-depth analysis of remote sensing materials was carried out. These remote sensing materials were processed in special programs, decoded, and new objects were mapped on the digital map base in ArcGIS program.

1 Introduction

In the Republic of Uzbekistan, the creation of digital cards of National Nature Parks and recreational objects using modern GAT programs is carried out by numerous measures for their state registration and the formation of a database. To this end, the formation of the cadastral system on the basis of Geographic Information Systems has accelerated significantly in the following years, while the current system and technologies were initially used in the maintenance of State cadastres, and to this day the use of GIS technologies in various fields research using remote sensing materials is being widely introduced into various fields [1].

In the world, special attention is paid to conducting targeted scientific research aimed at developing effective technologies for recording cadastral objects, designing and creating digital maps of national natural parks and recreational facilities using modern geographic information systems. In this regard, one of the important tasks is to improve the methodology for creating and updating cadastral digital maps of national parks.

Currently, cadastral works and their geodetic and cartographic support are being carried out in our republic, a set of measures is being carried out to update digital cadastral maps, including the cadastre of national parks, construct new telecommunications facilities, improve the infrastructure of existing ones, use modern computer technologies in the development of their application GIS technologies in various fields of research using remote sensing materials are widely implemented in various fields. The Action Strategy for the further development of the Republic of Uzbekistan for 2017-2021 includes the task of...
“creating a National Geographic Information System of the Republic of Uzbekistan in order to improve the quality of services provided to the population and entrepreneurs.” The implementation of this task, including the creation of a cadastral-geographical information system taking into account the requirements of modernization, scientific research on state registration of cadastral objects, and improvement of calculation methods, is one of the important tasks.

2 Materials and methods

As a result of systematic studies, it was determined that in the Republic of Uzbekistan it is necessary to develop a methodology for creating digital cards of National Nature Parks and recreational objects with the help of modern GIS programs. Figure 1.

- **Stage 1. National Nature Parks electronic digital cartographic Foundation**
  - Collection of cartographic and remote sensing materials
  - Selection of GAT programs to create a cartographic framework
  - Development of a new cartographic framework

- **Stage 2. Geophasic placement of objects of National Nature Parks as a thematic layer on a digital cartographic basis.**
  - Surveying national nature parks by Geodesic measurement and
  - Geophasic placement of objects of national nature parks on the card

- **Stage 3. Development of a Geodatas base of National Nature Banks**
  - Formation of a database in the Arsgis 10.8 program
  - Processing and updating data
  - Get charts, text and diagrams of data

- **Stage 4. Creating national nature parks digital**
  - Scale selection and design work in preparing Cadastral cards for publication
  - Development of tokens when creating Cadastral cards and schemes
  - Preparation and publication of GAT resources

*Fig. 1. Creation of National Nature Parks electronic digital maps.*
The process of researching the methodology for creating electronic digital cards of the National Nature Park using GAT Technologies was carried out at the following stages:

- Building the Electronic Digital cartographic foundation of National Nature Parks.
- Geofascial placement of objects of National Nature Parks as a thematic layer on a digital cartographic basis.
- Creation of National Nature Parks digital maps.

These phases were in turn expressed in distinct practical subgroups.

At the stage of the creation of electronic digital cards of national nature parks, the main emphasis was placed on the collection of cartographic and remote sensing materials, the selection of GIS programs for the creation of a cartographic basis, the development of a new cartographic basis.

The first sub-group, called the National Nature Parks electronic digital cartographic framework, is concerned with collecting cartographic and remote sensing materials, selecting GIS applications to create Cadastral digital cards, and developing a new digital cartographic framework. The first small group cartographic and probing materials of this stage were collected and systematized, and scientific literature was analysed.

In a small group called GIS application selection to build a cartographic framework, several GIS applications were studied and the necessary applications identified, it was determined by research that the use of Sas planeta, Google Earth Pro, ArcGIS applications was the optimal solution when creating the digital cartographic framework of these National Nature Parks. In this ArcGIS program, the main program Sas planete Google Earth Pro served as a utility [2].

In a small batch called the development of a new cartographic basis, the cards originally published were downloaded to the ArcGIS program and then the coordinates were determined on the card, with transformation work done based on these identified coordinates. Then the remote sensing material was downloaded using the SaS Planeta software [4].

The download of remote sensing materials using the SaS Planeta program is carried out in the following sequence:

- Initially, pictures from space ships were uploaded to the program.
- Pictures by coordinates were placed on trapezoids.
- Space pictures were scraped in the desired ECW format 2,3-pictures.

**Fig. 2.** Downloading a space photo in the SaS Planeta program.
In the SaS Planeta program, the downloaded images were processed and systematized, and for the implementation of object numbering work, the ArcGIS 10.8 software was loaded, as well as a superscript with a raster cartographic basis. This distance sensing material was mutually integrated with the transformed raster cartographic basis. As a result of the integration of the obtained geopictures, the creation of a new cartographic basis will significantly increase geofascial accuracy and work efficiency. When creating a cartographic basis, elements such as the borders of the Republic, region and district, hydrographic objects, communication routes, settlements, relief were formed digitally in separate layers [3]. On the digital cartographic basis, the importance was placed on the issue of geofascial placement of objects of national nature parks as a thematic layer in Phase 2, the study of national nature parks through geodesic measurement and cartographic materials, as well as the issue of geofascial placement of objects of National Nature Parks as a thematic layer on the card.

On the created cartographic basis, geodesic work was initially carried out on the site in the geophasic placement of National Nature Parks. These geodesic works were determined using the GNSS system using the National Nature Park kinematically, and national Nature Park was determined based on the required coordinate. In this case, the existing cartographic materials were also taxied, and the results of the geodesic measurement obtained were determined by the changes that were superimposed on the materials. Thus, in addition to field objects, national Nature Parks and point recreational objects and linear hydrographic objects, communication paths were also exported to the cartographic base.

In the third stage, called the development of the National Nature Parks Geodatas, ArcGIS 10.8 program focuses on the issues of database formation, data processing and updating, obtaining tables, texts and diagrams of data [4].

In this case, general information about the construction sites of recreation zones of National Nature Parks, guest houses, roads, landscapes, plants is summarized. The cadastral data of recreational objects is reflected in the attributive data of the electronic card.

3 Results

The development of the National Nature Parks Geodatas base reflects the issues of data processing and updating and obtaining analytical, synthetic, cartographic data. In this case, the collected information is formed in a database subsystem. The small system of the
National Nature Parks base sets the stage for obtaining information in the category and, if necessary, in the form of text, tables, diagrams and geoiconics Figure 4.

A model of this geofumadas base was developed to the map of national nature parks in the region and integrate into the cadastral database. The research of these processes in the region is based on the methods of cartographic research, the methodological basis for their study in ham.

The final stage, called National Nature Parks digital card creation, covers scale selection and design work in preparing Cadastral cards for publication, creation of cadastral cards and schemes, preparation of GIS attributes, and Publication work [2].

The process of drawing up electronic cards is carried out by automatically converting cartographic data into digital form.

GIS was implemented in technology programs on the basis of resources collected in the relevant directions when drawing up digital cards of National Nature Parks. Digital cards are made available to relevant organizations through electronic conveyance devices and published as needed.

As a result of the targeted research, it became known that the study of the objects of National Nature Parks, the application of GAT technologies in the formation of thematic layers in different directions, the rapid collection of data using new economical methods and the creation of digital cards laid the groundwork. In the study of the objects of national nature parks, remote sensing materials were also analyzed in depth. These remote sensing materials were processed in special programs and deciphered and new objects were conferenced on a digital cartographic basis in the ArcGIS program Figure 5.
4 Conclusion

Chamber and visual techniques were widely used in deciphering space shots. On the basis of the presented methods, a deep analysis of the results of deciphering was carried out, and serial vetoring was carried out. As a result of systematic research, the digital cartographic basis of National Nature Parks was formed Figure 6.

In the place of conclusion, it is worth noting that today the creation of such digital cards is a requirement of the time and serves as the basis for determining the geophasic location of Illyrian nature parks and recreational objects and creating a cadastre of the territory [3].
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Fig. 6. Zarafshan National Nature Park digital map of electron drawn in Arsgis 10.8 application.

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References

1. L. Kh. Gulomova, E. Yu. Safarov, I. O. Abdullaev, Geoinformation systems and technologies (University, Tashkent, 2013)
2. T. Mirzaliev, O. R. Allanazarov, About the informational capacity of maps, Scientific and methodological basis of creating the national atlas of Uzbekistan, Tashkent (2009)