Methods of creation an Atlas of National Parks and protected areas of Ukraine

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SUMMARY

An important element of protection of natural ecosystems are protected areas and parks, which are the basis for the preservation of the gene pool of flora and fauna, typical and rare landscapes, maintaining favorable ecological conditions. Cartographic support is an integral part of the process of creation and operation of any protected area. Today, cartographic materials of National Parks and protected areas of Ukraine need modernization. Geoinformation technologies, which carry many effective technological solutions, allow to significantly improve the quality and update the information content. The use of specialized GIS significantly improves the quality of cartographic material of National Parks and protected areas of Ukraine. The objectives of the work are to propose a technological scheme of mapping of National parks and protected areas of Ukraine using GIS technologies and to describe the methodology of this mapping. As a result of the task, one of the possible methods of mapping National Parks and protected areas of Ukraine using GIS-technologies, consisting of 6 stages, was developed. According to this method, a corresponding map was created, which consists of the following 11 layers: nature reserves, biosphere reserves, nature parks, regional landscape parks, reserves, natural monuments, protected tracts, botanical gardens, dendrological parks, zoological parks, monuments, garden and park art. According to the obtained vector layers of data, cartographic models for the thematic atlas of National Parks and protected areas of Ukraine were created. Each layout contains a map, a legend to it, a direction to the North, a scale and a frame design.

Keywords: GIS, National Parks, protected area, OSM, atlas
Introduction

An important element of protection of natural ecosystems are protected areas and parks, which are the basis for the preservation of the gene pool of flora and fauna, typical and rare landscapes, maintaining favorable ecological conditions.

Cartographic support is an integral part of the process of creation and operation of any protected area. Today, cartographic materials of National Parks and protected areas of Ukraine need modernization. Geoinformation technologies, which carry many effective technological solutions, allow to significantly improve the quality and update the information content. The use of specialized GIS significantly improves the quality of cartographic material of National Parks and protected areas of Ukraine. After all, the advantages of this method are the efficiency of creating maps, the ability to work with the database, additional opportunities for information analysis, as well as the modernity of this area.

A large number of scientists deal with this topic. Among the recent important works are the following (Balmford and al., 2015; Brander and al., 2015; González, 2017; Gosal and al., 2018, 2021; Drakou and al., 2015; Palomo and al., 2012; Park, Kim, 2019).

The objectives of the work are to propose a technological scheme of mapping of National parks and protected areas of Ukraine using GIS technologies and to describe the methodology of this mapping. The result is an atlas of National Parks and Protected Areas of Ukraine.

Methods of investigation

The first step was to search for input data and analyze them. The input data for the research was a vector map of Ukraine with administrative division into regions and districts, downloaded from the GADM service (Figure 1).

Since the data was obtained from free online services, their geometric correction did not make sense, as they were already bound in the coordinate system WGS_1984. Also, OpenStreetMap (OSM (Open Street Map), 2012) was used for research, which was uploaded to ArcGis. OSM was used as a substrate for polygonal layers of regions and districts of Ukraine.
According to the Law of Ukraine "On the nature reserve fund", the classification of territories and objects of the nature reserve fund of Ukraine is created (Table 1).

<table>
<thead>
<tr>
<th>Object types</th>
<th>Areas and objects that belong to the specified type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural areas and objects</td>
<td>Nature reserves, biosphere reserves, national nature parks, regional landscape parks, reserves, natural monuments, protected tracts</td>
</tr>
<tr>
<td>Artificially created objects</td>
<td>Botanical gardens, dendrological parks, zoological parks, natural monuments, parks-monuments of garden and park art</td>
</tr>
</tbody>
</table>

The next step was to vectorize the objects of National Parks and protected areas of Ukraine (Figure 2).

An attribute database with the following structure is created for each vector layer: Name - name of the protected area, Oblast - location (region of Ukraine), Area - area of the territory (ha), Type - type of protected area according to the classification. (Figure 3).

Also, separate symbols have been created to denote each type of protected area (Figure 4).
Results of investigations

As a result, models of maps of National Parks and protected areas for all regions of Ukraine were created (24 sheets). Created size maps are A4 (width - 29.7 centimeters, height - 21 centimeters). Figure 5 shows the created maps for two regions of Ukraine (Lviv and Zakarpattia regions) as an example.

These maps show vectorized objects with OSM substrate, north direction, scale, legend. The legend contains explanations for all symbols, namely, for 11 vector layers according to the classification of nature reserves of Ukraine (nature reserves, biosphere reserves, national nature parks, regional landscape parks, reserves, natural monuments, protected tracts, botanical gardens, dendrological parks, zoological parks, natural monuments, parks-monuments of garden and park art), as well as, the layer with the border of the selected region of Ukraine.

Figure 5 Maps for two regions of Ukraine (Lviv and Zakarpattia regions) as an example
Conclusions

As a result of the task, one of the possible methods of mapping National Parks and protected areas of Ukraine using GIS-technologies, consisting of 6 stages, was developed. According to this method, a corresponding map was created, which consists of the following 11 layers: nature reserves, biosphere reserves, nature parks, regional landscape parks, reserves, natural monuments, protected tracts, botanical gardens, dendrological parks, zoological parks, monuments, garden and park art.

According to the obtained vector layers of data, cartographic models for the thematic atlas of National Parks and protected areas of Ukraine were created. Each layout contains a map, a legend to it, a direction to the North, a scale and a frame design.

References


