

# CREATION OF THE WEB SERVICE OF UKRAINE'S NATIONAL NATURAL PARKS AS AN INSTRUMENT FOR THE ANALYSIS OF TERRITORIES AND DETERMINING ISSUES IN THE ADMINISTRATION AND LAND USE OF TERRITORIES

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## ABSTRACT

The paper focuses on the development and implementation of an electronic cadastre for territories of all National Natural Parks (NPPs); the creation of effective mechanism for registration, monitoring and research of NPP territories, etc., using GIS-technologies. Geographic information systems (GIS) are used by the countries across the world to create conditions for predicted development and sustainable land use to increase the efficiency of management of territories within the NPPs, and the improvement of the natural environment (NE) in leading countries of the world.

**Keywords:** national natural park, map-scheme, Minprirody, geographic information system, web service, monitoring, GIS-platform

## 1 INTRODUCTION

In accordance with the Law of Ukraine “On the Main Principles (Strategy) of Ukraine’s State Environmental Policy for the Period until 2020”, it is planned to create the network of a nationwide automated information analysis system for ensuring access to environmental information, which will include the national system of natural resource cadastres, environmental information management systems in accordance with EU standards. [1, 2]

The Ministry of Ecology and Natural Resources of Ukraine (Minprirody) publish no information, except for quantitative areal indicators of facilities of the Nature Reserve Fund (NRF) and applications for the expansion of NRF facilities. On the website of Minprirody, there are no publicly available map-schemes of NPP reflecting their functional zoning and their use regime, the number of historical and cultural sites and facilities for recreational activities within the NPP, etc.

The Minprirody declares the creation of an electronic cadastre of NRF facilities. However, the process of creating the electronic ecological cadastre remains at the stage of Minprirody declarations. Moreover, the State is gradually implementing the electronic system for storing, monitoring and analysing information in all spheres of activity, which will enable quick and rational decision-making.

Since over 26 years of Ukraine’s independence, no electronic ecological cadastre of NRF facilities based on the geographic information system (GIS) has been created as well as NPPs do not have their own ecological electronic service, there are problems with the existence and preservation of the boundaries of each park – the main problems with the disputable lands arise for local government authorities and local executive bodies.

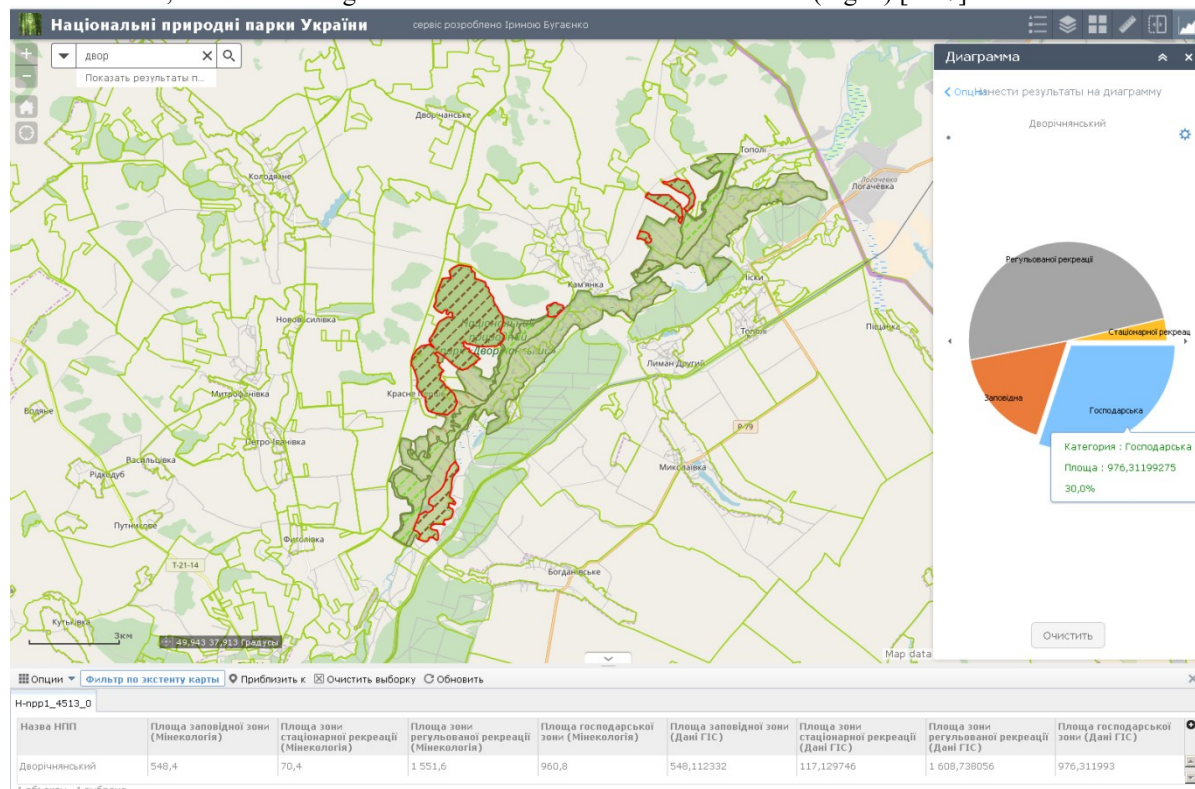
## 2 METHODS

By reason that there is no electronic ecological cadastre of Ukraine, but only intentions to create it, for further research and comprehensive study of the NPP territories as well as combining different types of documents within the same platform, we decided to use the GIS system for creating an effective tool for the monitoring and accounting of NPP territories to identify and specify the main issues of the NPPs.

After receiving from Minprirody map-schemes of 26 NPPs of Ukraine in electronic format, and some of them on paper, the following was carried out: [3]

- *referencing and transforming the map-schemes of all NPPs using ArcGIS For Desktop into a unified GIS-platform, and digitizing the boundaries of the NPPs and their functional zones.* Since the metadata contain the information on the areas of digitized sites, one can determine the area of NPP functional zones; convert it to a percentage, to reduce it to a diagram. It should be noted that after the digitization of territories of Ukraine’s NPPs, the areas of the functional zones, which formed the basis of the Decree of the President of Ukraine “On

the Establishment of a National Natural Park”, were entered in addition – this information is entered in the metadata fields, each site is assigned the status of a certain functional zone. (Fig. 1) [4 - 7].



**Fig. 1 Determination of the areas of NPP functional zones**

In the service, there is a function of determining the areas of functional parks zones. The resulting service indicators reduce, in the automatic mode, conversions into percentages, converting them into diagrams.

Combining all Ukraine’s NPPs within the unified GIS platform enabled an analysis of the existing state of NPP territories, comparing environmental and land cadastres, and detecting violations of applicable legislation within the NPPs by monitoring the territory using satellite images from public services. Using the GIS service of the Ukrainian NPP helped to identify three problem areas (directions, aspects, issues) in the management, land use, registration of the NPP.

*Inconsistency of the Land and Ecological Cadastres, and, as a consequence, violations of environmental legislation.* Having public access to the Public Cadastral Map of Ukraine, and after comparing it to that of the Ecological Cadastre (map-schemes declared by the Minpryrody), the inconsistency between the territories registered in the State Land Cadastre, SLC, and NPP territories was revealed. The combination of the State Land Cadastre (SLC) and the Ecological Cadastre of NPPs within the unified GIS platform allowed monitoring these territories and identifying specific territories that have already become “disputable” because several owners claim the same land plot. [8]

### 3 RESULTS AND DISCUSSION

NPP “Dvorichnyskyi”. Other landowners, and there is a regulated recreation zone of the NPP around (Figure 2a). In accordance with the Ecological Cadastre (NPP map-schemes from the Minpryrody), in the middle of the NPP, namely the regulated recreation zone – there is a free territory. In 2016, this territory was registered in the SLC with an intended purpose – commercial farming (Fig. 2b).



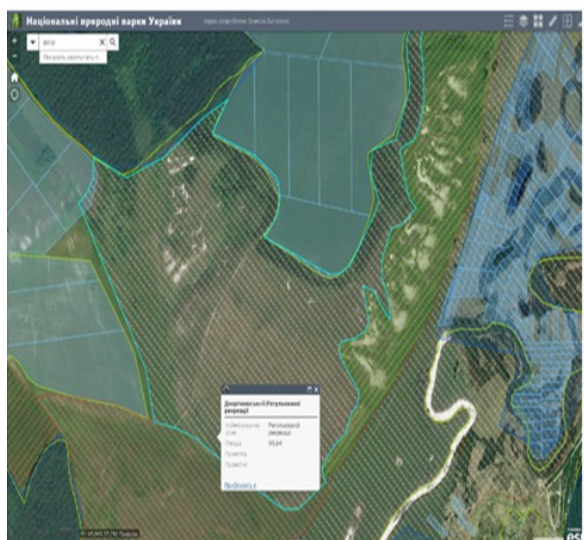


Fig. 2a. NPP “Dvornichnivskyi” Otherlandowners

Державна служба України з питань геодезії, картографії та кадастру  
Інформація Державного земельного кадастру  
про право власності та речові права на земельну ділянку

Час та дата запиту: 16:39 04.09.2017

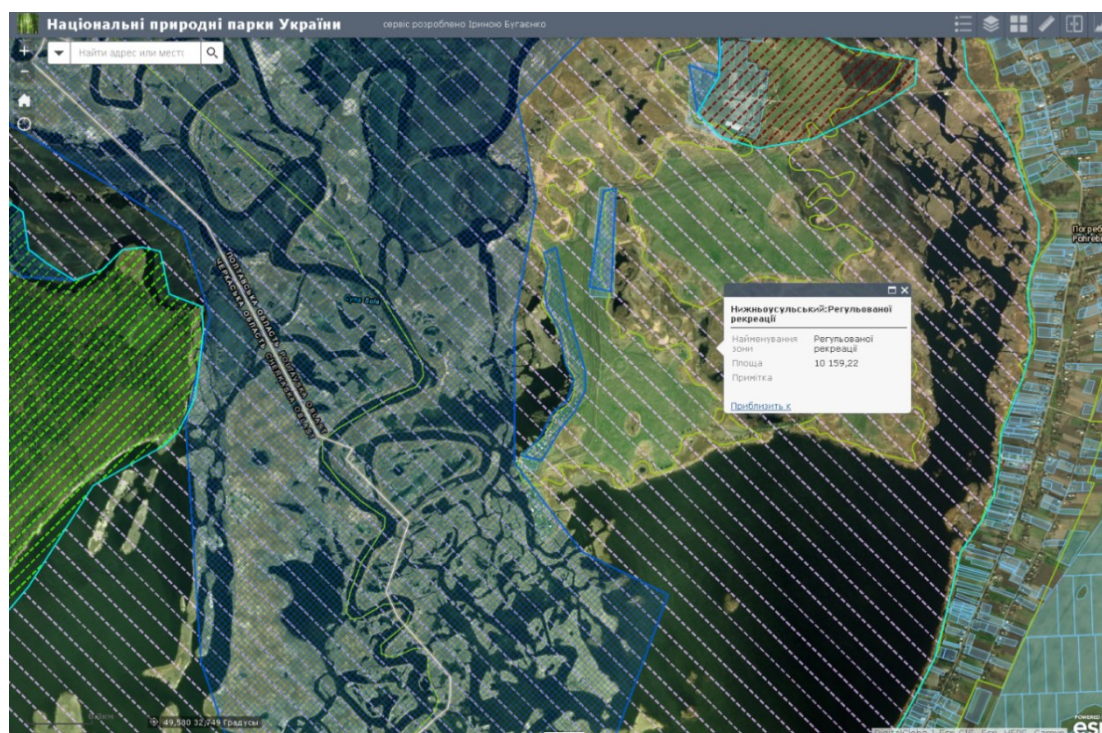
Відомості про земельну ділянку	
Кадастровий номер земельної ділянки	6321881500:06:000:0244
Цільове призначення	01.01 Для ведення товарного сільськогосподарського виробництва
Форма власності	Інформація відсутня
Площа земельної ділянки	6.7576 га
Місце розташування	Харківська область, Дворічанський район, Кам'янська сільська рада
Відомості про суб'єкта речового права на земельну ділянку	
Вид речового права	Право оренди землі
Найменування юридичної особи	ФЕРМЕРСЬКЕ ГОСПОДАРСТВО "ГИРЕНКО АНДРІЙ ІВАНОВИЧ"
Код ЄДРПОУ юридичної особи	37010538
Дата державної реєстрації права (в державному реєстрі прав)	27.10.2016
Номер запису про право (в державному реєстрі прав)	17173664
Орган, що здійснив державну реєстрацію права (в державному реєстрі прав)	Куп'янська районна державна адміністрація Харківської області

• Fig. 2b. Extract from the SLC—landplots with other intended purposes

**Fig. 2 Analysis of the use of the territory of the park with the included service sphere “Public cadastral map of Ukraine”.**

During the analysis of the territory state using ERS (Earth remote sensing), it was found that land plots of other owners registered in the SLC are accessed through the regulated recreation zone, thus disturbing the land use regime of this zone, in accordance with the Law of Ukraine “On the Nature Reserve Fund”.

NPP “Nizhniosulskyi”. According to the Ecological Cadastre – within the NPP regulated recreation zone, in the land plots registered in the SLC as intended for private housing construction, illegal construction was found (Fig. 3). In accordance with the Law of Ukraine “On the Nature Reserve Fund”, the construction of any facilities in the regulated recreation zone is prohibited.



**Fig. 3 Illegal construction in the regulated recreation zone of NPP “Nizhniosulskyi” Identifying violations of environmental legislation through the service.**

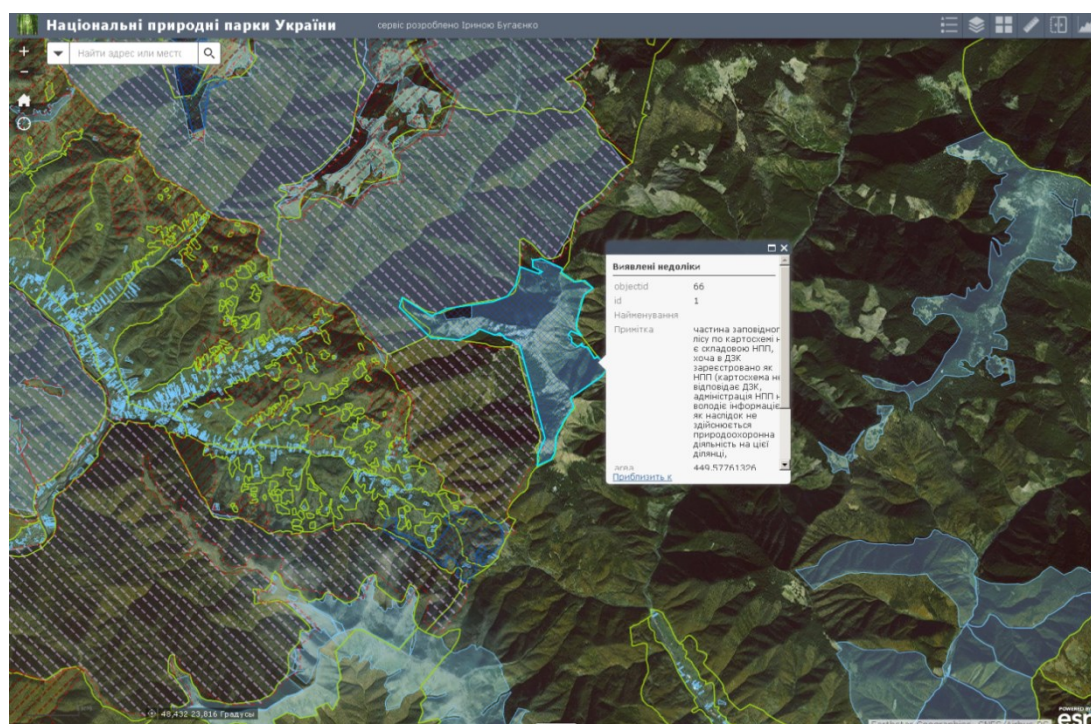


This territory was monitored in 2006 and 2015. By 2006, this territory was not built-up, and in 2015 – there was a new estate construction not registered in the SLC and not classified by the NPP administration as legal (Fig. 4).



**Fig. 4 Monitoring the territory of the regulated recreation zone of NPP “Nizhniosulsky” The service makes it possible to monitor the territory.**

NPP “Synevyr”. According to the public map of Ukraine, the land plot registered under the code 04.03 is intended for the conservation and use as national natural parks. At the same time, the Ecological Cadastre does not keep this territory on file as an NPP (Fig. 5). The Ecological and Land Cadastres do not agree with each other. As a result, the NPP administration does not have information that this territory is an NPP, and accordingly does not implement environment conservation measures within it. [9]

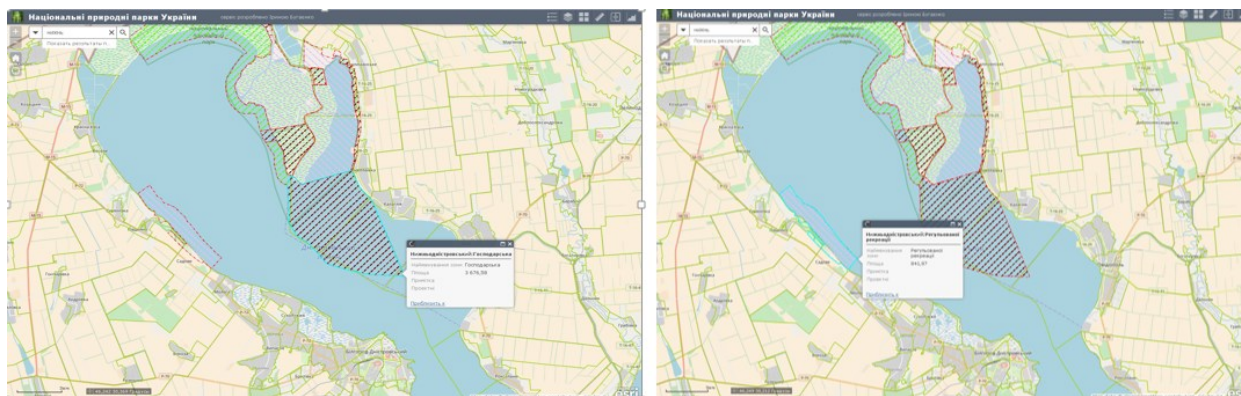


**Fig. 5 Ecological and Land Cadastres do not exchange information with each other**



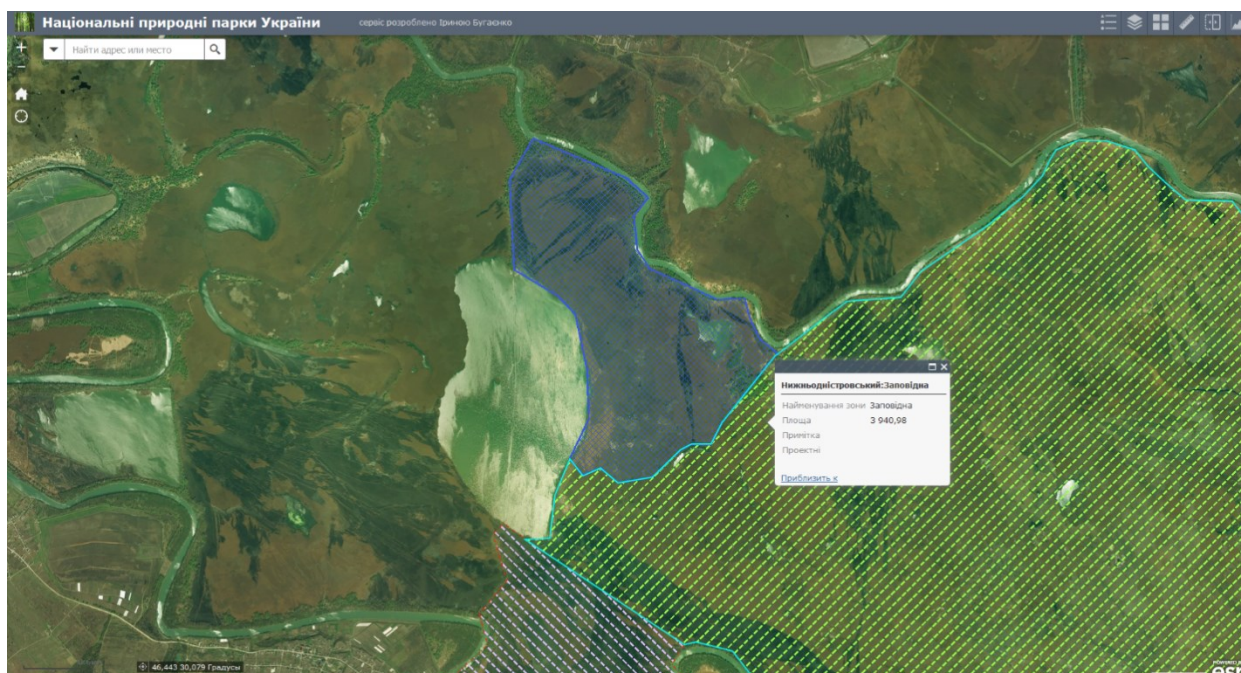
The service has a sphere “Public cadastral map of Ukraine (State land cadastre)”, and the service is the Ecological cadastre. With the help of the service, it is possible to compare and match them. The GIS service of Ukraine’s NPPs allows analysing the Ecological Cadastre (mapping schemes of the NPP) and to identify violations of the requirements for the preparation and approval of project documentation:

NPP “Nizhniiodnistrovsky”. The analysis of the territory showed that the economic zone and the regulated recreation zone are separated by a liman (Fig. 6). It is technically not possible to develop and then shift the boundaries of the NPP within the waters. A land management plan is developed for the whole territory of the water body.



**Fig. 6 Boundaries of the functional zones of NPP “Nizhniiodnistrovsky” divide the water body**

NPP “Nizhniiodnistrovsky” is in its northern part. Part of the plain territory – a meadow corresponding to the meadow in the conservation area of the NPP – was not made a part of it; besides the conservation area of the NPP, this site is surrounded by water bodies (Fig. 7). The project documentation contains no explanation why this territory was not included in the NPP. In addition to all appearances and natural “boundaries”, the territory is “surrounded” by water bodies; the site should have been included in the NPP according to its intended purpose.

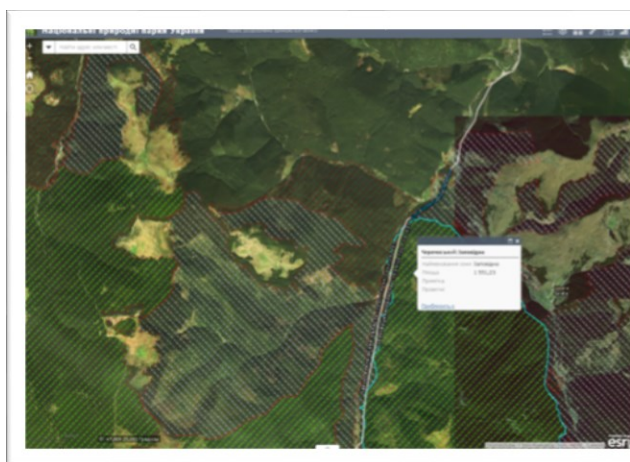


**Fig. 7 Territory not included in NPP “Nizhniiodnistrovsky”- NPPs “Cheremosky” and “Verkhovynsky”. One forest area is divided by the Perkolab River.**

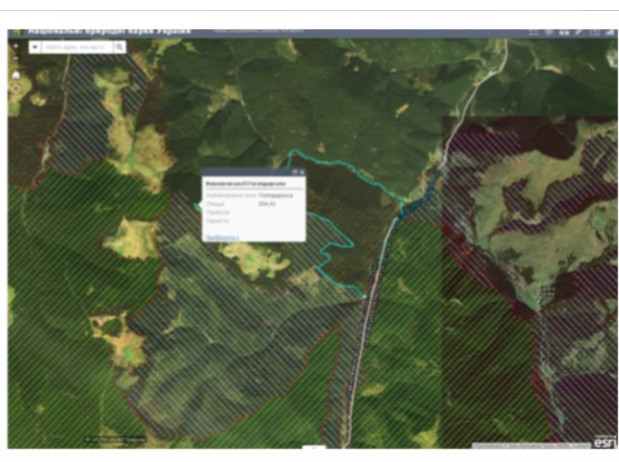
On the right side of the river, there is the NPP “Cheremosky” (Fig. 8a). On the left side of the river, there is the NPP “Verkhovynsky” (Fig. 8b). In the management plans for the territories of National Natural Parks, the protection, reproduction and recreational use of their natural complexes and territories (Management Plan) of the “Cheremosky” and “Verkhovynsky” parks, where the map-scheme is an integral part, designers divided one forest area into two different functional zones – conservation and economic ones – the regimes of these functional zones are substantially different. The mechanism of territory division into functional zones becomes



unclear– each NPP is divided at the discretion of designers. Such zoning of environmental facilities leads to the threat of losing valuable forest, which, according to the designer's intention, has the status “economic zone”.

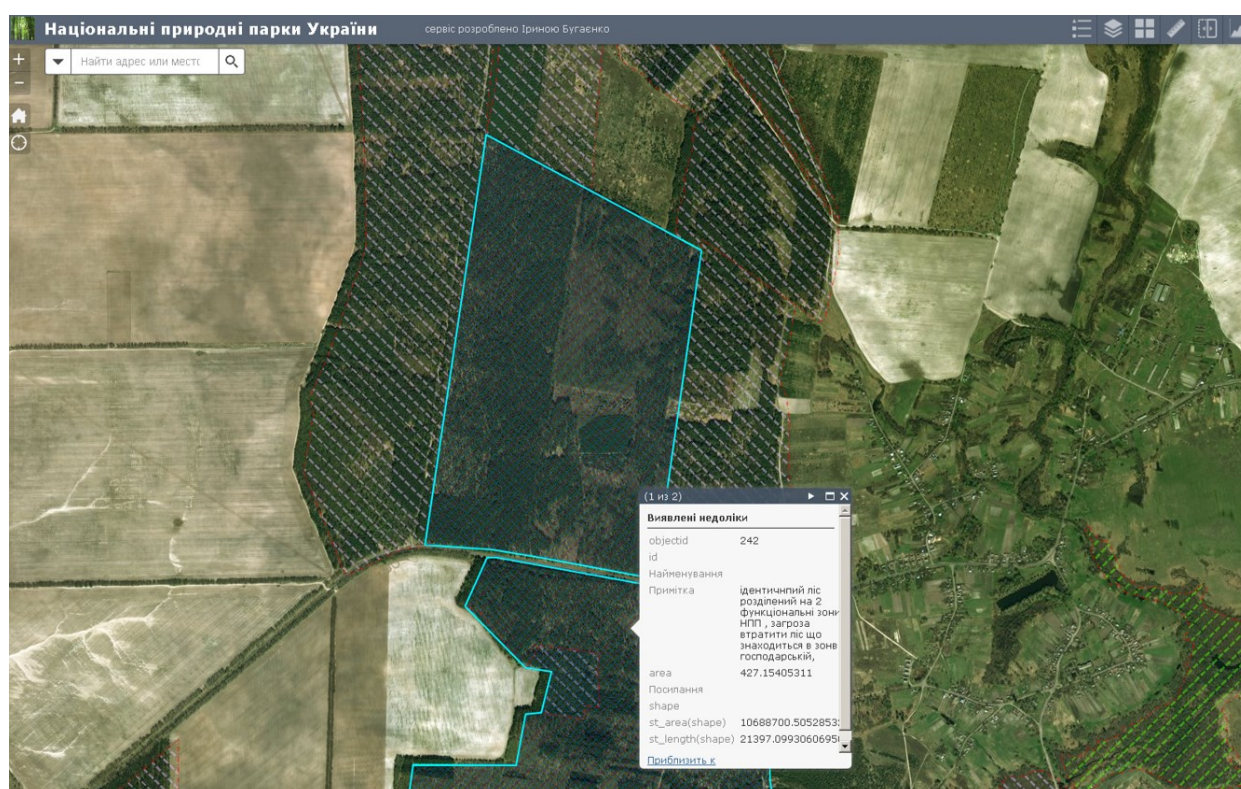


**Fig. 8a Conservation area of NPP “Cheremosky”**



**Fig. 8b Economic zone of NPP “Verkhovynsky”**

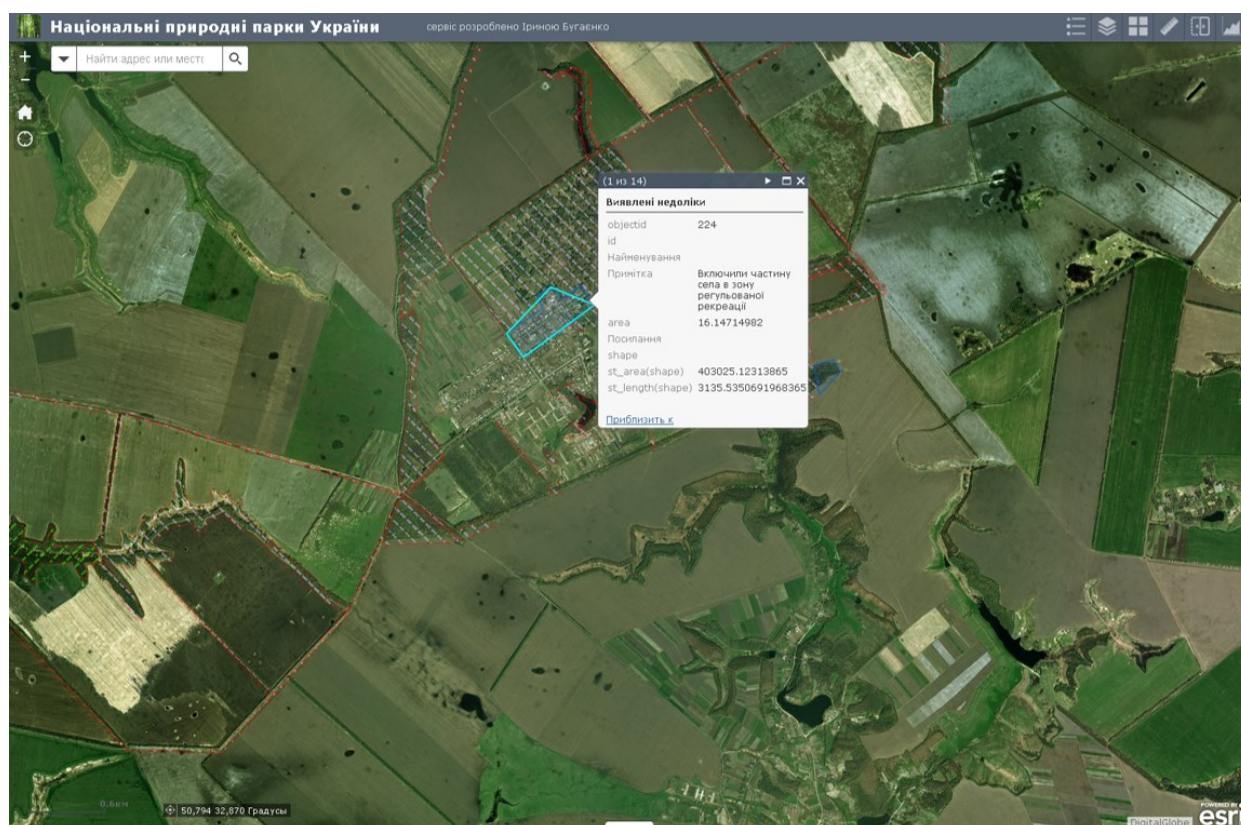
NPP “Ichniansky”. In the management plan, a single forest area was divided into two different functional zones – the regulated recreation zone and the economic zone (Fig. 9). Since the regime of the NPP economic zone allows forest felling, there is a danger of losing the valuable forest reserve of the NPP economic zone.



**Fig. 9 Single forest area is divided into two functional zones of NPP “Ichniansky”**

NPP “Ichniansky”. Designers have made a number of errors due to poor accuracy of the map-schemes – part of the settlement was included in the regulated recreation zone (Fig. 10), thus disturbing the land use regime of this zone in accordance with the Law of Ukraine “On the Nature Reserve Fund.” In accordance with the Law, in the territory of the regulated recreation zone, “...industrial, commercial and residential construction not related to the Park activity....” is prohibited. [10]





**Fig. 10 Inclusion in the territory of the regulated recreation zone of NPP “Ichniansky”– a settlement**

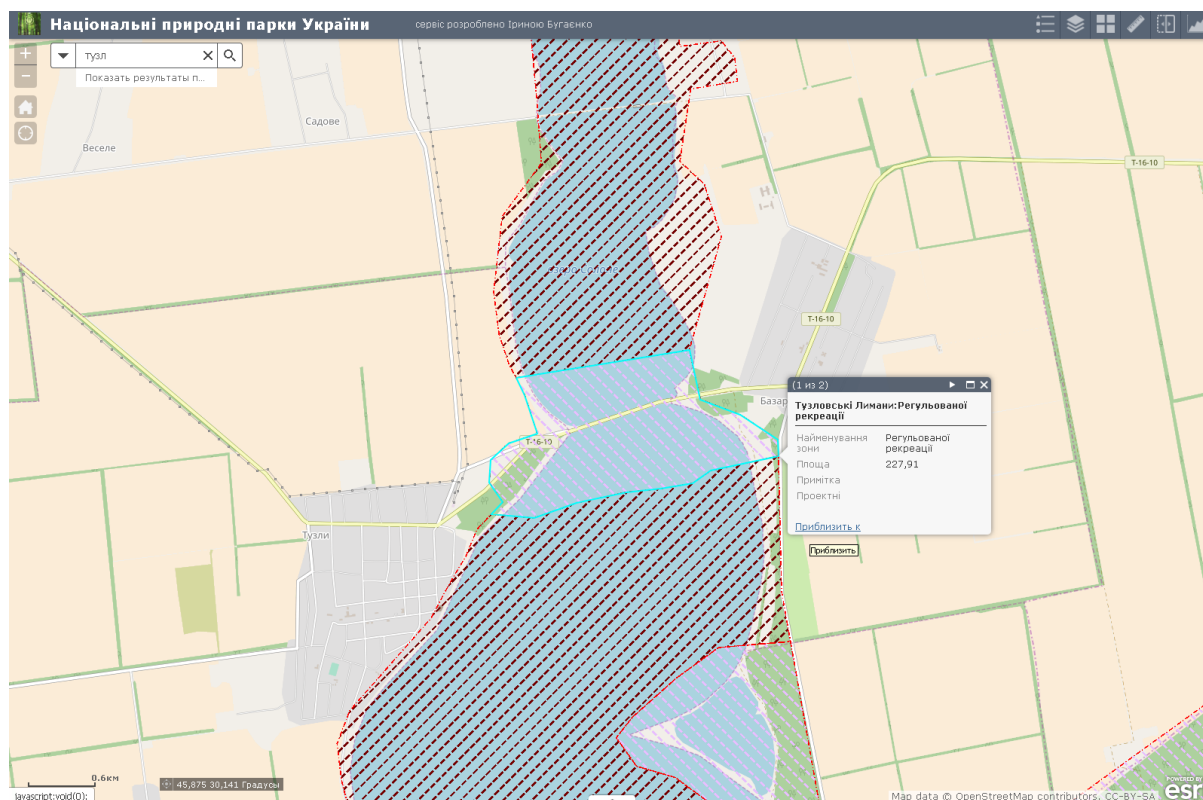
Since the GIS service allows analysing the territories of an NPP and its adjoining territories, this enables identifying the anthropogenic load on the ecological component of the NPP by external factors. The service includes 10 base maps that simplify this analysis. Using the GIS service of Ukraine’s NPPs, violations of environmental legislation were detected in the NPPs of Ukraine.

NPP “Holosiivsky”. Close to the zone of regulated recreation of the NPP, there is an asphalt plant. According to Ukrainian National Construction Regulation DBN 360-92\*, the sanitary protection zone of this plant is 500 m. [11]. The sanitary protection zone of the asphalt plant expands to 80% of the NPP regulated recreation zone, thus destroying its ecological component (Fig. 11).



**Fig. 11 Sanitary protection zone of the asphalt plant, expanded to the regulated recreation zone of NPP “Holosiivsky”**

NPP “Tuzlovskilymany” – the regulated recreation territory determined by the designer includes the Tatarbunary – Shabo highway (Fig. 12). The use regime of the regulated recreation zone in accordance with the Law of Ukraine “On the Nature Reserve Fund” prohibits the passage of vehicles within its territory, and, moreover, the construction and operation of the highway destroy the ecological component of the NPP. There is a conflict of law.



**Fig. 12 Disturbance of the land use regime of the regulated recreation zone of NPP “Tuzlovskilymany”**

The development of the GIS service of the Ukraine’s NPPs is the present-day need of society for an auxiliary tool to implement the necessary human needs, and those of the State in the first place, as a tool for keeping the NPP territories on file. [12] It allows monitoring the current state of NPP territories, timely detection of violations of legislation, sustainable land-use of NPP territories, managerial decision-making, environmental, scientific research, and recreational, educational activities. With its help, the problem of interactions between the Ecological and the Land Cadastres was solved, which leads to the impossibility of registration of other land users in the NPP territories.

#### 4 CONCLUSIONS

The use of modern technologies and the creation of the GIS service of Ukraine’s NPPs enable detecting errors primarily in the administration of the NPP territory. The GIS service of Ukraine’s NPPs was created with the aim of preserving conservation areas through their accounting, monitoring and detecting violations of applicable legislation, as has been declared by the Minpryrody for already ten years. In addition, the electronic Ecological Cadastre of the NPPs automatically agrees with the SLC within a single resource and within a unified coordinate system in accordance with applicable legislation. The electronic Ecological Cadastre will allow accounting – quantitative and areal indicators of the NPP in Ukraine (the total area of NPPs, the area of their functional zones). Also, the GIS service of Ukraine’s NPPs will allow making the right managerial decisions for the administration and land use of NPPs. In the GIS service of Ukraine’s NPPs, all information required for scientific, educational and recreational activities of NPPs will be publicly accessible. The GIS service helps to perform tasks assigned to NPPs in accordance with the Law of Ukraine “On the Nature Reserve Fund of Ukraine”.

The GIS service has enabled to identify current problems in administration, land use, and registration of NPPs. The absence of an ecological cadastre and the lack of agreement between the Ecological and Land Cadastres causes conflicts and results in the loss of particularly valuable land.

The service allowed identifying shortcomings in the project documentation. Failure to comply with other regulations and laws leads to the impossibility of further registration of the NPP territories that do not comply



with other legislative acts. Unreasonable approaches to functional zoning lead to the loss (devastation) of forests right in the NPP zone, which in view of the conservation status of the NPPs looks absurd in itself.

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