

OPEN GEODATA FOR NATIONAL PARKS

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ABSTRACT

Open geodata is one of the most powerful tools to inform, engage, and create opportunities for National Parks. We have been studying and accumulating experience with OSM for protected area's management since 2010. The main aim of our project is open geodata creation for National Parks. Open Datasets and Maps that have been created in the framework of implemented projects were successfully used by scientists, teachers, students and visitors of the National Parks.

Keywords: national parks, open geodata, OpenStreetMap, crowdsourcing

INTRODUCTION

Full functioning of organizations involved in the management of protected areas (hereinafter referred to simply PAs) is not possible without using GIS in the major aspects of activities - such as security, science, recreation, education and economic. For most of GIS tasks general geographic information is required.

Apart from conventional work with the image, usage of modern mapping models often implies work with data that lie at its core. In relation to general geographic information in common language this trend shows up in spreading of relatively new terms, such as basic data and base maps.

The word "base" captures main purpose most accurately - to serve as a base. The term “base” is referred to data describing stable objects that is the foundation for the positioning of other data.

Basic data serves as raw material from which so-called base maps are created, which are later used as background information and are placed in the context of thematic information area.

In sense of function base map is similar to topographic, which was traditionally used as a basis, although requirements for base map creation entails less claims for specifications and accuracy. When tasks of GIS project require expanded and more accurate information, then additional sources should be used.

In most cases base map implies a map containing at least information about hydrography, vegetation, roads, settlements, administrative boundaries. Basemaps can as well display terrain, land-use, pipelines and power transmission lines, individual facilities and other significant social and economic information. Depending on tasks of GIS project, base maps can be visualized in different way.

ABOUT PLATFORM

OpenStreetMap (OSM) and ArcGIS Online is a great platform for managing base and thematic open geodata. OpenStreetMap - this is a relatively young international community mapping project, which, just like Wikipedia project, anyone can participate. ArcGIS Online is available for national parks under the Esri Conservation Program.

Two main specifics that distinguish OSM from other distributed crowdsourcing mapping projects are focus on data and openness. All geographic data created by project participants is easily obtained and can be used for any purpose, including commercial.

Traditionally, attention of most participants in crud-basemaps projects is focused on the data related to personal and public transport different types, land use, service industries. For these areas project

requirements, documentation and tools are already worked out., new groups of participants are interested in management of open data that is closely related to their own areas of interest (e.g. example modeling of relief, vegetation, hydrography). We can say that OSM is a geographic information system aimed at keeping Base geodata up to date, on the top of that having public importance. During GIS projects realization OSM has been successfully used by various organizations as an additional or main source of maps and data in cases where use of traditional suppliers was impossible or impractical. In some of these projects existing OSM products were not just used, but even actively created [1, 2].

ArcGIS Online capabilities allow us to organize management of thematic data and maps. Outsourcing of some project tasks, e.g. maintaining thematic geodata and base maps will reduce the cost of hardware, software, administrator’s compensation while increasing overall efficiency. Stable process of updating base maps gives to specialist’s opportunity to focus on the implementation of thematic National Parks studies.

We have been studying and accumulating experience with OSM for protected area’s management since 2010. Several years ago National parks had no geospatial data for managing resources due to that they had no possibility to organize work in the best way. The main aim of our project is OpenGeo Data creation for National Parks. We concentrated on creation of next features: borders, buildings, roads including passes, points of interest, water features (Fig.1.). Special request from National Parks specialists is creation of relief and landscape large scale aps. This data is maintained outside of OSM.

List of Protected Areas	Start	Borders	Buildings	Roads	POI	Relief	Water	Landscapes
Homilshanski Lisy	2010	+	+	+	+	+	+	In process
Mezenskyi	2010	+	+	+	In process	+		+
Sokilnyki-Pomirky	2011	+	+	+	+	+	+	In process
Slobzhanskyi	2013	+	+	+	+	+	+	In process
Dvorichanskyi	2013	+	+	+	+	+	+	+
Yalta Mountain Forest	2013	+	+	+	+		+	
Central Chernozem	2013	+	+	+			In process	
Narachanski	2013	+	+	+	+		In process	
Siglikara	2014	+	+	In process	+		In process	In process
Izum Luka	2014	In process	+	+	+		In process	In process
Holy Mountains	2014	+	+	+	In process	In process	In process	
Enchanted Land	2014	In process	+	+	+		In process	
Danube Delta	2014	+	+	+	+			
Stokhid	2014	In process	+	In process	+			
Hetmanskyi	2015	+	+	In process	In process			

Fig.1. Scope of the project

Not only data availability significantly restricts Protected Area research, monitoring, and management, but also provokes violations of territorial integrity and land use. During first stage the main goal was establishing free and open public access to protected area borders through OSM and ArcGIS Online Open Data Site [3, 4].

In projects for updating base maps of Kharkov Woodland Park, Mezenskyi NP, Homilshanski Lisy NP and Dvorichanskyi NP work was done by several professionals without using tools for online-coordination. Open geodata that was updated by Slobzhanskyi NP as part of a multi-user distributed project, during which was tested cooperation model of both local and remote participants of OSM community (representatives of the National Park, students and teachers) and SCGIS Ukraine. Basemaps and thematic maps that have been created in the framework of implemented projects were successfully used by employees and visitors of the NP. National parks and Universities use open GIS

and proprietary GIS equally. ArcGIS uses as a part of ESRI Conservation program (2012-2016). ArcGIS and QGIS have possibility to get OSM data and maps to extent. Open geodata can be published as Web Map Services and Web Feature Services or Image Services per request from GIS Specialist (Fig.2.).

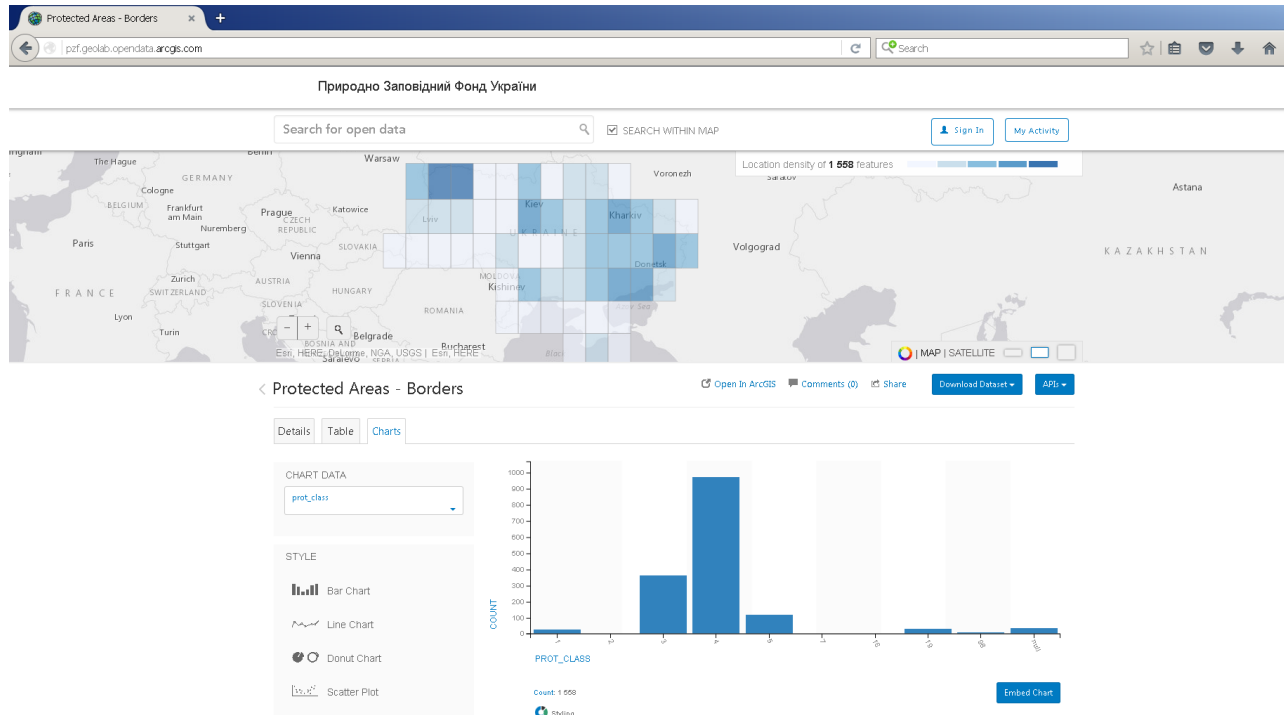


Fig.2. Open data site

Let's consider the following features of OSM, which will be interesting for specialists in design of base maps of protected areas.

Software

To create and manage data and maps in project, variety of software could be used. For small, simple operations use the software runs in the browser and does not require installation. If advanced editing of large amounts of data is necessary, PC software is used. For fieldwork mobile tools are used.

GIS Experts can use QGIS and ArcGIS to work with OSM.

Apart from basic software for working with data and maps there are many tools that perform additional functions of storage, backup, testing, providing access, document management, task management, communication, feedback, etc.

Data

Participation in the project gives access to wide range of up-to-date remote sensing data, including high-resolution images. In cases when data is used in open editors in order to enhance OSM coverage, it is provided free of charge.

Access to the small amounts of data is carried out directly through database editing software. Some of the organizations-participants of OSM- community support services of regular creation of backup data sets for administrative areas, which are available later in archived form. Also, there are available convenient tools for easy formation of user data sets for arbitrary area.

As one of the variant of field work is collection data using drones. For some territory there is no good Base Imagery (MapBox/Bing/Esri), also Imagery can be old or clouded. In order to cover territory that we are interested in such work has to be performed. From my experience students and worldly-wise GIS specialist are in the same way crazy about drones. Also we are all having tender fillings for data that collected by us. RGB enable the making orthophoto plans and digital terrain models of resolution of up to 0,5 cm for Basemaps. Near infrared imagery is ideal for botanical and landscape studies.

Maps

Based on the OSM-data a variety of options for basic and navigation maps are automatically created, updated and distributed for use in GIS, image editors and navigators. There are opportunities to connect existing map services, as well as to download maps in vector and raster file form, or to assemble maps and publish custom maps.

Possibility of using existing content and display settings could be interesting for national parks. Depending on the purpose of cartographic product, the most appropriate option of adapted design can be selected, for example black-and-white booklet depicting ecological trails within given area.

Community

Not all National Parks have at disposal geomatics specialists. Support of active members of community in can partially fill consulting needs of PAs concerning work on geoinformation tasks.

Motivated community members can develop a basic coverage of protected areas, and regardless of their spatial location they can remotely perform some type of work that do not require a physical presence (e.g. vectorization, analysis of feedback forms, integration of existing data sets).

An important part of the multi-user projects as are Mapping Parties. Active members can combine remote work with visits to the National Park as part of the Mapping Parties. It makes sense to organize workshops for beginners during such meetings, as well as distribute business cards with reference to the section of the OSM website dedicated to protected areas. Field Mapping Parties are great opportunity to get rest from daily routine with like-minded persons and friends. National Parks organize the reception of participants, provide accommodation and food. Newcomers have to take a part in Basic Training regarding filed work from experienced community member.

Involvement of local students and geography teachers into open geodata development enhancement can become a premise for emergence of local environmental protection groups. Another useful activity can be collaboration with local clubs of young naturalists, tourists, active students of biological and geographical specialties.

In cooperation with the OSM-community professionals of National Park are able to create and maintain up to date POI's database, which is important for park visitors. POI collection is element of the overall program of general visit to NP for experienced OSM members as well as for beginners. There are convenient tools with an intuitive interface supporting all popular operating systems for mobile data collection of POIs.

National park's visitors and local residents can report map inaccuracy or changes by sending a message through mobile or using web-based tools. Messages are monitored, checked, used in updating the database by the responsible employees or volunteers [4].

Risks

Strengths of the project are at the same time its specific risks, and these have to be taken into account during process organization. Thus, the ability to edit the database by anyone can result errors or intentional misrepresentation. Despite the fact that such cases are rare, there are tools in the project

that allow convenient tracking changes on a given area (e.g. the boundaries of protected areas), and simple restoration of data to the correct version if necessary.

For risk reduction, in certain projects can be used practice of periodic quality checks and following release after data sets and maps verification. Depending on needs of protected areas such verification can be performed, for example, annually or quarterly. By arranging access to tested releases on its web site you can be sure that employees and visitors are using map with precise information.

Implementation

Self-study of data model, quality requirements, software JOSM and iD, general technical and organizational structure of the project is the best way to start use OSM for PA tasks. For a quick start, use the special sections of the documentation that meant for newcomers. After introduction to the project basics your intentions should be discussed with the local OSM and SCGIS community. At this stage, the roundtable will be useful for communication. Start editing OSM from adding or clarifying the boundaries of protected areas. Existing base data collected in the framework of the local GIS can be integrated into OSM. Such integration must be performed in close collaboration with the community.

CONCLUSION

Now members OSM-communities have logically focused on the development of regional centers and major transport routes outside the cities. This leads to a lack of detailed base maps of areas with low population density. Thus, protected area specialists, as members OSM-community, have more opportunities in organization of controlled process of base map creation in compliance with all quality requirements.

Open geodata is one of the most powerful tools to inform, engage, and create opportunities for National Parks. When choosing a management strategy geodata protected areas need to remember that, in any case, open data of National Parks will be developed by community. Organizations that interact with the National Parks will use available online data for obtaining necessary information. Active users will upload into desktop and mobile devices available open data sets and maps. What kind of data and map this should be, depends on place of Open Data in the general program of GIS development of National Park.

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