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Possibilities of using text and graphic database '*Protected areas in Poland*' to analyses on protected areas

Możliwości wykorzystania tekstowej i graficznej bazy danych "*Obszary chronione w Polsce*" do analiz sieci obszarów chronionych

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Keywords: protected areas, the forms of nature conservation, national park, landscape park, nature reserve, protected landscape area, data resources, protection of nature

Słowa kluczowe: obszary chronione, formy ochrony przyrody, park narodowy, park krajobrazowy, rezerwat przyrody, obszar chronionego krajobrazu, zasoby danych, ochrona przyrody

Abstract

The article presents the database 'Protected areas in Poland', its actualisation, further modernisation and consequent abilities to search for information and to use them for analysis and researches on protected areas in Poland. Database is carried out at the Institute of Environmental Protection – National Research Institute.

Streszczenie

Tematem artykułu jest baza danych „Obszary chronione w Polsce”, jej aktualizacja i dalsza modernizacja oraz wynikające z niej możliwości wyszukiwania informacji i wykorzystania ich do analiz i badań nad obszarami chronionymi w Polsce. Baza danych prowadzona jest w Instytucie Ochrony Środowiska – Państwowym Instytucie Badawczym.

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1. INTRODUCTION

'Protected areas in Poland' database is a project carried out since 1998 in the Department of Nature and Landscape protection in the Institute of Environmental Protection – National Research Institute. As a result of regular and long-term work, it's been created a modern and user-friendly tool for collecting and processing information on nature valuable and legally protected areas in Poland. It is an important source of information and provides opportunities to conduct researches on the networks of protected areas, from the point of view of their quantity and structure, as well as dynamics of changes over the decades.

In the past two years, the database content has been substantially expanded and enriched with valuable, biodiversity data (author: M. Walczak, source: Sienkiewicz J. *et al.* 2000, 2008, Walczak M. *et al.* 2001, Rąkowski G. *et al.* 2005, 2006, 2009, 2010, 2013), as well as technically upgraded (author: M. Leszczyński).

The database contains about 3,450 protected objects. Taking into consideration the very large amount of data collected on the various forms of protection, not all areas have been fully updated and supplemented. Therefore, selecting information from the database, and thus, the ability to carry out reliable analyses, now refers to the following protected areas: 23 national parks,

122 landscape parks, 13 Ramsar sites and nature reserves of northern and, partially, central Poland.

Other areas (nature reserves of southern Poland, Natura 2000 areas, protected landscape areas, documentary positions) are introduced with the basic scope of information, already collected in the database before updating. We are currently working on introducing all natural and administrative data for these protected areas.

2. TECHNICAL INFORMATION OF THE DATABASE

Thorough technical modernisation has been started in 2012. It consisted of:

- ✓ integration of the descriptive database with information collected in the Arc GIS 9 system (Arc View 9.3.1, Arc Map 9.3.1.).
- ✓ replacement of an outdated application, which was used to resource the data, with a modern database management system.

To upgrade a descriptive database, freely available database management system MySQL version 5.5 has been used.

- ✓ introducing, viewing and editing of the data can be done by a web browser.
- ✓ program supporting the database uses PHP (ver. 5.4) and JavaScript jQuery library programming languages.

3. STRUCTURE AND RESOURCES OF THE DATA

Data resources exist in the form of two databases, graphical one and descriptive one, connected by the attributes. Each object in a descriptive database has its own graphic image in the form of polygons or dots placed on thematic layers.

Currently, the database contains graphic and descriptive information on almost all forms of nature conservation (apart from the most numerous: nature monuments and ecological farmlands), listed in the Act on Nature Conservation, 16 April, 2004 (Dz. U. No. 92 item. 880, with amends), as well as in the Ramsar international conservation areas, designated under the Convention on wetlands, of a great importance as waterfowl habitat.

The database collects information on

- ✓ 23 national parks and their protected zones (graphic and descriptive information);
- ✓ 122 landscape parks and their protective zones (graphic and descriptive information);
- ✓ 1485 nature reserves (graphic and descriptive information);
- ✓ 413 landscape protected areas (graphic and descriptive information);

- ✓ 266 nature and landscape areas (graphic and descriptive information – in the course of work);
- ✓ 194 documentary positions;
- ✓ Natura 2000 areas - Birds Special Protection Areas OSO (PLB) (graphic and descriptive information – in the course of work);
- ✓ Natura 2000 areas - Habitats Special protection Areas SOO (PLH) (graphic and descriptive information – in the course of work);
- ✓ 13 Ramsar areas (graphic and descriptive information).

The graphic database is an original project of the IOŚ-PIB and is not a reference base. It was created in ArcInfo; ArcMap is currently used for edition. Thematic layers are created in the SHAPE format in 1992 geographic coordinates. Graphic database contains layers showed in Fig. 1.

Descriptive database as a result of modernisation in 2012–2013, the descriptive database received a new layout. In 2014, presentation of data on the pages related to the specific forms of nature protection has been refined; it reached the desired optimal appearance and is clear, easy to read and visually attractive (Figs. 2 and 3.).

- ✓ It is possible to choose plant species online, using a list of 1286 plants. These are the species found commonly in the Polish flora as well as species listed in Appendix II of the Habitats Directive (numeric code, bold and the asterisk represent priority species).

Fig. 1. The content of the graphic database – layers with protected areas in Poland (Source: IOŚ-PIB database *Protected areas in Poland*)

Descriptive database

Fig. 2. Title page of database and presentation of the descriptive data

Fig. 3. Presentation of the descriptive data on the pages related to forms of nature conservation; example: Białogóra reserve

- ✓ Animal species can be selected from a list of 623 animals, which are the species commonly found in Polish fauna and those listed in Appendix II of the Habitats Directive.
- ✓ The list of habitats includes the most valuable nature habitats in Poland (81), listed in Annex I of the Habitats Directive.

4. DATA RESOURCE MANAGEMENT – POSSIBILITIES OF OBTAINING INFORMATION FROM THE DATABASE

Data resource management was improved in 2014. Program supporting the database enables to search for information from the data resource and to generate reports about the specified information range. Now it's possible to select information according to the following criteria:

- ✓ forms of protection;
- ✓ administrative position;
- ✓ creation date;
- ✓ types of reserves;
- ✓ species of plants, animals and mushrooms;
- ✓ types of protected habitats;
- ✓ forms of international protection;
- ✓ protection plan.

Data retrieval can be done by using a web browser, under 'Search' (Fig. 4.). The following sections present the possibilities of using the results of the information retrieval for analysis of networks of protected areas in Poland.

Lp.	Nr obszaru	Nazwa obszaru	Woj.	Pow. Lasy	Pow. Calk. plan
1	6.0528	Biała Góra II	1	0.00	3.81 Rozporządzenie Nr 1/07
2	6.0121	Bielinek	1	0.00	75.60
3	6.1163	Dolina Rzeki Brdy	1	0.00	1681.30 Zarządzenie Nr 17/0210/
4	6.0411	Góra św. Wawrzynca	1	0.00	0.75 Rozporządzenie Nr 246/0
5	6.0921	Góra Uszelce	1	0.00	12.02 Zarządzenie Nr 22/10 Reg.
6	6.1039	Kratynia Dolna	1	0.00	969.33
7	6.0082	Kułka	1	0.00	12.39
8	6.0308	Kwidzińskie Ostnice	1	0.00	2.36 Rozporządzenie Wojewody
9	6.0693	Milachowo	1	0.00	3.70
10	6.1394	Ostnicowe Parowy Gruczna	1	0.00	23.82 Zarządzenie Nr 0210/27/
11	6.0408	Ory Kiczarowskie	1	0.00	1.93
12	6.148	Przełom Miemi	1	0.00	10.18 brak
13	6.1399	Skarpy Ślesisłskie	1	0.00	13.82 brak
14	6.1608	Słoneczne Wzgórzca	1	0.00	49.45 brak
15	6.0637	Stary Przylep	1	0.00	2.13
16	6.0628	Wzgórze Włokowe nad Miedzyodrzem	1	0.00	4.19
17	6.0432	Złocza Płotowskie	1	0.00	34.49 Rozporządzenie Nr 246/0

Fig.4. Searching for information from the database

5. THE SCOPE OF WORK PERFORMED IN 2014

The scope of work performed under the theme 'Maintaining and complementing the descriptive and graphic database on protected areas' affected the following fields (Table 1):

- ✓ updating existing data and introducing information about the new protected areas,
- ✓ improving capabilities of selecting and printing the data.

6. SOURCES OF INFORMATION – DATA VERIFICATION

The main sources of information used to update and verify the data on protected areas are sets of references provided on the website by General Directorate of Environmental Protection. These are:

Sets of references (the only official source of information on protected areas, used by the central and local government, investors and all interested parties) introduced on the website by General Directorate of Environmental Protection:

- ✓ Central Register of Forms of Nature Conservation (CRFOP), containing descriptive data about objects protected (<http://crfop.gdos.gov.pl/CRFOP/>),
- ✓ Geoservice containing graphical data (spatial) (<http://geoservis.gdos.gov.pl/mapy/>).

The disadvantage of these sources is that they are not fully complete and require verification.

The accessory sources are:

- ✓ databases of Regional Directorates for Environmental Protection (16),
- ✓ State Forests databases (forest districts websites),
- ✓ managements of National and Landscape Parks,
- ✓ departments of environmental protection in the provinces, counties and municipalities.

Natural data sources are

- ✓ IOŚ-PIB publications on protected areas in Poland,
- ✓ other publications (articles, books, brochures, maps),
- ✓ data collected during the implementation of current topics, conducted in the Department of Nature and Landscape Conservation.

Improving the database technical capacity (author Mirosław Leszczyński) based on

- ✓ changing the information retrieval graphic layout,
- ✓ improving the searching criteria,
- ✓ extending the ability to print information about the areas,
- ✓ modifying the function of introducing legal acts,
- ✓ checking the correctness and integrity of the database.

7. EXAMPLES OF USING SEARCH CAPABILITIES OF THE DATABASE TO ANALYSES

Skilful use of searching possibilities of the base enables to perform many interesting analyses of the natural values of

Table 1. Data updating (2014 r.)

Form of protection	New objects	Number of updated objects	Cancelled objects	Scope of work
National parks	no	23	no	- It's been introduced a full range of information provided in a descriptive database for this form of protection
Landscape parks	no	122	no	- It's been introduced descriptions of parks to 122 objects according to the monograph 'Landscape Parks in Poland' as well as a full range of information about this form of protection provided in a descriptive database
Nature reserves	5	580 (Northern Poland + 30 reserves in dolnośląskie province)	3	- It's been introduced a full range of information provided in a descriptive database for this form of protection. - All reserves in Poland have been supplemented with information about the protection plans
Landscape protected areas	no	22	no	- It's been introduced a complete data about zachodniopomorskie province - It's been supplemented data on legal acts
Nature and landscape areas	50	8	no	- It's been introduced an available range of information provided in the descriptive database for this form of protection
Documentary positions	no	35	no	- It's been introduced an available range of information provided in the descriptive database for this form of protection
Natura 2000 areas	no	40	no	- It's been introduced an available range of information provided in the descriptive database for this form of protection
Ramsar areas	no	13	no	- It's been introduced an available range of information provided in the descriptive database for this form of protection

protected areas. With an existing graphic database, it is also possible to translate the results of searching to a graphic image. **It should be emphasized that interpretation of the results cannot in any way estimate these areas in terms of nature, because it applies to areas already recognised as the most valuable in Poland. User of the database is only informed about the type of natural assets (plants, animals, mushrooms, habitat type), which exist on the concrete protected area and about the limits of protected areas where these assets are present.**

Examples of such searches and their graphic images are presented in the following text.

7.1. The existence of valuable protected habitats listed in Annex I of the Habitats Directive in national parks, landscape parks and nature reserves of northern Poland.

All Natura 2000 habitats in Poland have been analysed for their occurrence within the protected areas mentioned above. For analyses the most and least occurring habitats were chosen. Conclusions are as follows:

- ✓ the appearance of specific, rare habitats is connected with the geographical distribution of particular ecosystems,

- ✓ rarest habitats occurring in national and landscape parks are (6130) Calaminarian grasslands of the *Violetalia calaminariae* (this habitat occurs only in Rudawski Landscape Park) and habitats in the Baltic coastal area are (1130) Estuaries, (1170) Reefs, (4010) Northern Atlantic wet heaths with *Ericion tetralix*, (2110) Embryonic shirting dunes, (2190) Humid dune slacks, (1210) Annual vegetation of drift lines.

- ✓ the most common protected habitats in national parks are:
 - 91E0 * Alluvial forests with *Alnus glutinosa* and *Flaxinus excelsior* (*Salicetum or-fragilis*, *Populetum alba*, *Alnenion glutinoso-incanae*, alder headwaters) occur in nearly all national parks, except Poleski and Drawieński National Parks.
 - 6510 Lowland hay meadows (*Arrhenatherun elatioris*) (20 national parks).
 - 7140 Transition mires and quaking bogs (mostly together with plants from *Scheuchzerio-Caricetea*) (17 parks).
 - 9170 Galio-Carpinetum oak-hornbeam forests (*Galio-Carpinetum*, *Tilio-Carpinetum*) (17 parks).

The details of the most rare habitats within the analysed protected areas are given in the Table 2.

Table 2. Appearance of rare, specific habitats in national parks, nature reserves and landscape parks in northern Poland

	Habitats	National park, Landscape park	Nature reserve
1.	1130 Estuaries	Woliński National Park	Kąty Rybackie Ujście Nogatu Zatoka Elbląska Ptasi Raj
2.	1160 Large shallow inlets and bays	Woliński National Park Nadmorski Landscape Park	-
3.	1170 Reefs	Słowiński National Park	-
4.	1210 Annual vegetation of drift lines	Słowiński National Park	Beka
5.	2110 Embryonic shifting dunes	Słowiński National Park	Kąty Rybackie Mewia Łacha Mierzeja Sarbska Ptasi Raj
6.	2140* Decalcified fixed dunes with <i>Empetrum nigrum</i>	Słowiński National Park Nadmorski Landscape Park	Białogóra Helskie Wydmy Mierzeja Sarbska
7.	2170 Dunes with <i>Salix repens</i> ssp. <i>argentea</i> (<i>Salicion arenariae</i>)	Słowiński National Park	Mewia Łacha Mierzeja Sarbska Ptasi Raj
8.	2190 Humid dune slacks	Słowiński National Park	Woskownica Kąty Rybackie Mierzeja Sarbska
9.	3230 Alpine rivers and ligneous vegetation with <i>Myricaria germanica</i>	Magurski National Park	No data
10.	4010 Northern Atlantic wet heaths with <i>Erica tetralix</i>	Słowiński National Park	No data
11.	5130 <i>Juniperus communis</i> formations on heaths or calcareous grasslands	Tatrzański National Park	No data
12.	6130 Calaminarian grasslands of the <i>Violetalia calaminariae</i>	Rudawski National Park	No data
13.	8120 Calcareous and calcshist screes of the montane to alpine levels (<i>Thlaspietea rotundifolii</i>)	Tatrzański National Park	No data
14.	91Q0 Western Carpathian calcicolous <i>Pinus sylvestris</i> forests	Tatrzański National Park Pieniński National Park	No data
15.	9420 Alpine <i>Larix decidua</i> and/or <i>Pinus cembra</i> forests	Tatrzański National Park	No data

(Source: IOŚ-PIB database Protected Areas in Poland)

Fig. 5. Appearance of rare habitats and rare species of plants, animals and mushrooms in national and landscape parks

The map presented in Fig. 5 shows locations of the most rare habitats, plant and animal species from Appendix II of the Habitats Directive and rare species of mushrooms.

7.2. Appearance of rare species of animals, plants and mushrooms in national parks, landscape parks and nature reserves in northern Poland (Fig. 6a–d)

Fig. 6a. Presence of pachnica dębowa (*Osmoderma hermit*)

Fig. 6b. Presence of flagowiec olbrzymi (*Meripilus giganteus*)

Fig. 6c. Presence of czarka szkarłatna (*Sarcoscypha austriaca*)

Fig. 6d. Presence of skalnica torfowiskowa (*Saxifraga hirculus*) in national and landscape parks

7.3. National and landscape parks of international protection as objects from UNESCO World Heritage List:

Białowiecki National Park
 Łuk Mużakowa Landscape Park

7.4. National and landscape parks of international protection as HELCOM areas (Baltic Sea Protected Areas, protected under the HELCOM Convention):

Slowiński National Park
 Woliński National Park
 Nadmorski Landscape Park
 Mierzeja Wiślana Landscape Park

7.5. National and landscape parks of international protection as UNESCO Biosphere Reserves – 'Man and the Biosphere':

Babiogórski National Park
 Białowiecki National Park
 Bieszczadzki National Park
 Ciśniańsko-Wetliński Landscape Park
 Kampinoski National Park
 Karkonoski National Park
 Dolina Sanu Landscape Park
 Pojezierze Łęczyńskie Landscape Park
 Bory Tucholskie National Park
 Poleski Landscape Park
 Poleski National Park
 Słowiński National Park
 Sobiborski Landscape Park
 Tatrzański National Park
 Tucholski Landscape Park
 Wdecki Landscape Park
 Wdzydzki Landscape Park
 Zaborski Landscape Park

8. PRACTICAL USE OF THE DATABASE

In 2014, information from the database were used for the following publications.

Researches

1. Interdisciplinary researches carried out in collaboration with other departments of IOŚ-PIB, for example, G. Rąkowski, M. Walczak, K. Czarnocki - „Program badawczy obiegu zanieczyszczeń w środowisku przyrodniczym realizowany na SKMŚ Puszcza Borecka. Analiza zmian awifauny lęgowej Puszczy Boreckiej na przeł. XX i XXI w. – etap III”.
2. Researches related to the theme of nature and landscape protection:
 B. Kornatowska, G. Rąkowski, M. Smogorzewska, M. Walczak, A. Zagórowicz - „Ocena skuteczności ochrony przyrody w Lasach Państwowych”. Etap III
 Maps used in this publication were created on the base of information from a descriptive and graphic database.
3. Publication commissioned by the Regional Directorate of Environmental Protection in Krakow under contract 68/2014 / RDOŚ / LF „Wykonanie opracowań przyrodniczych i planów zadań ochronnych dla 12 obszarów Natura 2000 w ramach projektu LIFE12 NAT/PL/000053 Ochrona siedlisk

kserotermicznych w obszarach Natura 2000 na Wyżynie Miechowskiej". The contract was funded by the European Union Financial Instrument" LIFE + " and the National Fund for Environmental Protection and Water Management.

Thanks to capabilities of the graphic and descriptive database, it's been created a number of maps showing inventory and analytic works.

9. RELEASE OF THE DATABASE

In 2014, the database was installed on the IOŚ-PIB server. The access is protected by password and available only in a local network. Currently, data from the database are available free of charge, mainly for scientific purposes (e.g. for IOŚ-PIB employees and students).

10. PLANNED WORKS

- ✓ Further introducing the nature and administrative data to the database (nature reserves of Central and Southern Poland, Natura 2000 areas).
- ✓ IT works:
 - possibility to select information from the database using municipalities and counties,
 - ability to print **selected** information on protected areas,
 - to add information about location of selected object in the forest inspectorate,
 - to add information about data sources,
 - to correct the layout of nature/landscape areas and documentary positions,
 - to connect graphic and descriptive database,
 - to add a map of selected areas.

- ✓ The database will be placed on the IOŚ-PIB website and, in a simplified version, available for a wide range of users.

11. CONCLUSIONS

1. 'Protected areas in Poland' database is unique in terms of both data resources and technical capabilities. Large amount of natural and administrative data, introduced in 2014, enables to carry out reliable analysis on the following protected areas: 23 national parks, 122 landscape parks, 13 Ramsar sites and 550 nature reserves in northern Poland (provinces: zachodniopomorskie, pomorskie, warmińsko-mazurskie, podlaskie, kujawsko-pomorskie).
2. The database should be constantly updated and supplemented.
3. The software used to operate the database enables to generate and print reports of predetermined range of information. It is an important source of information and provides opportunities to conduct researches on protected areas, from the point of view of their quantity and structure, as well as dynamics of changes over the decades.
4. The detailed and reliable descriptions of the natural protected areas are compatible with knowledge that has been gathered in BO department, as a result of many years of researches (sources: IOŚ -PIB publications on protected areas in Poland).
5. A huge amount of data and technical capabilities of supporting application make 'Protected areas in Poland' database unique, compared to other available records, even those considered to be referential.
6. Owing to the very large amount of information, maintaining and updating the database is very labour intensive.
7. The database is an important tool for environmental education – in 2014, a lot of information on protected areas has been granted mainly to students writing master's thesis.

REFERENCES AND LEGAL ACTS

Dyrektywa Rady 92/43/EEG z dnia 21 maja 1992 r. w sprawie ochrony siedlisk przyrodniczych oraz dzikiej fauny i flory. Załącznik I i II. (Dz.U. UE.L. 1992 Nr 206, poz. 7).

Konwencja Ramsarska o obszarach wodno-błotnych mających znaczenie międzynarodowe, zwłaszcza jako środowisko życiowe ptactwa wodnego, podpisana w Ramsarze 2 lutego 1971r. (Dz.U. 1978 nr 7 poz. 24).

RAKOWSKI G., SMOGORZEWSKA M., JANCZEWSKA A., WÓJCIK J., WALCZAK M., PISARSKI Z. 2002. Parki krajobrazowe w Polsce. IOŚ, Warszawa.

RAKOWSKI G., WALCZAK M., SMOGORZEWSKA M. 2013. Obszary Natura 2000 w Polsce III. Specjalne obszary ochrony siedlisk w Polsce Południowej. IOŚ-PIB, Warszawa.

RAKOWSKI G., WALCZAK M., SMOGORZEWSKA M. 2010. Obszary Natura 2000 w Polsce I. Obszary specjalnej ochrony ptaków. IOŚ-PIB, Warszawa.

RAKOWSKI G., WALCZAK M., SMOGORZEWSKA M. 2009. Parki narodowe w Polsce. IOŚ, Warszawa.

RAKOWSKI G., WALCZAK M., SMOGORZEWSKA M. 2006. Rezerваты przyrody w Polsce Środkowej. IOŚ, Warszawa.

RAKOWSKI G., WÓJCIK J., WALCZAK M., SMOGORZEWSKA M., BRODOWSKA M. 2005. Rezerваты przyrody w Polsce Północnej. IOŚ, Warszawa.

SIENKIEWICZ J., KLOSS M., WALCZAK M. 2000: Propozycja objęcia ochroną nowych obszarów wodno-błotnych w ramach Konwencji Ramsarskiej. Część I. Ostoje z siedliskami torfowiskowymi. Ochrona Środowiska i Zasobów Naturalnych, nr 19: 75-88.

SIENKIEWICZ J., WALCZAK M., SMOGORZEWSKA M. 2008. Ramsar sites in Poland. IOŚ, Warszawa.

Ustawa z dnia 16.04.2004 r. o ochronie przyrody (Dz. U. 2004 nr 92, poz. 880 z późniejszymi zmianami).

WALCZAK M. 2013: Update and modernisation of the descriptive and graphic databases of protected areas in Poland, ENVIRONMENTAL PROTECTION AND NATURAL RESOURCES 2013, VOL. 24, NO 4(58): 55-58.

WALCZAK M. 2012. Możliwości wykorzystania bazy danych do badań nad zmianami sieci obszarów chronionych w Polsce. *Ochrona Środowiska i Zasobów Naturalnych*, IEP-NRI, Warszawa. Nr 54: 261-272 (Possibility of using databases on protected areas for studies on changes in protected area networks in Poland).

WALCZAK M. 2011: Baza danych „Obszary chronione w Polsce” możliwości wykorzystania zawartych w niej informacji. *Ochrona Środowiska i Zasobów Naturalnych*, 2011, nr 47, s.163-172(The database “Protected areas in Poland”, the possibilities of using the information contained.).

WALCZAK M., RADZIEJOWSKI J., GACKA-GRZESIKIEWICZ E., SMOGORZEWSKA M., SIENKIEWICZ J., Pisarski Z. 2001. *Obszary chronione w Polsce*. Wyd. III. IOŚ, Warszawa.

INTERNET SOURCES

<http://crfop.gdos.gov.pl/CRFOP/>

<http://geoserwis.gdos.gov.pl/mapy/>