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Threats to biodiversity in Natura 2000 sites on the example of the Region of Warmia and Mazury

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Abstract

The article describes threats to habitat and species conservation areas in the Region of Warmia and Mazury, which are part of the Natura 2000 network. Standard Data Forms were analysed to reveal the presence of the highest level threats in two-thirds of the evaluated sites. Most of the identified threats were associated with forest management, agriculture and hydrological conditions.

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1. INTRODUCTION

The Habitats Directive of 1992 forms the cornerstone of Europe's natural conservation policy and establishes an EU-wide ecological network of protected habitats and species [Winkel et al., 2015]. However, time has shown that the creation of the Natura 2000 network alone does not solve all problems. The first report on the conservation of habitats and species, published by the European Commission on 13 July 2009, revealed that only a small proportion of vulnerable habitats had achieved good conservation status. At the level of biogeographic regions, the conservation status of nearly 65% of 701 analysed habitats indicated in Annex I to the Habitats Directive was evaluated as unfavourable. Similar results were noted with regard to species conservation. A total of 2240 assessments of species conservation status were carried out in the European Union, and only 17% of the assessments were evaluated as favourable, 52% as unfavourable, whereas 31% were classed as unknown [Report from the Commission ..., 2009].

These findings can be attributed to several factors, including insufficient focus on the contradictory goals of nature conservation and economic growth, and the implementation of protection programs that are limited to conservation measures only [Piąty Krajowy Raport ...,

2014]. According to Hochkirch et al. [2013], despite the indisputable achievements of the Habitats Directive and the Birds Directive in the European Union, the process of implementing the relevant legal acts should be modified. In the authors' opinion, the legislators should:

- focus on sites with the highest natural value
- develop strategic plans for the conservation of the most vulnerable species
- improve the monitoring system that focuses on changes in the population size of priority species
- allocate more funds to education to raise public awareness of the need for biodiversity preservation.

2. MATERIALS AND METHODS

The Region of Warmia and Mazury is situated in the macroregions of the Masurian Lake District, Old Prussian Lowland and the Lithuanian Lake District. Warmia and Mazury is one of the most naturally valuable Polish regions. Protected areas, including nature reserves (111 sites), landscape parks (6) and protected landscape areas (69), span nearly 47% of the region's territory [Program

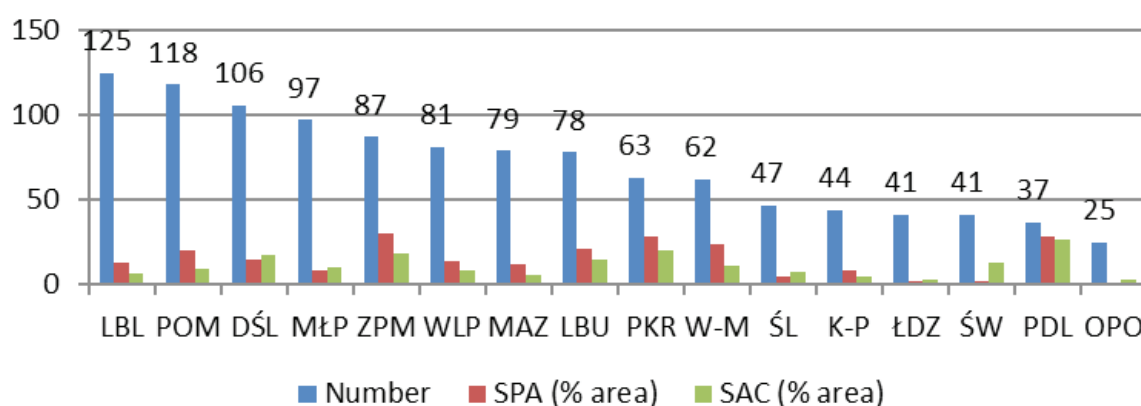


Figure 1. Number and area of Natura 2000 sites in Polish regions (LBL - lubelskie, POM - pomorskie, DŚL - dolnośląskie, MŁP - małopolskie, ZPM - zachodniopomorskie, WLP - wielkopolskie, MAZ - mazowieckie, LBU - lubuskie, PKR - podkarpackie, W-M - warmińsko-mazurskie, ŚL - śląskie, K-P - kujawsko-pomorskie, ŁDZ - łódzkie, ŚW - świętokrzyskie, PDL - podlaskie, OPO - opolskie)

Source: Own elaboration based on Central Statistical Office data (Ochrona Środowiska 2015)

ochrony środowiska ..., 2016]. Warmia and Mazury has been included in the Nature 2000 network as an area of outstanding natural value in Poland and the European Union.

The aim of this study was to analyse factors that exert a negative influence on the biological diversity of Natura 2000 sites in the Region of Warmia and Mazury. Standard Data Forms (SDF) relating to all sites in the evaluated region were analysed. In SDF, the relative importance of a threat or pressure is ranked in three categories: high (H), medium (M) and low (L). This paper focuses only on threats of high importance, which directly or immediately influence and/or act over large areas [Instrukcja wypełniania ..., 2012].

3. RESULTS AND DISCUSSION

The Natura 2000 network has been established to protect the most seriously threatened habitats and species in Europe. Natura 2000 sites have been designated under two key documents: the Birds Directive (Council Directive 2009/147/EC on the conservation of wild birds) and the Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora). Upon its accession to the European Union, Poland undertook to designate natural areas that should be included in the Natura 2000 network and to develop a legal framework for protecting those areas. At present, Natura 2000 sites occupy nearly one-fifth of Poland's land area, including 849 Special Areas of Conservation (SAC) and 145 Special Protection Areas (SPA).

In the Region of Warmia and Mazury, the Natura 2000 network features 60 sites, including 44 SAC and 16 SPA. In the analysed region, Natura 2000 spans an area of 664,990 ha (27.6% of the region's area), and in this respect, Warmia and Mazury ranks 10th in Poland. In 2015, SPA

occupied an area of 575,809 ha (23.8%) and SAC – 258,190 ha (10.7%) (Fig. 1) [Ochrona Środowiska GUS, 2016]. The largest SPA in the Region of Warmia and Mazury is Puszcza Piska PLH280008 with an area of 172,802.2 ha (including 169,101.30 ha in Warmia and Mazury), and the smallest SPA is Jezioro Łukajno PLB 280003 with an area of 1380.2 ha. The largest SAC is Ostoja Piska PLH280048 with an area of 57,826.61 ha, and smallest SAC is Torfowiska Źródłiskowe near Łabędzka PLH280047 with an area of only 26.95 ha. The sites included in the pan-European Natura 2000 network are characterized by various land-use intensity. The aim of Natura 2000 is not only to protect naturally valuable areas, but also to promote their sustainable development [Bołtomiuk, 2010]. Every Natura 2000 site is characterized by specific features which, to a varied extent, exert a negative impact on the protected natural resources. The threats identified in Natura 2000 sites include all adverse factors that lead to changes in the desirable natural status of habitats and species. These negative impacts can lead to:

- complete habitat loss
- decrease in habitat size
- degradation or fragmentation of habitats
- loss or deterioration of species characteristic of a given habitat and, consequently, habitat degradation.

The identified threats can also lead to a complete loss of or significant decrease in the populations of selected species [Jacki, 2015, Zawadzka et al., 2013].

Threats of high importance (H) were not identified in only 21 of 60 Natura 2000 sites in the Region of Warmia and Mazury. In the remaining sites, 1 to 6 threats were detected. The most extreme case is Ostoja Północnomazurska PLH280045 in the counties of Giżycko and Węgorzewo, where 7 important threats (agriculture, forestry, urbanization, recreation, pollution, ecosystem

Table 1. Number of threats identified in Natura 2000 sites in the Region of Warmia and Mazury.

Number of threats	Natura 2000 sites
7	Ostoja Północnomazurska PLH280045,
6	Jezioro Woszczelskie PLH280034, Zalew Wiślany i Mierzeja Wiślana PLH280007
5	Budwity PLH280010, Ostoja Piska PLH280048,
4	Dolina Drwęcy PLH280001, Doliny Omulwi i Płodownicy PLB140005, Jezioro Wukśniki PLH280036, Ostoja Napiwodzko-Ramucka PLH280048, Puszcza Piska PLH280008, Swajnie PLH280046, Torfowiska źródliskowe koło Łabędnika PLH280047, Warmińskie Buczyny PLH280033
3	Dolina Pasłęki PLB280002, Grążwa PLH280011, Jonkowo-Warkały PLH280009, Kaszuny PLH280040, Mazurska Ostoja Żółwia Baranowo PLH280036, Ostoja Lidzbarska PLH280012, Ostoja Radomno PLH280035, Ostoja Warmińska PLH280015
2	Mazurskie Bagna PLH280054, Rzeką Pasłęka PLH280006, Uroczysko Markowo PLH280032
1	Aleje Pojezierza Iławskiego PLH280051, Bieńkowo PLH280009, Dolina Kakaju PLH280036, Doliny Erozyjne Wysoczyzny Elbląskiej PLH280030, Jezioro Długie, Lasy Iławskie PLH280005, Mokradła Kolneńskie i Kurpiowskie PLH200020, Murawy koło Pasłęki PLH280041, Murawy na Pojezierzu Elckim PLH280041, Niecka Skalska PLH280049, Ostoja Borecka PLH280016, Ostoja Dylewskie Wzgórza PLH280043, Ostoja Iławska PLH280053, Ostoja nad Oświnem PLH280044, Ostoja Welska PLH280014, Puszcza Romincka PLH280005
0	Gierłoż PLH280002, Jezioro Dobskie PLB280012, Jezioro Drużno PLB280013, Jezioro Karaś PLH280003, Jezioro Łuknajno PLB280003, Jezioro Oświn i okolice PLH280004, Lasy Skalskie PLH280011, Mamerki PLH280004, Niedźwiedzie Wielkie PLH280050, Ostoja Poligon Orzysz PLB280014, Przełomowa dolina rzeki Wel PLH280015, Puszcza Borecka PLH280006, Puszcza Napiwodzko-Ramucka PLH280048, Torfowisko Zocie PLH280037, Zalew Wiślany PLH280007

Source: own elaboration based on Standard Data Forms (<http://natura2000.gdos.gov.pl/datafiles>)

modification, biotic and abiotic natural processes) were identified (Table 1).

Forests occupy an area of 787,900 ha in Warmia and Mazury (31.2% of the region's territory), of which 43% is protected under the Natura 2000 network. Therefore, the majority of threats in Natura 2000 sites in the evaluated region are associated with forest management (Fig. 2). Such threats were identified in 23 of 60 sites (Aleje Pojezierza Iławskiego PLH280051, Budwity PLH280010, Dolina Kakaju PLH280036, Doliny Erozyjne Wysoczyzny Elbląskiej PLH280030, Doliny Omulwi i Płodownicy PLB140005, Gązwa PLH280011, Kaszuny PLH280040, Mokradła Kolneńskie i Kurpiowskie PLH200020, Niecka Skalska PLH280049, Niedźwiedzie Wielkie PLH280050, Ostoja Borecka PLH280016, Ostoja Iławska PLH280053, Ostoja Lidzbarska PLH280012, Ostoja Napiwodzko-Ramucka PLH280048, Ostoja Piska PLH280048, Ostoja Północnomazurska PLH280045, Ostoja Radomno PLH280035, Ostoja Warmińska PLH280015, Puszcza Romincka PLH280005, Rzeką Pasłęka PLH280006, Uroczysko Markowo PLH280032, Warmińskie Buczyny PLH280033, Zalew Wiślany i Mierzeja Wiślana PLH280007). In Poland, Natura 2000 covers both natural forests and near-natural commercial forests. Production is not banned in forests that are Natura 2000 sites, but all economic activities have to be adapted to the unique requirements of the protected species and habitats [Natura 2000, a ochrona lasów 2012]. In natural habitats, protective measures

should aim to maintain the existing variations in the age structure, spatial structure and species composition of forest stands [Hołdyński et al., 2014].

In theory, habitat conservation should not pose an excessive challenge for forest administrators, and it should not significantly restrict forest production activities. Certain limitations could apply to priority habitats that occupy very small areas in the Polish forests and for that reason alone, should receive special protection [Lesiński et al., 2009]. However, a certain paradox exists in forestry. One of the aims of forest management is to raise public awareness about the importance of environmental protection and to promote multi-functional use of forest resources. At the same time, forestry is an important sector of the national economy, and all factors that jeopardize the achievement of the highest possible profit have to be effectively addressed [Machoń, 2013].

The threats to Natura 2000 forest sites involve:

- unintentional damage to habitats resulting from forest management and protection,
- changes resulting from the planting of species that overshadow heliophilous plants or sudden exposure to sunlight due to tree felling,
- development projects, drainage and elimination of wetland biotopes, anthropogenic pressure resulting from public access to forests [Dubel et al. 2013].

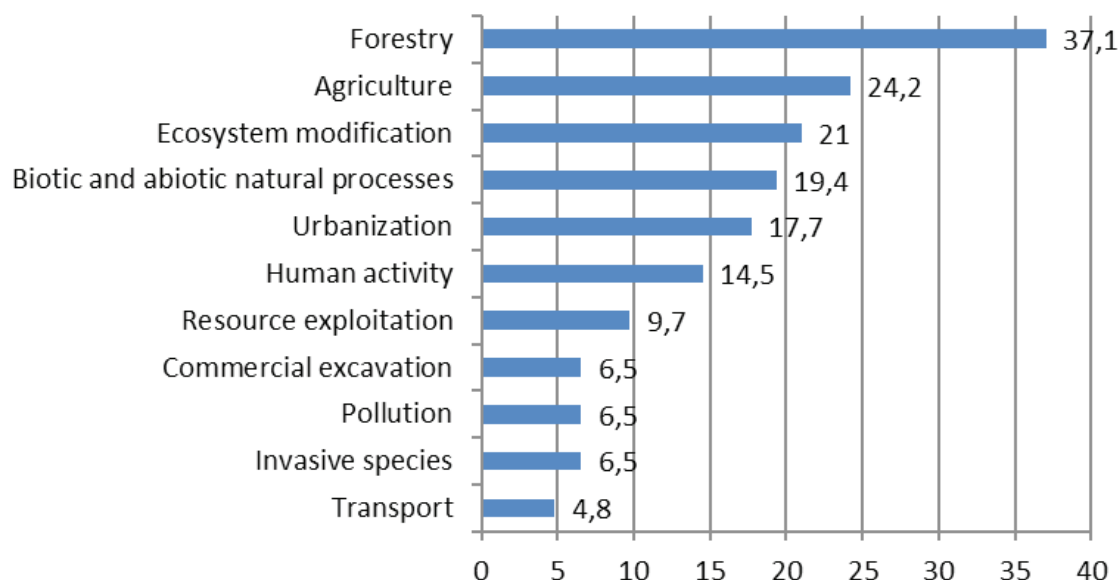


Figure 2. Threats identified in Natura 2000 sites in the Region of Warmia and Mazury (%).

Source: own elaboration based on Standard Data Forms (<http://natura2000.gdos.gov.pl/datafiles>).

An analysis of SDF revealed that the most serious threats resulting from forest management in Warmia and Mazury include:

- forest management and tree planting
- elimination of dead and dying trees
- timber production without reforestation or natural regrowth.

The afforestation of low quality farmland zoned for non-agricultural use also poses a significant problem, in particular with regard to bird protection in meadow habitats. The resulting threat contributes to the loss or significant elimination of avifauna in meadows and marshes [Kędziora and Karg 2010, Sikora 2007, Zębek and Truszkowski 2015, Dubel et al. 2013, Ptaki łąk i mokradeł Polski ... 1998]. Agriculture also poses a considerable threat, and it is responsible for nearly a quarter of all adverse events reported in 15 Natura 2000 sites in Warmia and Mazury (Fig. 3). In the analysed region, farmland occupies an area of 994,600 ha (more than 54% of total area), of which 98.8% is suitable for agriculture; therefore, it is used for crop production to a varied extent [Rolnictwo w Województwie Warmińsko-Mazurskim ... 2016].

In Warmia and Mazury, the main threats posed by agriculture in Natura 2000 sites include:

- changes in production technology
- mowing and grazing
- livestock production (farming)
- the use of biocides, hormones and chemical substances
- the use of artificial fertilizers
- farm restructuring.

The above factors pose a threat for habitats and species in the 23 Natura 2000 sites in the region (Dolina Omulwi i Płodownicy PLB140005, Jezioro Wukśniki PLH280036, Jonkowo-Warkały PLH280009, Mazurska Ostoja Żółwia Baranowo PLH280036, Mazurskie Bagna PLH280054, Murawy koło Pasłęki PLH280041, Murawy na Pojezierzu Elckim PLH280041, Ostoja Dylewskie Wzgórza PLH280043, Ostoja Lidzbarska PLH280012, Ostoja Północnomazurska PLH280045, Ostoja Warmińska PLH280015, Puszcza Piska PLH280008).

According to Lickiewicz [2011] and Pawalczyk and Jermaczek [2004], the abandonment of traditional, extensive farming practices and the use of agricultural land for non-farming purposes pose the greatest threats to the Natura 2000 network. Intensive farming involves the sowing of high-yielding grasses in grasslands, and the use of plant protection agents and fertilizers. Farmland abandonment leads to secondary succession and the loss of valuable open areas.

Ecosystem modification constitutes the third most important threat to vulnerable habitats and species in Natura 2000 sites. The relevant activities mainly involve changes in hydrological conditions resulting from river regulation and engineering, construction of flood banks and polders, sewage discharge, fish ponds, water uptake and stream bed renaturalization [Kowalczak et al. 2009]. In Warmia and Mazury, threats resulting from ecosystem modification and changes in hydrological conditions have been identified in 16 sites (Bieńkowo PLH280009, Budwity PLH280010, Dolina Drwęcy PLH280001, Dolina Pasłęki PLB280002, Doliny Erozyjne Wysoczyzny Elbląskiej PLH280030, Doliny Omulwi i Płodownicy PLB140005, Gązwa PLH280011, Jezioro Woszczelskie

PLH280034, Jezioro Wukśniki PLH280036, Jonkowo-Warkały PLH280009, Mazurskie Bagna PLH280054, Ostoja Północnomazurska PLH280045, Puszcza Piska PLH280008, Zalew Wiślany and Mierzeja Wiślana PLH280007).

The remaining types of threats are less severe, and they have been identified in fewer sites. They include:

- biotic and abiotic natural processes (biocenotic evolution, succession, hybridization, lower fertility, suppressed gene expression) (Budwity PLH280010, Gązwa PLH280011, Jezioro Długie PLH280030, Jezioro Woszczelskie PLH280034, Jezioro Wukśniki PLH280036, Ostoja Lidzbarska PLH280012, Ostoja Piska PLH280048, Ostoja Północnomazurska PLH280045, Ostoja Radomno PLH280035, Ostoja Warmińska PLH280015, Ostoja Welska PLH280014, Swajnie PLH280046, Zalew Wiślany and Mierzeja Wiślana PLH280007)
- urbanization (residential areas, generation of waste and sewage, other types of human activity associated with urbanization, industrial production) (Dolina Drwęcy PLH280001, Dolina Pasłęki PLB280002, Doliny Omulwi i Płodownicy PLB140005, Jezioro Woszczelskie PLH280034, Mazurska Ostoja Żółwia Baranowo PLH280036, Ostoja Napiwodzko-Ramucka PLH280048, Ostoja Piska PLH280048, Ostoja Północnomazurska PLH280045, Ostoja Radomno PLH280035, Puszcza Piska PLH280008, Warmińskie Buczyny PLH280033)
- human activity (sports, outdoor recreation, sports and recreational facilities, other types of human activity) (Jezioro Woszczelskie PLH280034, Jezioro Wukśniki PLH280036, Mazurska Ostoja Żółwia Baranowo PLH280036, Ostoja Napiwodzko-Ramucka PLH280048, Ostoja Piska PLH280048, Puszcza Piska PLH280008, Zalew Wiślany and Mierzeja Wiślana PLH280007)
- resource exploitation outside agriculture and forestry (marine and freshwater aquaculture, fisheries, hunting and harvest of wild animals) (Dolina Drwęcy PLH280001, Jezioro Woszczelskie PLH280034,

Ostoj nad Oświnem, Ostoja Napiwodzko-Ramucka PLH280048, Ostoja Piska PLH280048, Swajnie PLH280046)

- invasive species (Budwity PLH280010, Kaszyny PLH280040, Swajnie PLH280046, Warmińskie Buczyny PLH280033)
- pollution (surface and ground water pollution, air pollution, soil pollution, solid waste, excluding sewage dumping) (Jezioro Wukśniki PLH280036, Jonkowo-Warkały PLH280009, Ostoja Północnomazurska PLH280045, Warmińskie Buczyny PLH280033)
- commercial excavation (sand, gravel, peat) (Budwity PLH280010, Kaszyny PLH280040, Ostoja Warmińska PLH280015, Zalew Wiślany and Mierzeja Wiślana PLH280007).

4. CONCLUSIONS

An analysis of Standard Data Forms for Natura 2000 sites in the Region of Warmia and Mazury revealed a number of factors that pose or could pose a threat to vulnerable habitats and species. However, it should be noted that the information presented in SDF does not paint a comprehensive picture of the relevant risks. Conservation plans that create a framework for the protection of Natura 2000 sites play an important role. To date, conservation plans have been developed for only 37 of 60 sites in Warmia Mazury. Bearing in mind that Natura 2000 sites had been designated in 2009, this is not an impressive result. Other problems stem from the contradictory goals of nature conservation and business activities. These issues are poorly addressed by SDF, and their importance should be duly recognized, in particular in areas subjected to strong anthropogenic pressures, such as forestry, agriculture and tourism.

There is no doubt that the Natura 2000 network contributes to the preservation of biological diversity in Warmia and Mazury. However, the offered protection may prove to be insufficient in the foreseeable future.

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