

NATURAL ATTRACTIVENESS OF „ŁĄKI PYZDERSKIE” AREA

Summary

The aim of the research was to present a floristic and phytosociological assessment of „Łąki Pyzderskie” complex in terms of its natural and touristic attractiveness as well as the determination of existing and potential risks for the flora of this area. The research was conducted in the years 2012-2016. Natural values of grassland and pasture communities which influenced their touristic attractiveness were defined on the basis of a complex analysis of 226 phytosociological relevés completed with Braun-Blanquet's method in representative areas of 50 m². The results show that natural values of this area are determined by: geomorphology of the area i.e. small dry hills and basins; presence of halophile communities, especially with *Glaux maritima*, *Triglochin maritima*, *Samolus valerandi*; floral diversity visible in the richness of phytocenoses (30 communities from 5 phytosociological classes), richness in species (a total number of 233 observed species including 16 endangered and protected, inter alia: *Samolus valerandi*, *Glaux maritima*, *Epipactis palustris*, *Orchis palustris*, *Dactylorhiza maculata*, *Triglochin maritima*, *Tetragonolobus maritimus*), domination of native species, presence of numerous (89) melliferous plants, presence of 55 species with medicinal/herbal properties and 28 poisonous ones.

Key words: diversity of meadow communities, protected plant species, halophytes

PRZYRODNICZA ATRAKCYJNOŚĆ „ŁĄK PYZDERSKICH”

Streszczenie

Celem prowadzonych badań była ocena florystyczno-fitosocjologiczna kompleksu Łąk Pyzderskich w kontekście atrakcyjności przyrodniczo-turystycznej oraz określenie istniejących i potencjalnych zagrożeń dla szaty roślinnej tego terenu. Badania prowadzono w latach 2012-2016. W walory przyrodnicze zbiorowisk łąkowo-pastwiskowych wpływające na ich atrakcyjność turystyczną określono na podstawie wielokierunkowej analizy 226 zdjęć fitosocjologicznych wykonanych metodą Braun-Blanqueta, na reprezentatywnych powierzchniach wielkości 50 m². Uzyskane wyniki wskazują, że o walorach przyrodniczych badanego terenu decydują: geomorfologia terenu, tj. niewielkie przesychnające wyniesienia oraz nieckowate zagłębienia; występowanie zbiorowisk halofilnych, szczególnie z udziałem *Glaux maritima*, *Triglochin maritima*, *Samolus valerandi*; różnorodność florystyczna wyrażona bogactwem fitocenozy (30 zbiorowisk z 5 klas fitosocjologicznych), bogactwem gatunkowym (łącznie zanotowano ponad 233 gatunki, w tym 16 zagrożonych objętych ochroną m.in.: *Samolus valerandi*, *Glaux maritima*, *Epipactis palustris*, *Orchis palustris*, *Dactylorhiza maculata*, *Triglochin maritima*, *Tetragonolobus maritimus*), dominacją gatunków rodzimych, obecnością licznych (89) gatunków miododajnych, obecnością 55 gatunków o właściwościach leczniczych/zielarskich i 28 trujących.

Słowa kluczowe: różnorodność zbiorowisk łąkowych, gatunki chronione, halofity

1. Introduction

Attractiveness of grasslands may be considered in various aspects: from their feed suitability, through their usability attractiveness connected with obtaining herbal resources, nectar, variability of habitats and species (typically natural aspects), to their landscape attractiveness, which is gaining value [2]. Currently, when grasslands are being more and more often extensified, attention is paid mainly to their natural and landscape values. It is a species composition of meadow green growth that may make a region more attractive [1].

In Wielkopolska, „Łąki Pyzderskie” complex of ca. 300 ha is unique due to significant diversity of species and presence of well-known salty springs [16], which determine the development of saline plants. It is located at the right bank of Warta River within 5 km in the south-east from Pyzdry. There are few saline areas in Poland. They are located at the seaside and in the central Poland. They are all unique due to their plant cover [6] and therefore protected within *Nature 2000* program [14]. It is being observed that saline areas are shrinking, mainly due to the limitations in their agricultural usage and to the fact that there are being over-

grown by such expansive species as *Phragmites australis* or *Calamagrostis canescens*, which results in irreversible changes in a floral composition of the green growth which becomes poorer in halophile species [6]. Results, in such extensive use of the meadows, „Łąki Pyzderskie” complex, which was well known for its significant variability of plant species, gradually becomes poorer in natural and landscape values, which are important for education and ecotourism.

The aim of the research was to present a floristic and phytosociological assessment of „Łąki Pyzderskie” complex in terms of their natural and touristic attractiveness, and determination of the existing and potential threats for the flora of this region.

2. Materials and methods

An assessment of floristic and phytosociological attractiveness of „Łąki Pyzderskie” complex was conducted on the basis of 226 phytosociological relevés made with Braun-Blanquet's method [3] in the years 2012-2016. In order to complete the assessment, analyses of the following aspects were conducted:

- richness in species,

- determination of syntaxons and their classification into a phytosociological system [12],
- non-feed value of the green growth i.e. presence of protected species [19], halophytes, [18], medicinal/herbal and poisonous plants [17] and melliferous plants [10].

In order to characterize habitats, their moisture and salinity were determined phytoindically as main factors which influence the differentiation of flora of „Łąki Pyzderskie” complex. Furthermore, the area has been assessed in terms of its usefulness for tourism with Mahon’s and Miller’s method [11]. In order to do it, it was divided into 100x100 m squares (122 fields). In every field, a synthesis of the following indexes was conducted (on the basis of phytosociological relevés): area coverage, presence of protected species, presence of trees, index of synanthropization, index of resistance to recreational use, presence of herbs and esthetical properties of the community, which has been presented in a map made with ArcGIS 10.2.

3. Results and discussion

„Łąki Pyzderskie” complex is very diverse in terms of habitat and usage. Ground water level fluctuates and there are saline deposits where various habitats have been developed. 30 plant communities from 5 phytosociological classes have been observed there (Table 1): *Phragmitetea* (13), *Asteretea trifolium* (1), *Scheuchzerio-Caricetea nigrae* (3), *Molinio-Arrhenatheretea* (11) and *Nardo-Callunetea* (2). The largest areas are covered by the following communities located in depressions: *Caricetum gracilis*, *Eleocharitetum palustris* and *Phragmitetum australis* from *Phragmitetea* class, communities from habitats with variable moisturization from *Molinietalia* such as *Molinietum caeruleae* and *Deschampsia caespitosa* community, as well as phytocenoses of *Carex nigra* from *Scheuchzerio-Caricetea nigrae* class. However, what is most valuable due to the presence of saline springs, is the area covered with the flora from *Asteretea trifolium* class. It is in the areas where salty waters effuse, that groups of halophile communities such as *Triglochino-Glaucetum maritimae* and *Potentillo-Festucetum arundinaceae* developed. These communities are rich in numerous valuable halophytes which are more and more endangered due to the lack of utilization (especially of pastures) and which is necessary for the maintenance of halophile flora, according to Nienartowicz and Piernik [13]. In elevated areas, there are groups of meadows with numerous blooming, herbal and melliferous species (meadows with *Holcus lanatus*, *Poa pratensis-Festuca rubra* community, phytocenoses of *Anthoxanthum odoratum* and *Nardus stricta*). What is worrying is the fact that *Phragmites australis* is very expansive and enters in sward of most of the communities. It is mainly connected with significant limitations of grassland utilization of the complex – especially with the lack of mowing. This unprofitable aspect was mentioned even by Piernik et al [15] during the research on the utilization of halophile communities. The expansion of *Phragmites australis*, especially into halophile communities and purple moor grass meadows, leads to the displacement of valuable species connected with these habitats and monotonization of „Łąki Pyzderskie” landscape, and grassland complexes in other regions in the country [6].

Determinant of natural quality of „Łąki Pyzderskie” complex is related to the richness of species, share of halo-

phytes in the green growth communities, presence of protected species and of species with therapeutical properties, and melliferous plants. Due to their specialty, halophytes are sensitive to the transformations of habitat conditions, especially to changes in moisturization (drying) and competition of other species which follow the limitation of utilization. In the complex of „Łąki Pyzderskie”, among 233 species, 87 halophytes were observed including 7 obligatory ones (Table 1), inter alia frequently observed *Glaux maritima*, *Puccinellia dystans*, *Festuca arundinacea*, *Bulboschoenus maritimus*, *Carex dystans*. They were most popular in the groups of *Triglochino-Glaucetum maritimae* (6) phytocenoses. The listed species were also accompanied by *Samolus valerandi* whose presence in this area had first been observed in 2003 [5].

Natural attractiveness is also determined by the number of protected species. 16 such species were observed there including 5 under total protection (the rest was under partial protection). Most of them was localized in the green growth of *Molinietum caeruleae* community (9) and also in *Triglochino-Glaucetum maritimae* (7), *Carex nigra* (7), as well as in the communities of *Holcus lanatus* and *Deschampsia caespitosa* (5 in each). There was one of the largest populations of *Orchis palustris* in the country. During the research, as many as 6 protected species from *Orchidaceae* family were observed there (*Dactylorhiza incarnata*, *D. maculata*, *D. majalis*, *Epipactis helleborine*, *E. palustris*, *Platanthera biflora*), while only 3 were found by Brzeg [4] almost 20 years ago.

Meadows are also rich in blooming melliferous species. Their presence in the sward of a meadow allows for their utilization as nectar feed which provides one of the most valuable types of honey [9, 8]. The most useful in this aspect are the communities of *Molinietum caeruleae* (45), from *Deschampsia caespitosa* (43), from *Holcus lanatus* (39), *Poa pratensis-Festuca rubra* (36), from *Anthoxanthum odoratum* (36) from *Molinio-Arrhenatheretea* class (Table 1). Due to the presence of herbs, they are referred to as “a natural pharmacy”. Due to the highest content of herbal species, a phytocenoses of *Molinietum caeruleae* (27) in the most attractive; and community with *Holcus lanatus* (24) and with *Carex nigra* (23 species) are almost as proliferous as *Molinietum caeruleae*.

Such significant diversification of phytocenoses results in the variability of habitats and is presented in moisture [F] and salinity [S] figures (Fig. 1).

The highest moisture is observed in *Phragmitetum* community, as well as in *Phalaridetum arundinaceae* phytocenoses and groups from *Poa palustris* (c.a. F=9). Habitats – communities which are least moisturized are *Anthoxanthum odoratum*, *Poa pratensis – Festuca rubra* and from *Festuca pratensis*. According to a salination index, apart from *Triglochino-Glaucetum maritimae* (S=5,94) halophile species also enter the green growth of other communities such as *Agrostis stolonifera-Potentilla anserina* (S=3,13), *Phalaridetum arundinaceae* (2,56) and *Eleocharitetum palustris* (2,35).

Results of natural and touristic valorization conducted on the basis of a synthesis of bonitation indexes obtained in the analysis of phytosociological relevés show that the complex is diverse. Areas which were the most suitable for ecotourism, were the ones localized in the center of the research area (Fig. 2).

Table 1. Natural characteristic of plant communities of the area „Łąki Pyzdarskie”
 Tab. 1. Charakterystyka przyrodnicza zbiorowisk kompleksu „Łąki Pyzdarskie”

Plant community	Number of relevés	Number of plant species- total	Number of plant species	Number of halophytes		Protected species		Medicinal plant species	Toxic plant species	Toxic and medicinal meicalnial species	Melliferous species	
				obligatory	facultative	total protection	partical protection					
Class: <i>Phragmitetea</i> R.Tx. et Prsg 1942												
1.	<i>Eleocharitetum palustris</i>	15	60	6 - 20	5	35	2	2	12	4	1	19
2.	<i>Phragmitetum australis</i>	14	66	5 - 19	2	35	0	3	12	6	3	24
3.	<i>Scirpetum maritimi</i>	3	26	9 - 19	2	19	1	2	5	0	1	9
4.	<i>Oenanthe - Rorripetum</i>	1	16	16	0	10	1	0	2	3	2	5
5.	<i>Caricetum gracilis</i>	19	80	6 - 22	1	42	1	5	16	8	3	28
6.	<i>Caricetum appropinquatae</i>	5	32	8 - 17	0	15	0	1	8	2	2	9
7.	<i>Caricetum ripariae</i>	4	34	5 - 22	0	19	0	2	10	4	3	13
8.	<i>Caricetum acutiformis</i>	3	35	6 - 23	0	17	0	1	9	4	2	12
9.	<i>Caricetum vesicariae</i>	3	38	13 - 17	1	19	1	2	8	4	3	12
10.	<i>Caricetum vulpinae</i>	1	15	15	1	11	0	0	5	0	1	8
11.	<i>Phalaridetum arundinaceae</i>	1	7	7	0	6	0	1	1	1	0	2
12.	Community with <i>Poa palustris</i>	1	12	12	0	6	0	0	2	0	0	3
13.	Community. with <i>Calamagrostis canescens</i>	2	19	12 - 13	0	11	0	0	3	3	2	5
Class: <i>Asteretea tripolium</i> Westh. at Beeft. ap. Beeft 1962												
14.	<i>Triglochino-Glaucetum maritimae</i>	11	49	6 - 19	6	28	3	4	5	4	1	16
Class: <i>Scheuchzerio - Caricetea</i> (Nordh. 1937) R.Tx. 1937												
15.	<i>Caricetum lasiocarpae</i>	4	35	10 - 14	0	23	1	4	6	4	0	13
16.	Community with <i>Carex nigra</i>	20	92	6 - 26	3	42	2	5	23	7	1	34
17.	Community with <i>Pedicularis plustris</i>	4	48	15 - 25	0	25	1	3	17	5	2	24
Class: <i>Molinio - Arrhenatheretea</i> R.Tx. 1937												
18.	Community <i>Agrostis stolonifera - Potentilla anserina</i>	9	48	7 - 18	4	32	1	3	6	2	2	15
19.	<i>Potentillo-Festucetum arundinaceae</i>	2	29	17 - 18	1	18	0	1	10	0	1	15
20.	Community with <i>Juncus conlomeratus</i>	2	19	6 - 16	0	12	0	0	5	3	0	11
21.	<i>Scirpetum sylvatici</i>	2	21	8 - 17	0	13	1	0	5	2	1	8
22.	<i>Alopecuretum pratensis</i>	4	36	12 - 15	0	25	0	1	12	3	1	15
23.	Community with <i>Holcus lanatus</i>	23	96	11 - 25	1	47	1	5	24	6	2	39
24.	<i>Molinietum caeruleae</i>	18	103	9 - 27	2	43	3	6	27	8	1	45
25.	Community <i>Deschampsia cespitosa</i>	15	97	12 - 30	2	45	2	4	22	7	2	43
26.	Community <i>Poa pratensis-Festuca rubra</i>	15	84	13 - 27	2	37	0	3	22	6	1	36
27.	Community with <i>Festuca pratensis</i>	10	62	11 - 25	1	33	0	3	15	3	1	32
28.	Community with <i>Anthoxanthum odoratum</i>	6	58	13 - 27	2	29	1	3	19	4	1	36
Class: <i>Nardo - Callunetea</i> Prsg 1949												
29.	Community with <i>Nardus stricta</i>	8	74	9 - 32	0	32	0	3	20	6	1	31
30.	Community with <i>Calluna vulgaris and Salix sp.</i>	1	14	14	0	2	0	0	6	1	0	4

Source: own elaboration / Źródło: opracowanie własne

Far fewer points were granted to the ones localized nearby building complexes. Significant values of the central part of the complex are conditioned mainly by the presence of various groups of halophile flora and purple moor grass meadows with variable moisturization in small depressions, flower meadows with numerous species from *Arrhenatheretalia* order and communities from *Nardo* –

Callunetea class on sandy hills, which were rich in protected species including halophytes, melliferous species and species used in traditional medicine. Almost 100% of these groups are composed of only native species, which additionally boost their natural value. In some places the landscape is enriched with single trees or small willow thickets.

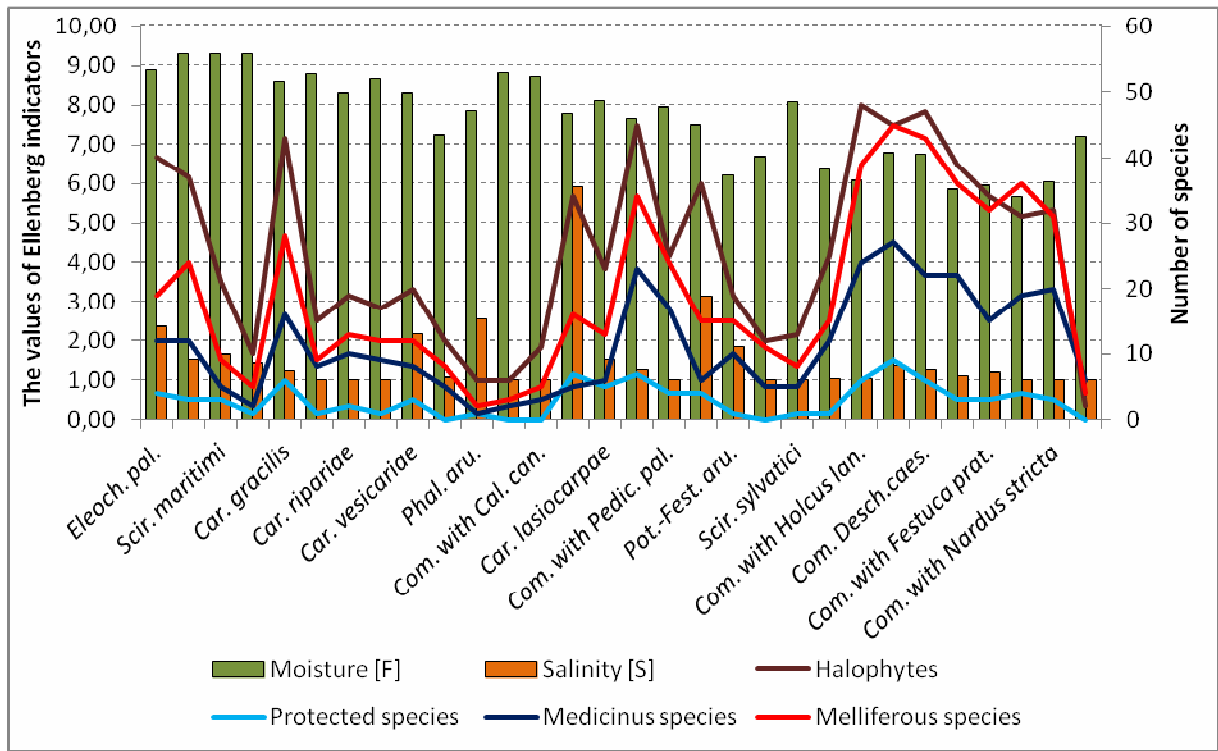


Fig. 1. Groups of species which account for the attractiveness of „Łąki Pyzdurskie” against habitat conditions of phytocenoses (a phytoindication method [7])

Rys. 1. Grupy gatunków świadczące o atrakcyjności „Łąk Pyzdurskich” na tle warunków siedliskowych fitocenoz (metoda fitoindykacji [7])

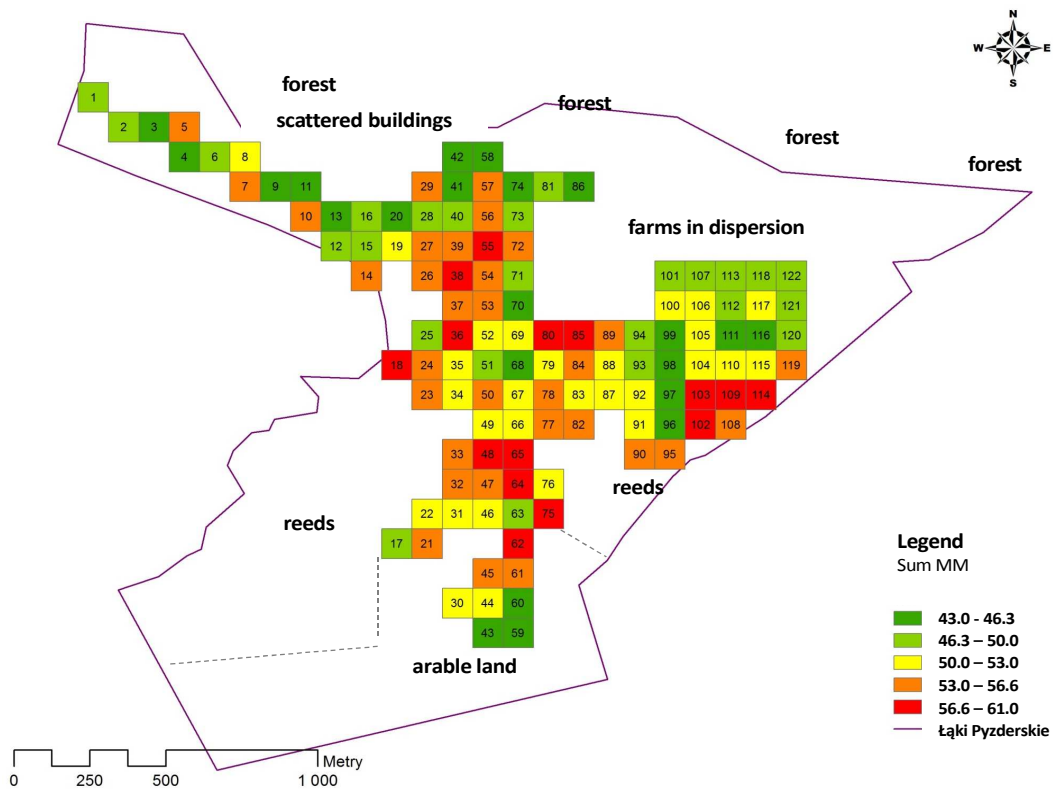


Fig. 2. Results of a natural and tourist valorization (according to Mahon and Miller [11])

Rys. 2. Wyniki waloryzacji przyrodniczo-turystycznej (według Mahona i Millera [11])

4. Conclusions

1. Touristic attractiveness of the researched area is determined by the geomorphology of the area i.e. small dry hills and basins as well as by natural values of the flora of a grassland complex.

2. Touristic attractiveness is influenced by:

- presence of halophile communities, especially the ones with the share of *Glaux maritima*, *Triglochin maritima*, *Samolus valerandi* (protected in the program Nature 2000 as a priority habitat - *1340 inland saline grasslands, pastures and reeds),
- phytosociological diversity – 30 communities from 5 phytosociological classes: *Phragmitetea* (13), *Asteretea trifolium* (1), *Scheuchzerio-Caricetea nigrae* (3), *Molinio-Arrhenatheretea* (11) and *Nardo-Callunetea* (2),
- richness in species of the phytocenoses: 233 species including 16 endangered and protected, inter alia: *Samolus valerandi*, *Glaux maritima*, *Epipactis palustris*, *Orchis palustris*, *Dactylorhiza maculata*, *Triglochin maritima*, *Tetragonolobus maritimus*,
- domination of native species,
- presence of numerous (89) melliferous species, inter alia: *Carduus nutans*, *Calluna vulgaris*, *Cirsium palustre*, *Centaurea cyanus*, *Taraxacum officinale*,
- presence of 55 medicine/herbal species and 28 poisonous species.

3. It is crucial to sustain the natural values of more moisturized and saline areas through the systematic usage as they determine touristic attractiveness of this complex.

5. References

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