

THE IMPORTANCE OF THE „SANTOCKIE ZAKOLE” NATURE RESERVE FOR PRESERVATION OF BIOLOGICAL DIVERSITY AND TOURISM

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Summary. The lower parts of the River Warta and the River Noteć have had a great influence on preservation of biological diversity and tourism and for that reason in 1998 a nature reserve was created, called „Santockie Zakole”. The aim of our research was to identify the fauna of the reserve as well as to present the importance of the natural advantages for the development of tourism and ecological education. The reserve is 454.94 ha large. Its main feature is the landscape as well as flora and birds. There are many old river beds, small ponds, clumps and thickets. In the waters of „Santockie Zakole” one can find 14 kinds of leeches, 38 kinds of molluscs, 6 kinds of *Bryozoa*, 27 kinds of arthropods. Apart from this there are many species of aqueous invertebrates, which belong to different systematic groups. The fact that they can live in these waters indicates how clean the waters are. The area, which we would like to present is also a very precious ecosystem for many species of waterfowl and marshbirds. The village of Santok is worthy of special attention; its origin goes back as far as the 8th century.

Key words: reserve, tourism, species diversity, wildlife conservation.

INTRODUCTION

The Lubuskie Region has 49 nature reserves with the total area of 2917.93 ha. The lower parts of the River Warta and the River Noteć have had a great influence on the preservation of biological diversity and tourism and for that reason nature reserves, called „Slonsk” and „Santockie Zakole” were created there. The „Slonsk” reserve was converted in 2002 into a national park called „Ujście Warty”.

As the importance of valley systems and their edges along rivers has been appreciated for a long time, a suggestion has been made to protect pre-valleys of the River Warta and the River Noteć and their tributaries as ecological corridors [Agapow 2000].

The aim of our research was to recognize the fauna of the old river beds and to examine the beds of the Warta and Noteć, which surround the area, and to find out how important „Santockie Zakole” is for the development of tourism and ecological education.

RESEARCH AREA

The „Santockie Zakole” nature reserve was legally approved on the basis of the decree of the Minister of Environment, Natural Resources and Forestry on the 23rd of December 1998. It is located on a curve of the River Warta, 10 km east of Gorzów Wlkp. The reserve is 454.94 ha large, and an area where business activity is limited to a minimum.

Its main feature is the landscape as well as flora and birds. There are many old river beds, small ponds, clumps and thickets. The most beautiful features are sessile oaks and other kinds of trees, among which there are 220 recognised as natural features of historic importance (including 201 oaks). They grow in the riparian forests as multi-species stands and groups of trees. During the research 177 species of breeding and migratory birds were registered [Majewski and Wiatr 1981, Engel and Mrugasiewicz 1992]. One interesting feature is an old river bed nearby Stare Polichno. It is inhabited by a variety of plants and animals. In spring, after flood waters lower, temporary reservoirs are created, which are a place of living for invertebrates and which provide good conditions for fish and amphibians to develop successfully. On the nature reserve area there is a strong-hold signing about the history of the Santok settlement, whose origin goes to the 8th century. Not only was it a place of strategic significance but it was also an important point on the trade route between Poznań and Szczecin. At the moment, after long-lasting archaeological work, the area of the village is a great attraction for tourists and a reminder of its past glory.

THE RANGE AND METHODS

The research was conducted in 1992 on the area of the then planned reserve and it was repeated in 2002 after the reserve had been created. The field research included listing of water plants and invertebrates. The zoological samples were collected between April and September from the River Warta and the River Noteć as well as from the old river beds. A bucket net was used to take the samples (from dipper and slimy places) as well as plants and things found in the rivers. The collected samples were identified with the use of the following works: Pawłowski [1936], Urbański [1957], Piechocki [1979], Piechocki and Dyduch-Falniowska [1993] and others.

THE RESULTS

The following species of water plants have been recognised:

<i>Hottonia palustris</i> L.	<i>Nymphaea alba</i> L.
<i>Sagittaria sagittifolia</i> L.	<i>Hydrocharis morsus-ranae</i> L.
<i>Phragmites australis</i> Cav.	<i>Lemna minor</i> L.
<i>Phalaris arundinacea</i> L.	<i>Alisma plantago-aquatica</i> L.
<i>Myriophyllum verticillatum</i> L.	<i>Schoenoplectus lacustris</i> L. (Palla)
<i>Batrachium circinatum</i> (Sibth.) Fr.	<i>Butomus umbellatus</i> L.
<i>Potamogeton crispus</i> L.	<i>Sparganium ramosum</i> Huds.
<i>Nuphar lutea</i> L.	<i>Elodea canadensis</i> Rich.

Stagnant waters are inhabited by vascular plants, which are quite well developed. The largest number, as far as species are concerned, grow in an old bed connected the River Warta [Agapow 1975]. The protected species, which one can find there are yellow water lilies and marsh marigolds.

In the waters of „Zakole Santockie” one can find 14 kinds of leeches, 38 kinds of molluscs, 6 kinds of *Bryozoa*, 27 kinds of arthropods. The River Warta, old beds and temporary waters of the reserve are inhabited by the following kinds of species:

Hirudinea:

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| <i>Glossiphonia complanata</i> (Linnaeus, 1758) | <i>Erpobdella nigracollis</i> (Brandes 1900) |
| <i>Glossiphonia concolor</i> (Apáthy, 1888) | <i>Erpobdella octoculata</i> (Linnaeus, 1758) |
| <i>Glossiphonia heteroclita</i> (Linnaeus, 1758) | <i>Erpobdella testacea</i> (Savigny, 1820) |
| <i>Hemiclepsis marginata</i> (O.F. Müller, 1774) | <i>Erpobdella monostriata</i> (Lindenfeld et Pietru- |
| <i>Batrachobdella paludosa</i> (Carena, 1824) | szyński, 1890) (= <i>Erpobdella testacea</i> f. <i>mo-</i> |
| <i>Theromyzon tessulatum</i> (O.F. Müller, 1774) | <i>monostriata</i> Lind. et Pictr., 1890) |
| <i>Helobdella stagnalis</i> (Linnaeus, 1758) | <i>Dina apathyi</i> Gedroyć, 1916 |
| <i>Haemopsis sanguisuga</i> (Linnaeus, 1758) | <i>Dina lineata</i> (O.F. Müller, 1774) |

Mollusca:

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| <i>Theodoxus fluviatilis</i> (Linnaeus, 1758) | <i>Segmentina nitida</i> (O.F. Müller, 1774) |
| <i>Viviparus viviparus</i> (Linnaeus, 1758) | <i>Planorbis corneus</i> (Linnaeus, 1758) |
| <i>Valvata piscinalis</i> (O.F. Müller, 1774) | <i>Succinea putris</i> (Linnaeus, 1758) |
| <i>Valvata naticina</i> Menke, 1845 | <i>Unio crassus</i> (Philipsson, 1788) |
| <i>Bithynia tentaculata</i> (Linnaeus, 1758) | <i>Unio pictorum</i> (Linnaeus, 1758) |
| <i>Lithoglyphus naticoides</i> (C. Pfeiffer, 1828) | <i>Unio tumidus</i> (Philipsson, 1788) |
| <i>Physa fontinalis</i> (Linnaeus, 1758) | <i>Anodonta anatina</i> (Linnaeus, 1758) |
| <i>Lymnaea stagnalis</i> (Linnaeus, 1758) | <i>Anodonta cygnea</i> (Linnaeus, 1758) |
| <i>Lymnaea auricularia</i> (Linnaeus, 1758) | <i>Pseudanodonta complanata</i> (Rossmässler, 1835) |
| <i>Lymnaea peregra</i> (O.F. Müller, 1774) | <i>Sphaerium corneum</i> (Linnaeus, 1758) |
| <i>Lymnaea truncatula</i> (O.F. Müller, 1774) | <i>Sphaerium rivicola</i> (Lamarck, 1818) |
| <i>Lymnaea glutinosa</i> (O.F. Müller, 1774) | <i>Sphaerium solidum</i> (Normand, 1844) |
| <i>Planorbis planorbis</i> (Linnaeus, 1758) | <i>Pisidium amnicum</i> (O.F. Müller, 1774) |
| <i>Anisus vortex</i> (Linnaeus, 1758) | <i>Pisidium casertanum</i> (Poli, 1791) |
| <i>Ilyptentis complanatus</i> (Linnaeus, 1758) | |

Bryozoa

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| <i>Plumatella fruticosa</i> Allman, 1884 | <i>Cristatella mucedo</i> Cuvier, 1798 |
| <i>Plumatella repens</i> (Linnaeus, 1758) | <i>Paludicella articulate</i> (Ehrenberg, 1831) |
| <i>Plumatella fungosa</i> (Pallas, 1768) | <i>Fredericella sultana</i> (Blumenbach, 1779) |

Arthropoda

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| <i>Branchipus schaefferi</i> Fisch. | <i>Orconectes limosus</i> (Raf.) |
| <i>Triops cancriformis</i> L. | <i>Hydrometra</i> sp. |
| <i>Bosmina longirostris</i> (O.F. Müller) | <i>Ranatra linearis</i> L. |
| <i>Daphnia magna</i> L. | <i>Nepa cinerea</i> L. |
| <i>Simocephalus vetulus</i> (O.F. Müller) | <i>Ilyocoris cimicoides</i> L. |
| <i>Alonella nana</i> (Baird) | <i>Notonecta glauca</i> L. |
| <i>Pleuroxus uncinatus</i> (Baird) | <i>Plea minutissima</i> Fussel |
| <i>Condonia candida</i> (O.F. Müller) | <i>Coenagrion pulchellum</i> Vanderlinden |
| <i>Cypris pubera</i> (O.F. Müller) | <i>Erythronema najas</i> (Hansmann) |
| <i>Eudiaptomus gracilis</i> (Sars) | <i>Aeschna grandis</i> L. |
| <i>Canthocampus staphylinus</i> (Jur.) | <i>Libellula quadrimaculata</i> L. |
| <i>Cyclops strenuous</i> Fisch. | <i>Sympetrum danae</i> Sulzer |
| <i>Asellus aquaticus</i> Racov | |

In the sixties the River Warta and the River Noteć were characterised by rich biological variety. In the next years their state was perpetually degraded as a result of municipal and industrial sewage. It caused the fall of size of many water fauna species and their disappearance. Not only *Bivalvia* and *Gastropoda*, but also the other taxons and the water vegetation were affected by them. Only the old river beds situated outside the embankment have preserved their specific variety in a little changed form. They were the refuge for very valuable species. When the water condition of researched rivers has been improved, which took place in the last ten years, it is possible to return of disappeared flora and fauna possible. The occurrence of *Bryozoa* in the old river beds of „Santockie Zakole” indicates the considerable purity of this water.

An example of this could be *Dina apathyi*. This is a very rare species and in Poland it has been found only in a few places [Sandner 1951, Pawłowski 1968, Agapow 1982]. It grows only in certain places in Europe. The reason may be that it used to be warmer in Europe and the plant was widespread all over the continent, but after the climate cooled down, it survived only in those areas where the conditions were good enough. It was found earlier in a reservoir at the mouth of the River Noteć [Agapow 1982, 1992]. *Dina lineata* is a species whose life is connected with a body of waters created at terraces and the mouth of rivers as well as with small ponds will dry out in summer. According to Bennike [1943], this species exists only in flowing waters. In the stagnant and temporary reservoirs two species *Phyllopora* has been found, which require clean water.

CONCLUSIONS

The area presented here is a very precious ecosystem not only for birds but also for many species of invertebrates. It provides good conditions for the reproduction of fish, amphibians and the larvae of many insects [Agapow 1992]. Old river beds and temporary waters are inhabited by a variety of plants and animals.

The creation of nature reserves in the river's valleys which form the natural ecological corridors contributes to the preservation of biological diversity and to the spread of species in the particular river-basins.

The nature reserve „Santockie Zakole” and other protected objects can be of use for the tourism. It has an important social and economic aspect too and is an impulse for the balanced economic development. The economic benefits of nature advantages are an important argument to involve the local community in an environmental protection [Jasnowska *et al.* 1999].

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ZNACZENIE REZERWATU PRZYRODY „SANTOCKIE ZAKOLE” DLA ZACHOWANIA RÓŻNORODNOŚCI BIOLOGICZNEJ I TURYSTYKI

Streszczenie. Z uwagi na ogromne znaczenie dolnego odcinka Warty i Noteci dla zachowania różnorodności biologicznej oraz turystyki utworzono w 1998 r. rezerwat „Santockie Zakole”. Celem naszego opracowania było rozpoznanie fauny na terenie rezerwatu oraz przedstawienie znaczenia walorów przyrodniczych dla rozwoju turystyki i edukacji ekologicznej.

Obszar rezerwatu obejmuje 454,94 ha. Jest to teren o charakterze krajobrazowym oraz florystyczno-ornitologicznym. Występuje tu wiele interesujących starorzeczy, oczek wodnych, kęp lasów i zarośli. W wodach „Santockiego Zakola” stwierdzono występowanie 14 gatunków pijawek, 38 gatunków mięczaków, 6 gatunków mszywiolów, 27 gatunków stawonogów. Ponadto stwierdzono wiele gatunków bezkręgowców wodnych, należących do różnych grup systematycznych. Ich występowanie wskazuje na znaczną czystość tych wód. Omawiany obszar jest więc bardzo cennym ekosystemem dla wielu gatunków ptaków wodnych i błotnych.

Na szczególną uwagę zasługuje wieś Santok, której historia sięga VIII wieku i grodzisko położone na terenie rezerwatu. W chwili obecnej po długotrwałych pracach archeologicznych teren grodziska jest wielką atrakcją turystyczną, przypominającą dawną świetność przygranicznej osady.

Słowa kluczowe: rezerwat, turystyka, różnorodność gatunkowa, ochrona przyrody