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FAUNA AND FLORA IN TWO CITY-CENTRE WATER RESERVOIRS IN GORZÓW WIELKOPOLSKI

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Summary. Lake Leśnik, situated at Emilia Plater Street and commonly called „Ruski Staw" („Ruthenian Pond") by inhabitants of Gorzów Wielkpolski, and Lake Błotne are natural kettle-holed and landlocked water reservoirs located in urban, canalised areas. The surface area of Lake Leśnik amounts to 1.7 hectares, and the surface area of Lake Błotne does not exceed 1 hectare. Both of the lakes are natural elements of the local landscape. The lakes are supplied by ground waters, precipitation and surface runoffs. A part of the rainwater from the region which runs off the storm sewage canal system ending with a petroleum derivative separator, reaches Lake Leśnik. Until recently the water for the needs of neighbouring fruit and vegetable gardens was periodically taken from this reservoir. At present, the water intake is not exploited. In the vicinity of Lake Błotne there are: a primary school and detached houses which are provided with a sewer system. Rainwater from the neighbouring housing estate is discharged to Lake Błotne. The research was conducted on both of the lakes where six positions of sampling were marked. The samples were collected from the lakes at the depth of 80 cm, by means of a scoop net, together with the survey of water plants and immersed objects. The purpose of the research was to determine the biological diversity of city-centre reservoirs and to determine the influence of external environment on its formation. Lake Leśnik, which is located at Emilia Plater street and whose shores are flat, has a very well developed belt of coastal plants, among which the dominating plants are: common reed (*Phragmites communis*), lesser reed-mace (*Typha angustifolia*) and sweet flag (*Acorus calamus*). In the belt of plants with floating leaves: yellow water lilly (*Nuphar lutea*) and white water lilly (*Nymphaea alba*), water smartweed (*Polygonum amphibium*). A few pairs of coots (*Fulica atra*) nest here. On the other hand, Lake Błotne, which is partly surrounded by steep shores, was subjected to thorough purification, and therefore in fact the belt of coastal plants does not exist. Small communities are constituted by soft-rush (*Juncus effusus*), common reed (*Phragmites australis*) and lesser reed-mace (*Typha angustifolia*) along stretches a few-metres long. The immersed plants: hornwort (*Ceratophyllum demersum*), whorled water milfoil (*Myriophyllum verticullatum*). What is more, a number of mallards (*Anas platyrhynchos*) (without the young) were noticed swimming. The bed of the reservoirs is muddy-loamy. Due to the present character of the reservoirs, they are a very rich source of information on the specific diversity of flora and fauna typical of the city-centre lake environment, and in the case of Lake Błotne, on the ecological succession process after a purification.

Key words: urban lakes, flora and fauna, species diversity

INTRODUCTION

The transformation of natural environment of Gorzów Wielkopolski, as a result of city development since the middle of the 60s of the 20th century, has had a significant impact on

reduction of Gorzów Wielkopolski natural values. Population increase by 100% forced new housing estates and roads to be built. It also contributed to the liquidation of green areas which were previously fruit and vegetable gardens. New factories were built and the gas and dust they emitted affected greenery and the existing water reservoirs. The latter, together with parks and lawns, are very frequently sanctuaries for many species of water fauna and plants. As a result of anthropopressure, they suffered permanent degradation. However, the Kłodawka River, Lake Błotne and Lake Leśnik have been recently subjected to reclamation.

The aim of our research was to precisely determine the present qualitative composition of fauna and flora in both of the water reservoirs and to determine the influence of external factors on the formation of this composition.

STUDY AREA

Lake Leśnik, which is situated at Emilia Plater Street and which is commonly called „Ruski Staw" („Ruthenian Pond") by inhabitants of Gorzów Wielkopolski, and Lake Błotne are natural kettle-holed and landlocked water reservoirs located in the urban, canalised areas. The surface area of Lake Leśnik amounts to 1.7 hectares, and the surface area of Lake Błotne does not exceed 1 hectare. Both of the lakes are natural elements of the local landscape. The lakes are supplied by ground waters, precipitation and surface runoffs. A part of the rainwater from the region which runs off the storm sewage canal system ending with a petroleum derivative separator, reaches Lake Leśnik. Until recently the water for the needs of neighbouring fruit and vegetable gardens was periodically taken from this reservoir. At present, the water intake is not exploited. In the vicinity of Lake Błotne there are: a primary school and detached houses which are provided with a sewer system. The rainwater from the neighbouring housing estate is discharged to Lake Błotne.

The quality assessment of the waters was conducted by the Provincial Inspectorate of Environmental Protection, Branch in Gorzów Wielkopolski.

Lake Leśnik in Gorzów Wielkopolski was researched twice in 2003. The waters of Lake Leśnik were characterised by good oxygenation, both in spring as well as in summer. Despite the fact that the reservoir was significantly burdened with external runoffs, the amount of organic and bioorganic substances was not high. Both indicators showed values of classes I and II. The sanitary condition of the reservoir, according to earlier research from the period 2000-2001 corresponded to the class II (in 2003, the cola titre was not examined).

MATERIALS AND METHODS

The research was conducted in the months between April and the middle of August 2006. Six positions of sampling were marked. The research samples were collected by means of a scoop net (the mesh size: 0.5 cm) on sandy and muddy days. The contents were rinsed by means of a sieve (the mesh size: 0.2 mm). The objects immersed in water and water flora were examined. The specimens of invertebrates which were collected were put in containers and preserved with 4% formalin solution. The collected material was identified according to the works of Pawłowski [1936], Urbański [1957], Łukin

[1976], Stańczykowska [1986], Piechocki and Dyduch-Falniowska [1993], Engelhardt [1998] and Rybak [2000a and b] with the use of a stereoscopic microscope.

The research of Lake Błotne in Gorzów Wielkopolski was carried out in spring and summer of 2003 and that examination helped to classify the reservoir waters in class II due to increased concentration of chemical oxygen demand (COD) in both research periods. The other indicators which were subject to the research, i.e. nitrogen compounds, general phosphorus, organic substances and salinity, did not exceed the value for class I of flowing waters cleanliness. The examinations of sanitary condition conducted in previous years showed a very high changeability of results – from class I to NON. Such high fluctuations did not allow to determine the proper tendency of changes in the reservoir.

RESULTS

Vascular plants are one of the main factors which differentiate the water environment; they constitute the basis of life for animal organisms. Therefore, the existence and location of vascular plants in a reservoir become so important. On the basis of the research, the water flora taxa were determined.

Lake Leśnik (Phot. 1), whose shores are flat, has a very well developed belt of coastal plants, among which the dominating plants are: common reed (*Phragmites communis*), lesser reed-mace (*Typha angustifolia*) and sweet flag (*Acorus calamus*). In the belt of plants with floating leaves: yellow water lilly *(Nuphar lutea*), white water lilly (*Nymphaea alba*), and water smartweed (*Polygonum amphibium*) dominate. Amongst the immersed plants, the dominating ones are: Canadian pondweed (*Elodea canadensis*), whorled water milfoil (*Myriophyllum verticillatum*).

Phot. 1. View of Lake Leśnik (photo. Izabela Krzyżanowska)
Fot. 1. Widok na jezioro Leśnik

In the material which encompasses the quality samples, the following species of invertebrate fauna and higher taxa appeared:

Table. 1. Invertebrates in Lake Leśnik
Tabela 1. Bezkręgowce jeziora Leśnik

Taxa – Taksony	Types and species – Typy i gatunki
Leeches – Pijawki *(Hirudinea)*	*Piscicola geometra,* *Theromyzon tesselatum,* *Glossiphponia complanata,* *Erpobdella octoculata,* *Haemopsis sanguisuga*
Dragonflies – larvae and imago Ważki – latwy I imago *(Odonata)*	*Coenagrion sp.,* *Platyncnemis pennipes,* *Anax imperator* *Aeschna sp.,* *Libellula quadrimaculata,* *Cordulia sp..* *Lestes sponsa*
Bugs – Pluskwiaki *(Hemiptera)*	*Corixide sp.* *Ilyocoris cimicoides,* *Hydrometra sp.*
Coleopterans – larvae and imago Chrząszcze – larwy i imago *(Coleoptera)*	*Dystiscus marginalis* *Hydrous piceus* *Acilius sulcatus*
Caddis flies – Chruściki *(Trichoptera)*	*Limnophilus flavicornis*
Diptera – Muchówki *(Diptera)*	*Culex sp.* *Tipula sp.* *Tabanus sp.*
Snails – Ślimaki *(Gastropoda)*	*Viviparus contectus* *Bithynia tenteculata* *Lymnea stagnalis* *Planorbis planorbis* *Valvata piscinalis*
Fish – Ryby *(Pisces)*	*Rutilus rutilus* *Perca fluviatilis* *Carassius carassius*
Amphibians – Płazy *(Amphibia)*	*Rana esculenta*
Reptiles – Gady *(Reptilia)*	*Natrix natrix*
Nesting birds – Ptaki gniazdujące *(Aves)*	*Fulica atra*

Lake Błotne (Phot. 2), which is partly surrounded by steep shores, was subjected to thorough purification, and therefore in fact the belt of coastal plants does not exist. Small communities are constituted by soft-rush (*Juncus effusus*), common reed (*Phragmites australis*) and lesser reed-mace (*Typha angustifolia*), along stretches a few metres long. The bed of the reservoirs is muddy-coniferous. The immersed plants: hornwort (*Ceratophyllum demersum*), whorled water milfoil (*Myriophyllum verticullatum*).

Table 2. Invertebrates in Lake Błotne
Tabela 2. Bezkręgowce Jeziora Błotnego

Taxa – Taksony	Types and species – Typy i gatunki
Leeches – Pijawki *(Hirudinea)*	*Piscicola geometra,* *Erpobdella octoculata* *Haemopsis sanguisuga*
Dragonflies – larvae and imago Ważki – larwy i imago *(Odonata)*	*Coenagrion sp.,* *Platyncnemis pennipes,* *Cordulia sp.* *Lestes sponsa*
Bugs – Pluskwiaki *(Hemiptera)*	*Corixide sp.*
Diptera – Muchówki *(Diptera)*	*Culex sp.* *Tipula sp.* *Tabanus sp.*
Molluscs – Mięczaki *(Mollusca)*	*Viviparus contectus* *Anodonta piscinalis* *Bithynia tenteculata* *Lymnea stagnalis* *Planorbis planorbis* *Valvata piscinalis* *Sphaerium corneum*
Amphibians – Płazy *(Amphibia)*	*Rana esculenta*
Feeding birds – *Ptaki żerujące (Aves)*	*Anas platyrhynchos*

Phot. 2. View of Lake Błotne (photo. Izabela Krzyżanowska)
Fot. 2. Widok na Jezioro Błotne

DISCUSSION

Owing to the present character of the reservoirs, the reservoirs are a rich source of information on the diversity of flora and fauna species which are typical of the urban lake environment. In the case of Lake Błotne, this information pertains to the process of ecological succession after the reservoir purification.

CONCLUSIONS

The environmental protection policy of the city of Gorzów Wielkopolski should provide the city inhabitants with good conditions for rest and recreation, taking into consideration the principles of balanced development and reasonable development of the reservoirs (e.g. fry-stocking, constant monitoring, providing containers for waste and litter, and systematic cleaning of the coastal belt). It should be remembered that the species diversity is dependent on environmental conditions, water cleanliness, the character of the ground as well as the occurrence of water plants [Pawłowski 1936b, Wojtas 1959, Agapow 1982 Dumnicka 1994, Korycińska 2004]. The effectiveness of all these activities will not only influence the natural environmental protection with all its elements but will also increase the attractiveness of this area amongst the city inhabitants.

REFERENCES

Agapow L., 1982: Living conditions and existence of leech (*Hirudinea*) in the waters of Myślibórz Lake District. Series: Monographs, 150, Physical Education Academy, Poznań, pp. 5-74 (in Polish).

Engelhardt W., 2000: Flora and fauna of inland waters. A guide. Multiko, Warszawa, pp. 81-299 (in Polish).

Kajak Z., 1998: Hydrobiology – Limnology. Ecosystems of Inland Waters. PWN, Warszawa, 43-55 (in Polish).

Korycińska M., 2004: The assessment of the Liwiec river waters on the basis of the existence diversity of macroinvertebrates. Ph.D. Thesis. Podlasie Academy in Siedlce, Faculty of Ariculture, pp. 29-47 (in Polish).

Król S., Agapow L., Bienikowski J., Engel J., Kleinhardt J., 1994: Nature of Gorzów Province. WFOŚ i GW Gorzów Wlkp., pp. 19-21 (in Polish).

Łukin E.I., 1976: Leeches of fresh and salt water bodies. Fauna of the USSR: Leeches. Inst. Zool. Akad. Nauk Leningrad, pp. 19-92 (in Russian).

Pawłowski L.K., 1936: Zur Ökologie der Hirudineenfauna der Wigryseen. Arch. Hydrobiol. Ryb., 10, 1-47.

Pawłowski L.K., 1936b: Leeches (Hirudinea). Freshwater fauna of Poland, pp. 26 (in Polish).

Piechocki A., 1979: Freshwater fauna of Poland. Issue 7. Mollusks. Snails. PWN, Warszawa, pp. 17-45 (in Polish).

Piechocki A., Dyduch-Falniowska A., 1993: Freshwater fauna of Poland. Issue 7A. Mollusks (*Mollusca*). Bivalves (*Bivalvia*). PWN, Warszawa, pp. 28-125 (in Polish).

Rybak J.I., 2000a: The survey of fresh-water invertebrate animals: Arthropoda, Insecta: Odonata(larvae), Lepidoptera (larvae), Megalogtera (larvae), Planipennia (larvae), Collembola. Cz. 8, Insecta insects. State Inspection of Environmental Protection. Warszawa, pp. 75 (in Polish).

Rybak J.I., 2000b: Inverterbates, Fresh-water Animals. Guide for Recognizing. PWN, Warszawa, pp. 85 (in Polish).

Stańczykowska A., 1986: Invertebrate Animals of our Waters. WSiP Warszawa, pp. 69-305 (in Polish).

Starmach K., Wróbel S., Pasternak K., 1978: Hydrobiology. Limnology. PWN, Warszawa, pp. 360-377 (in Polish).

WIOŚ. Red. Szenfeld M., 2004: The state of environment in Gorzów Wlkp. in the year 2003. Zielona Góra – Gorzów Wlkp monitoring library of environment, pp. 16-17 (in Polish).

FAUNA I FLORA DWÓCH ŚRÓDMIEJSKICH ZBIORNIKÓW WODNYCH W GORZOWIE WIELKOPOLSKIM

Streszczenie. Jezioro Leśnik przy ul. Emilii Plater, zwane popularnie wśród Gorzowian „Ruskim Stawkiem", i Jezioro Błotne to naturalne zbiorniki wytopiskowe, bezodpływowe, położone na terenach miejskich, skanalizowanych. Powierzchnia jeziora Leśnik wynosi ok. 1,7 ha, natomiast powierzchnia Jeziora Błotnego nie przekracza 1 ha. Oba zbiorniki stanowią naturalny element lokalnego krajobrazu. Źródłem ich zasilania są wody gruntowe, opady atmosferyczne i spływy powierzchniowe. Do jeziora Leśnik trafia część wód deszczowych z rejonu, spływających kanalizacją burzową zakończoną separatorem substancji ropopochodnych. Do niedawna ze zbiornika pobierana była okresowo woda na potrzeby okolicznych ogródków działkowych. Aktualnie ujęcie nie jest eksploatowane. Jezioro Błotne otaczają w najbliższym sąsiedztwie: szkoła podstawowa i domy w zabudowie jednorodzinnej, obecnie skanalizowane. Do Jeziora Błotnego odprowadzane są wody deszczowe z pobliskiego osiedla. Materiał do pracy został zgromadzony na obu jeziorach z 6 stanowisk. Próby pobrano na głębokości do 80 cm, za pomocą siatki czerpakowej wraz z przeglądem roślinności wodnej i przedmiotów zanurzonych. Celem badań jest określenie różnorodności biologicznej śródmiejskich zbiorników wodnych oraz określenie wpływu otaczającego środowiska na jej kształtowanie. Jezioro przy ul. Emilli Plater, którego brzegi są płaskie, ma bardzo dobrze rozwinięty pas roślinności przybrzeżnej, wśród której dominuje trzcina pospolita (*Phragmites communis*), pałka wąskolistna (*Typha angustifolia*) i tatarak zwyczajny (*Acorus calamus*), w pasie roślin o liściach pływających: grążel żółty (*Nuphar lutea*). Gniazduje tu kilka par łysek (*Fulica atra*). Natomiast Jezioro Błotne, otoczone częściowo stromymi brzegami, zostało poddane gruntownemu oczyszczeniu, w związku z czym pas roślinności przybrzeżnej praktycznie nie istnieje. Niewielkie zbiorowiska porasta sit rozpierzchły (*Juncus effusus*), trzcina pospolita (*Phragmites australis*) i pałka wąskolistna (*Typha angustifolia*) – kilkumetrowe odcinki, zaobserwowano także pływające bez przychówku kaczki krzyżówki (*Anas platyrhynchos*). Dno zbiorników jest mulisto-ilaste. Ze względu na obecny charakter zbiorników stanowią one bogate źródło informacji dotyczących różnorodności gatunkowej flory i fauny typowej dla środowiska jezior śródmiejskich, a w przypadku Jeziora Błotnego dotyczących procesu sukcesji ekologicznej po dokonanym czyszczeniu zbiornika.

Słowa kluczowe: jezioro śródmiejskie, flora i fauna, różnorodność gatunkowa