

ROTIFERA AND CLADOCERA IN PARUSZOWIEC DAM RESERVOIR AFTER RESTORATION

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Summary. The Paruszowiec reservoir in Upper Silesia is a small, lowland dam reservoir, created between World War I and World War II. Between April and November, 2004, species composition and densities of planktonic rotifers and cladocerans were investigated. Altogether, 33 planktonic rotifers and 14 cladocerans species were noted in the reservoir. Mean densities were: rotifers – 223 ind. dm⁻³ and cladocerans 114 ind. dm⁻³. During the study period there was a domination of rotifers in the zooplankton, except in May when cladocerans dominated. Among rotifers communities there dominated: *Keratella cochlearis*, *Keratella cochlearis* f. *tecta*, *Keratella quadrata* and *Polyarthra vulgaris*. Among communities of cladocerans there dominated: *Bosmina longirostris*, *Chydorus sphaericus* and *Daphnia cucullata*. Species composition and domination structure definitely confirmed the progressive eutrophication of the Paruszowiec reservoir.

Key words: rotifers, cladocerans, species diversity, dam reservoir

INTRODUCTION

The Paruszowiec reservoir was created between World War I and World War II by the construction of a dam on the river Ruda in Upper Silesia. For many years it was an object of interest because it was the habitat of *Trapa corynithiaca*. Until 1977, there existed a reserve called the 'Anchor in Paruszowiec' which was the only site for *Trapa corynithiaca* and *Marsylia quadrifolia*. The reserve was devastated during resoration work on the reservoir, after which, in 1988, there was an attempt to reintroduce *Trapa* into the reservoir, which failed.

This study concerns the zooplankton of the Paruszowiec reservoir, especially the rotifers and cladocerans. The trophy status of the reservoir has been based on the structure of the zooplankton communities. This is the first that such research that has been carried out in the Paruszowiec reservoir.

STUDY AREA

The Paruszowiec reservoir is located on the river Ruda, near the town of Rybnik. For many years it has accumulated sediments from the river (85% of total capacity). The first restoration of the reservoir was carried out in the years 1974-1975, when sediments

were removed, and open-work slabs were laid to strengthen the buttresses. In 1998, a second restoration was undertaken. The reservoir covers an area of 12.5 ha, and has a total capacity of 210,000 m³. The reservoir is also used for recreational purposes.

MATERIALS AND METHODS

Zooplankton was sampled at 2-week intervals from April till November in 2004. Samples were collected from 2 research areas: the bank zone and the pelagic zone, using a planktonic net (50 µm). The samples were then preserved in a solution of formalin and glycerin.

The trophic condition was calculated using the TSI_{SD} Carlson Index [Carlson 1977] and the species diversity was assessed according to the Shannon Weaver Biodiversity Index. All statistics were calculated by the MVSP Programme.

RESULTS AND DISCUSSION

Water temperature in the reservoir varied between 3 and 27°C, pH value was from 7 to 9. Oxygen parameters varied from 5 to 11 mg O₂ dm⁻³, and phosphate from 0.5 to 1.0 mg PO₄ dm⁻³.

Water transparency – measured with a Secchi disc – varied from 0.25 to 0.60 m. TSI_{SD} using the Carlson Index indicated eutrophic water in the reservoir from 53 to 58.

Altogether, 33 species of rotifers and 14 species of cladocerans were noted in the Paruszowiec reservoir (Tab. 1). The highest dominance and constancy were found in: *Keratella cochlearis*, *Keratella cochlearis* f. *tecta* and *Keratella quadrata*, *Bosmina longirostris* and *Chydorus sphaericus* (Tab. 1). There are typical eutrophic species.

These species were the dominant ones in the reservoirs of Upper Silesia [Bielańska-Grajner 1978, Pilarczyk 1984, Bielańska-Grajner and Pilarczyk 1996]. Mean density of planktonic rotifers and cladocerans were 223 ind. dm⁻³ and 114 ind. dm⁻³ (Fig. 1). The density ratio of *Keratella cochlearis* f. *tecta* to *Keratella cochlearis* was 36% and showed the highest eutrophy of the reservoir (Fig. 2).

Values of the Shannon diversity index of plankton rotifers and cladocerans were low, respectively 2.1 and 1.4.

The highest species diversity $H = 3.5$ was recorded for planktonic rotifers in the upper part of the Zemborzycki reservoir. However, the Shannon diversity index $H = 2.1$ in the deepest part of the Zemborzycki reservoir was similar to the results from the Paruszowiec reservoir [Demetraki-Paleolog 2005].

Species composition and domination structure of zooplankton confirmed the eutrophication of Paruszowiec reservoir. A similar structure of zooplankton has been observed in other eutrophic reservoirs in Poland [Radwan 1973, Ejsmont-Karabin and Węgleńska 1989, Bielańska-Grajner and Pilarczyk 1996, Bielańska-Grajner 2002, Demetraki-Paleolog 2005].

Table 1. Species composition of Rotifera and Cladocera in Paruszwieć reservoir
 Tabela 1. Skład gatunkowy Rotifera i Cladocera w zbiorniku Paruszwieć

Taxons – Taksony	D (%)	C (%)	Indicators o trophy Wskaźniki trofii
Rotifera			
<i>Asplanchna priodonta</i> Gosse	1.55	26.5	
<i>Brachionus angularis</i> Gosse	1.1	32.3	Eu
<i>Brachionus calyciflorus</i> Pallas	2.2	41.3	Eu
<i>Brachionus quadridentatus</i> Hermann	0.8	5.5	Eu
<i>Brachionus urceolaris</i> (Müller)	0.9	8.8	Eu
<i>Brachionus variabilis</i> (Hempel)	4.2	11.8	Eu
<i>Cephalodella forficata</i> (Ehrenberg)	0.03	2.9	
<i>Cephalodella gibba</i> (Ehrenberg)	0.35	5.9	
<i>Colurella adriatica</i> Ehrenberg	0.5	26.5	
<i>Colurella colurus</i> (Ehrenberg)	0.8	20.5	
<i>Euchlanis deflexa</i> Gosse	0.3	5.5	
<i>Filinia longiseta</i> (Ehrenberg)	0.02	2.9	Eu
<i>Filinia terminalis</i> (Plate)	0.04	5.9	
<i>Gastropus minor</i> (Rousselet)	0.07	2.9	
<i>Keratella cochlearis</i> (Gosse)	33	100	
<i>Keratella cochlearis f. tecta</i> (Lauterborn)	19.2	88	Eu
<i>Keratella testudo</i> (Ehrenberg)	0.01	2.9	
<i>Keratella quadrata</i> (Müller)	12.5	82	Eu
<i>Lecane closterocerca</i> (Schmarda)	1.0	23.5	
<i>Lecane luna</i> (Müller)	0.07	2.9	
<i>Lecane lunaris</i> (Ehrenberg)	0.04	2.9	
<i>Lepadella acuminata</i> (Ehrenberg)	0.09	5.9	
<i>Lepadella patella</i> (Müller)	0.17	5.9	
<i>Mytilina ventralis</i> (Ehrenberg)	0.01	8.8	
<i>Notholca acuminata</i> (Ehrenberg)	0.03	2.9	
<i>Notholca squamula</i> (Müller)	0.15	5.9	
<i>Polyarthra dolichoptera</i> Idelson	0.9	23.5	
<i>Polyarthra vulgaris</i> Carlin	11	50	
<i>Pompholyx complanata</i> Gosse	0.3	5.9	
<i>Pompholyx sulcata</i> Hudson	6.2	47	Eu
<i>Rotaria rotatoria</i> (Pallas)	0.17	2.9	
<i>Synchaeta oblonga</i> Ehrenberg	0.9	23.5	
<i>Synchaeta pectinata</i> Ehrenberg	1.3	17.6	
<i>Trichocerca pusilla</i> (Lauterborn)	0.17	5.7	Eu
Cladocera			
<i>Alona quadrangularis</i> (O.F. Müller)	0.6	14.7	
<i>Alona guttata</i> (G.O. Sars)	0.2	5.9	
<i>Alonella nana</i> (Baird)	0.1	2.9	
<i>Bosmina coregoni</i> (Baird)	0.3	8.9	Eu
<i>Bosmina longirostris</i> (O.F. Müller)	53.5	73.5	Eu
<i>Ceriodaphnia quadrangula</i> (O.F. Müller)	1.5	17.6	
<i>Chydorus sphaericus</i> (O.F. Müller)	19.4	91	Eu
<i>Daphnia cucullata</i> (G.O. Sars)	13.5	61.8	Eu
<i>Daphnia longispina</i> (O.F. Müller)	7.95	55.8	Eu
<i>Daphnia pulex</i> (Leydig)	1.4	8.9	
<i>Pleuroxus aduncus</i> (Jurine)	0.3	8.9	
<i>Pleuroxus uncinatus</i> (Baird)	0.4	8.9	
<i>Polyphemus pediculus</i> (Linne)	0.2	2.9	
<i>Simocephalus vetulus</i> (O.F. Müller)	0.9	2.9	

D – dominance, C – constancy, Eu – eutrophy

D – dominacja, C – stałość, Eu – eutrofia

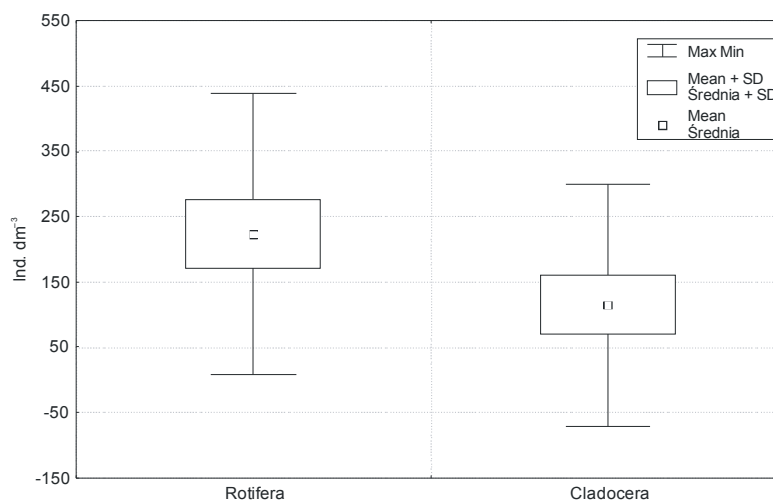


Fig. 1. Mean abundance (for study period) of rotifers and cladocerans in Paruszowiec reservoir
Rys. 1. Średnie zagęszczenie (w okresie badań) wrotków i wioślarek w zbiorniku Paruszowiec

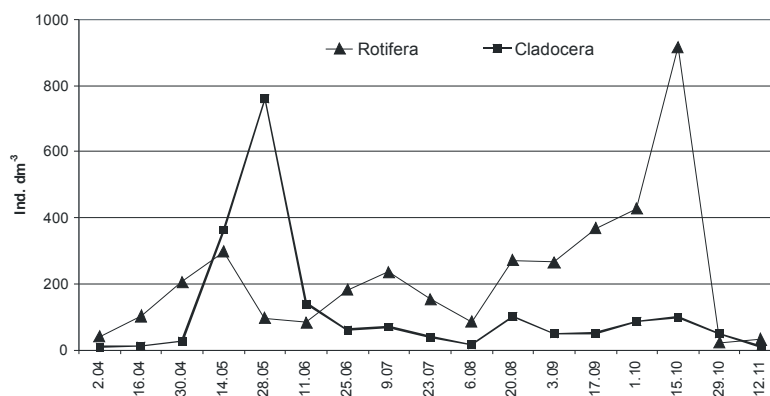


Fig. 2. Density changes of rotifers and cladocerans in Paruszowiec reservoir in 2004
Rys. 2. Zmiany zagęszczenia wrotków i wioślarek w zbiorniku Paruszowiec w 2004 roku

CONCLUSIONS

1. A total of 33 planktonic rotifers and 14 cladoceran species occurred in the Paruszowiec reservoir. The Shannon-Weaver index values were low.
2. The community structure of planktonic rotifers and cladocerans showed that the Paruszowiec reservoir should be included among the eutrophic water ecosystems. This result is confirmed by the TSI_{SD} Index.

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ROTIFERA I CLADOCERA ZBIORNIKA ZAPOROWEGO PARUSZOWIEC
PO ZABIEGACH REKULTYWACJI

Streszczenie. Zbiornik Paruszowiec (Górny Śląsk) jest małym, nizinnym zbiornikiem zaporowym, który zbudowano w okresie międzywojennym. Od kwietnia do listopada 2004 roku badano skład jakościowy i zagęszczenie wrotków i wioślarek w tym zbiorniku. Ogółem w zbiorniku stwierdzono 33 gatunki wrotków i 14 gatunków wioślarek. Średnie zagęszczenie wrotków wynosiło $223 \text{ osob.} \cdot \text{dm}^{-3}$ a wioślarek – $114 \text{ osob.} \cdot \text{dm}^{-3}$. W okresie badań w zooplanktonie dominowały wrotki, z wyjątkiem maja, kiedy przeważały liczebnie wioślarki. Wśród wrotków dominującymi gatunkami były: *Keratella cochlearis*, *Keratella cochlearis* f. *tecta*, *Keratella quadrata* i *Polyarthra vulgaris*. Wśród wioślarek dominantami były: *Bosmina longirostris*, *Chydorus sphaericus* i *Daphnia cucullata*. Skład gatunkowy i struktura dominacji zgrupowań wrotków i wioślarek wskazują na postępującą eutrofizację zbiornika Paruszowiec.

Słowa kluczowe: wrotki, wioślarki, różnorodność gatunkowa, zbiornik zaporowy