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ZOOPLANKTON SPECIES AS BIOLOGICAL INDICATORS OF THE WATER OF BOVILLA RESERVOIR

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SYNOPSIS

Comparative studies were performed on the zooplankton composition and some physical and chemical properties of the Bovilla reservoir. Zooplankton abundance, conductivity, organic matter, hardness and orthophosphate concentrations were lower and Secchi depth was investigated for the four series time during the year 2006. Rotifera species *such as Polyarthra trigla, Keratella quadrata, Asplanchna priodonta and Ascomorpha* sp., showed peaks, particularly in spring, summer and late summer. *Diaphanosoma brachiurums, Bosmina longirostris* and *Ceriodaphnia quadrangula* of Cladocera species increased in late summer whereas *Bosmina longirostris* and *Daphnia spp*. were prominent in spring. The cyclopoid copepod *Cyclops vicinus* was dominant in Bovilla among other species of Cyclpoida.

Rotifer and other zooplankton species sensitivity to some physical and chemical conditions allow using them as bioindicators of aquatic ecosystem saprobity. Being rather tolerant to different environmental conditions, many rotifer species are good indicators of water quality and can be used for the ecological monitoring of water bodies (HELLAWELL,J.M.(1986); HILSENHOFF,W.L.(1988); PUJIN, 1992; SHUMKA, 2001).

INTRODUCTION

The first impoundment of a newly constructed reservoir normally is characterized by a load surge in terms of easily degradable organic materials initiated by the inundation of soil with its vegetation. A period of approximately 10 years seems to be necessary to achieve a stage in which the rate of change is substantially retarded. To that fact there is enough time to consider that the Buvilla Reservoir currently is passing the achievement stage of slowly changes in the water processes. This is only theoretical, while the nature process after intervention are combined intensively with human interaction due to the land structure, livestock presence and land cover as well.

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Increase in human population and development of tourism cause harmful changes in ecosystems. The consequences of that are changes in qualitative and quantitative compositions of biocenoses. Because of that is possible to explore conditions in some ecosystems by using composition of organisms that live in it - bioindicators.

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MATERIAL AND METHODS

The samples have been collected at the open part of the Reservoir respectively at the depth of 0, 2, 5, 10, 15, 20, 30 AND 40 m in three different stations. The quantitative samples have been collected with Ruttner bottle. The samples for the qualitative analyses has been collected with plankton net Nanzen 20, that was also used for the filtration purposes. The samples have been fixed with formalin 4%.

During the lab procedures the enumeration was done via Invert microscope, while for the species determination were used the Stereo microscope too. The estimation is made based on Standard Methods for the Examination of Water and wastewater (1997).

Saprobiological analysis was done by using standard Pantle-Buck method (PANTLE-BUCK, 1955) based on qualitative and relative quantitative composition of Rotifera, Cladocera and Copepoda species.

INVESTIGATED AREA.

Watershed basin of Bovilla covers a total area of 98 km2, including the Tërkuza upriver and of some of its effluents, rivers or torrents. It extends behind Kruja-Dajti mountain chain, starting from the narrow gorge of Zall-Herri. The relief of the zone is vertically and horizontally very fragmented, forming often deep valleys with narrow gorges. The slopes and crests are mainly composed of limestone, while the valley bottoms are sandy combined with clays. As regards vegetation, until 600 m above sea level, there dominate the Mediterranean evergreen shrubs, increasing the altitude until 1000 m, the vegetation changes in oak trees and between 1400 and 1700 m in beeches and pine trees. Pines grow up mostly over ultrabasics, whereas beeches over sedimentary formations. Few crests are uncovered and plant formations generally host wild animals, i.e. wild pig or cat, fox or rapacious birds, etc.

RESULTS AND DISCUSSIONS

During the investigated period 41 species were identified. Their qualitative and quantitative composition varied depending on locations. At this period the *Cladocera* and *Rotatoria* species were dominant, while the copepods have been following them. Out from the dominant species the *Bosmina, Keratella* and *Macrocyclops albidus* has been most abundant. A considerable number of *Bosmina* females has been revealed with egg. The number of nauplius stage and copepodits was present moderately.

The analyses revealed that in the open part of the reservoir there are present 21 Rotatoria species, 11 Cladocera and 5 Copepoda species.

Based on the other reservoir experiences, the Bovilla ecosystem is unsaturated with concern to definite zooplankton species number (and composition) to a higher extend than lakes. We thought that this is valid for the first impoundment phase. Possibly this explain way zooplankton become abundant.

Based on the data gathered during the period os investigation, the zooplankton community shows a maximum value of 3450 (x 1000 ind/m^3) during the September 2007 and September 2008 (Fig. 1).

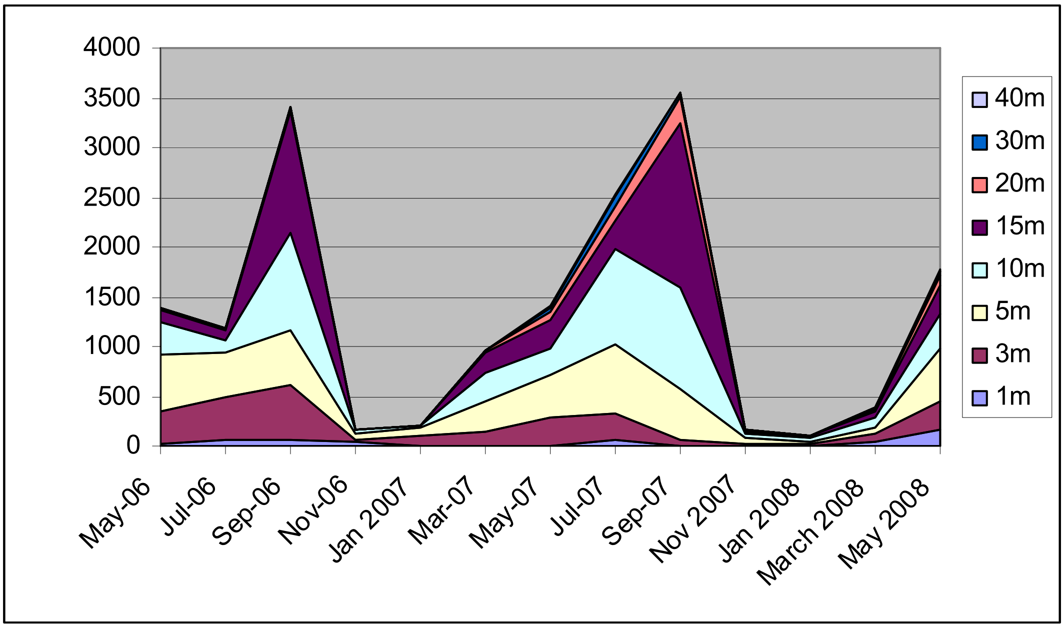

Fig. 1. The total zooplankton dynamics (total (x 1000 ind/m3)), for the period May 2006-May 2008 in Bovilla Reservoir

Reservoir ecosystems usually are considered to be more controlled by catchment area characteristics and by meteorological phenomena than most of the lakes, due to larger watershed/reservoir volume ratios and therefore shorter retention time (straskraba et al., 1993).

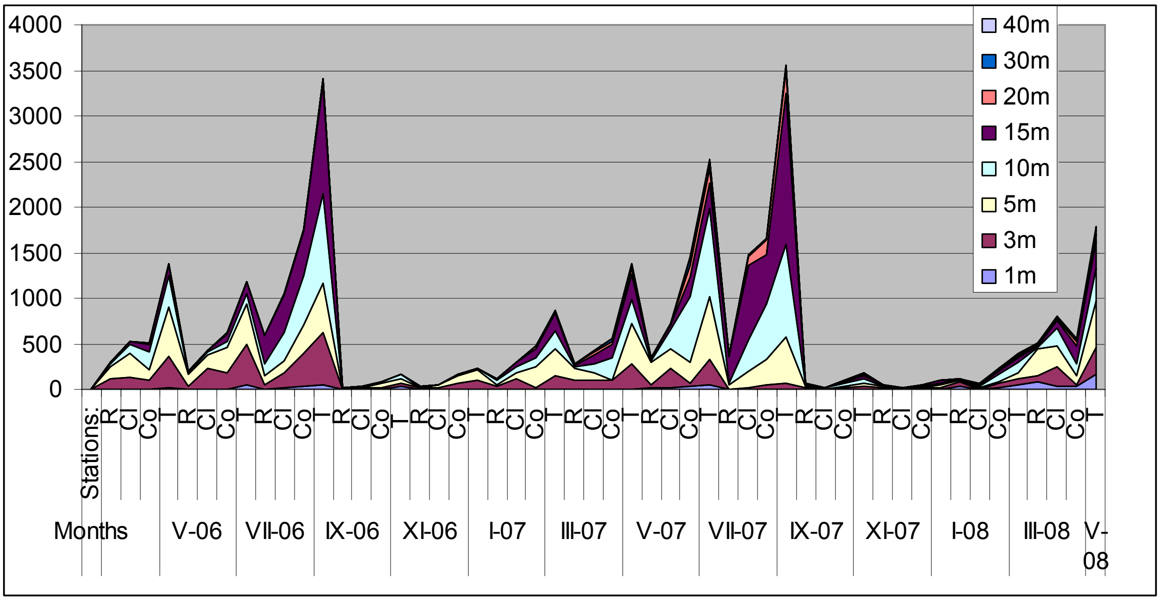

Fig. 2. The dynamics of zooplankton group (R-Rotatoria; Cl-Cladocera; Co-Copepoda and T-Total) in Bovila reservoir.

Table 1. Identified species in Bovilla Reservoir (2006-2008) and their saprobiological belonging

		□	
	ROTATORIA	s-Saprobe class	S-Index saprobe
1	*Brachionus quadridentatus*	β–α	2.2
2	*Brachionus caciciflorus v.brycei*	β–α	2.5
2	*Brachionus angularis*	β–α	2.5
3	*Keratella cochlearis*	o	1.9
4	*Keratella.c.v.macracantha*	o	1.55
5	*Keratella quandrangula*	β–α	1.55
6	*Kellicotia longispina*	o	1.1
7	*Lepadella sp.*	o	1.7
9	*Lecane curvirostris*	β–α	1.4
10	*Trichocerca bicristata*	o	1.6
8	*Trichocerca capucina*	o	1.4
9	*Trichocerca similes*	o	1.4
10	*Trichocerca rectangularis*	o	1.4
11	*Asplanchna priodonta*	β–α	1.2
12	*Polyarthra vulgaris*	β–α	2.1
13	*Polyarthra trygla*	β–α	2.1
14	*Synchaeta pectinata*	β–α	2.2.
15	*Synchaeta kitina*	β–α	2.2.
16	*Pleosoma truncatum*	β–α	
17	*Testudinella sp.*	β–α	1.5
18	*Pompholyx sulcata*	β–α	2.25
19	*Pedalion sp.*	β–α	1.5
20	*Epiphane sp.*	β–α	1.2
21	*Ascomorpha ecuaudis*	β–α	1.2
22	*Filinia longiseta*	o	2.35
23	*Gastropus stylyfer*	o	
	CLADOCERA		
1	*Scapholeberis mucronara*	o	1.65
2	*Simocephalus sp.*	o	1.65
3	*Bosmina longirostris f. typical*	o–β	1.55
4	*Bosmina longirostris f. brevicornis*	o–β	1.55
5	*Bosmina longirostris f. pellucida*	o–β	1.55

6	*Bosmina longispina*	o–β	1.55
7	*Diaphanosoma brachiurum*	o	1.4
8	*Alona gutatta*	o	1.2
9	*Allonella sp.*	o	1.2
10	*Moina longirostrus*	o	1.4
11	*Diaphnia longispina*	o–β	1.55
12	*Cerodaphnia rectangularis*	o–β	1.4
	COPEPODA		
1	*Cyclops vicinus*	o	1.55
2	*Eucyclops serrulatus*	o	1.55
3	*Eucyclops macruroides*	o	1.55
3	*Mesosclops leuckarti*	o	1.55
4	*Nauplius stage*		
5	*Copepodit stage*		

Using standard Pantle-Buck method (Pantle-Buck, 1955) based on qualitative and relative quantitative composition of Rotifera, Cladocera and Copepoda species, the major zooplankton components of recorded species belongs to I, and I – II water category.

Values of saprobity index during the investigated period varied within limits from 1.2 to 2.16, which correspond with oligosaprobic and β−mesosaprobic waters.

CONCLUSIONS

The Bovilla ecosystems is unsaturated with concern to a define species number (and composition) to a higher extend than lakes. In particular, this is valid for the first impoundment phase that this water body currently is facing. Possibly this explains why also unusual zooplankters may become abundand and the Buvilla case this is happen with *Bosmina* species. Examples are the water mine *Piona limnetica* in a reservoir in Panama (GLIWICZ, 2000) and small Turbellaria in other water bodies. It is to be expected that top-down regulation of the zooplankton dominance structure attains its full efficiency once there is something like an equilibrium in the composition of the fish community.

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The recorded changes for the short time period are linked with an unsaturated water body, like a reservoir, related to biotic diversity as to zooplankton quantity showed certain changes in the Lake Bovilla pelagic water.

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