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LENGTH-WEIGHT REGRESSION AND DRY WEIGHT ESTIMATES FOR THE MAIN ZOOPLANKTON SPECIES OF BUVILLA RESERVOIR

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Synopsis

In this paper are presented the data on biomass of the zooplankton of Bovilla Reservoir. The reservoir itself consist the main source for of drinking water for the Tirana capital city. Based on different bibliographical data there are existing dry weights for many zooplankton species (BOTTRELL et al., 1987, DUMONT et al., 1975, MALLEY et al., 1989, MICHALOUDI, 2005 etc.). Based on our calculations the dry weights were: 2, 225 µg *Asplanchna priodonta*, 0, 03 µg *Brachionus angularis*, 0, 021 µg *Tricocherca sp*., etc.

During the investigated period 36 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 has been following them. Out from the dominant species the *Bosmina, Keratella* and *Macrocyclops albidus* has been most abundant. Reservoirs defined in agreement with ICOLD have in comparison with lakes higher watershed area/waterbody area rate, shorter theoretical retention time, different basin morphology with deepest point at the dam and mostly deep outlet. Their ecosystems usually are considered to be more controlled by catchment area characteristics and by meteorological phenomena than most of lakes, due to larger watershed/reservoir volume ratios and therefore shorter retention time (SHUMKA, 2008).

INTRODUCTION

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.

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.

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%. The livings were grouped based on species and size groups with 25 individuals (See Table 1). The individual length was measured (to nearest 0.01 mm) and individuals were treated with distillated water and then dried and weighted on a microbalance (10 μg precision)

The copepodit stadiums were treated together and not separated. The described procedure were applied for each season excluding species that are partly present during the year. Length-weight regression was calculated using the linear form ln(W)=lna+lnb(L), where L is body length in mm and W is body weight in μg dry weight.

RESULTS AND DISCUSSIONS

During the investigated period 37 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 has 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.

Table 1. The list of species identified in Bovilla Reservoir

ROTATORIA	CLADOCERA	COPEPODA
Brachionus quadridentatus	*Scapholeberis mucronara*	*Cyclops vicinus*
Brachionus angularis	*Simocephalus sp.*	*Mesosclops leuckarti*
Keratella cochlearis	*Bosmina longirostris*	*Nauplius stage*
Keratella.c.v.macracantha	*Diaphanosoma brachiurum*	*Copepodit stage*
Keratella quandrangula	*Alona gutatta*	
Kellicotia longispina		
Lepadella sp.		
Trichocerca capucina		
Trichocerca similes		
Trichocerca rectangularis		
Asplanchna priodonta		
Polyarthra vulgaris		
Polyarthra trygla		
Synchaeta pectinata		
Pleosoma truncatum		
Testudinella sp.		
Pompholyx sulcata		
Pedalion sp.		
Epiphane sp.		
Filinia longiseta		
Ascomorpha ecuaudis		

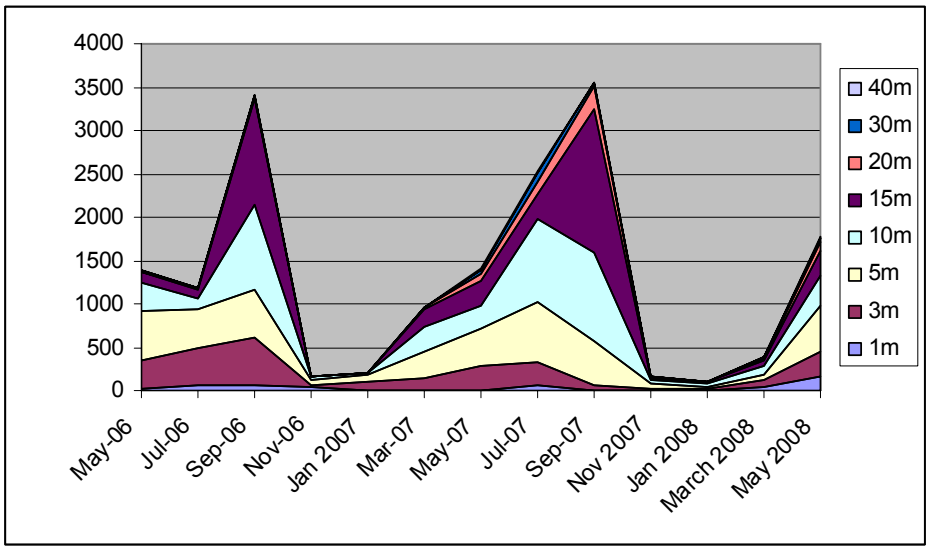

Fig. 1. The total zooplankton dynamics (total (x 1000 ind/m^3)), for the period May 2006-May 2008 in Bovilla Reservoir

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).

In the table 2 are given the weight data for the main zooplankton components of Lake Bovilla. The species *Diaphanosoma brachiurum, Bosmina longirostris, Cyclops vicinus* and *Mesocyclops leuckarti* are the main elements of the zooplankton considered within this paper. In the table 3 are shown the length-weight regression where is evidenced wide range of slope regression.

Table 2. Dry weights (in μm) of the crustacean species of Bovilla reservoir during seasons.

Species size class in μm	Winter	Spring	Summer	Autumn
Bosmina longirostris				
200-300	0.26	0.41		0.33
3001-400	0.73	0.99		0.8
401-500	1.09	1.45	1.44	1.33
Diaphanosoma brachiurum				
300-500		0.42	0.44	
501-700		0.92	2.1	
701-900		2.17	3.2	
901-1100		2.34	3.5	
Scapholeberis mucronata				
300-500		0.48	0.6	
501-700		0.89	1.2	
701-900		1.3	2.09	
Mesocyclops leuckarti				
adults male		3.8	1.6	1.8
adults fmeale		1.3	1.4	1.1
Cyclops vicinus				
adults male		17.1	21	
adults fmeale		11	10	
Copepodites all				
300-500		0.34	0.3	0.2
501-700		0.88	0.46	0.78
701-900	1.7	2.33	1.6	2.6
901-1100				
Nauplii all				
200-300	0.31	0.2	0.23	0.117
3001-400	0.58	0.55	0.41	0.33
401-500				

Table. 3. Length-dry weight relationship of size class species in Bovilla reservoir - ln(W)=lna+lnb(L)

Species	ln(W)=lna+lnb(L)
B. longirostris	ln(W)=3.01+3.4 ln(L)
D. brachiurum	ln(W)=1.081+2.455 ln(L)
S. mucronata	ln(W)=1780+2.433 ln(L)
M. leuckarti	ln(W)=1.211+2.556ln(L)
Ciclopodites	ln(W)=lna+lnb(L)
Nauplii	ln(W)=1.699+ 1.899ln(L)

Based on different sources it is stated that the crustacean weight is controlled by geographical distribution, different habitats, temperature and food presence. According to DUMONT et.al (1975) MICHALOUDI, E. (2005) etc, the trophic status of the lake may have impact to the seasonal variations of the weights. Further research in both crustacean species and rotifers are required in order to define whether the range values of length- weight regression are in compliance with those stated for the other continental waters.

REFERENCES

BOTTREL, H., A. DUNCAN, Z.M. GLIWICZ, E.GRYGIEREK, A. HERZIG, A. HILBRICHT-ILKOWSAKA, H.KURASAWA, P. LARSSON& T. WEGLENSCA (1976). A review of some problems in zooplankton production srudies. Norw. J. Zol., 24: 419 – 456.

BROOKS, J.L. & DOODSON, S.I (1965): Predation, body size and composition of plankton. Science, 150, 28-35.

DUMONT, H.J., VAN DE VELDE & S. DUMONT (1975). The dry weight estimate of biomass in a selection of Cladocera, Copepoda and Rotatoria from plankton, periphyton and benthos of continental waters. Oecologia, 19: 75-97

MALLEY, D.F., LAWRENCE, M.A., FINDLAY (1989). range of variations in estimates of dry weights for plankton species. Can. Tech. Rep. Fish. Aquat. Sci., 1666

MICHALOUDI, E. (2005) Dry weight of the zooplankton of Lake Micri Prespa (Macedonia, Greece). Belg. J. Zol., 135 (2): 223-227.

SHUMKA, S & NIKLEKA, N. (2008). a ten years life story of development of zooplankton populations at the Bovilla reservoir. 3rd Congress of Ecologist of Macedonia.