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# ASSESSMENT OF THE ZOOPLANKTONIC COMMUNITIES IN AQUATIC BASINS IN THE SOUTHERN AREA OF ROMANIA

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***Abstract***

*In the present work, the results of the assessment of the state of zooplankton communities are presented from different types of water bodies. For the study, water samples were collected and analyzed from three types of water basins: systematic pond (EC 1 lfov and EC 1 Cazaci - SCDP Nucet), semi-systematic pond (Iaz no. 7 Crevedia) and reservoir (Bunget 2). The research was carried out in 2023, and the results highlighted the fact that the composition of the zooplankton in the aquatic ecosystems studied was made up of species belonging to the taxonomic groups: Rotifera, Copepoda and Cladocera. Based on these aspects, the qualitative and quantitative structure of the zooplankton in the studied water basins was established. Were identified 24 taxa (16 taxa - Rotifera, 3 taxa - Copepoda and 5 taxa - Cladocera). The weight of each taxonomic group is different in the three types of ecosystems: in the systematic pond - type water basins, cladocerans predominate (38.7% in EC 1 Cazaci and 44.0% in EC 1 Ilfov), in semi-systematic pond Iaz no. 7 Crevedia rotifers predominate (69.5%) and in Bunget 2 reservoir copepods predominate (49.5%).*

***Key words****: reservoir, semi-systematic pond, systematic pond, water basin, zooplankton.*

## INTRODUCTION

Zooplankton, by its structure and functions, is indispensable for the normal and efficient development of the circuit of matter and energy in a lentic water basin (Battes, 2018; Battes, 2010). Zooplankton is an ecologically and economically important food source for fish and plays an important role in the transfer of organic matter through food webs. It is one of the basic components of the trophic chain, not only because it represents the trophic base of most filtering organisms, but also because of its qualitative structure. Zooplankton respond rapidly to environmental variability, and changes in population dynamics and species composition often indicate changes within water bodies. Within the appearance and development of organisms with a trophic role, a seasonality related to climatic factors and a variability related to those of the aquatic environment (physico-chemical, biological) can be distinguished (Radu, 2019). This is expressed in the modification of the structure and functional indicators (Lebedenco, 2020). In aquatic ecosystems, filtering zooplankton organisms are the main consumers of vegetable and animal detritus suspended in the water mass and on the bottom of water bodies, directly transforming dead organic matter into biomass for the upper trophic link, thus shortening trophic chains and accelerating the cycle of matter in ecosystems (Pricope, 2011).
Zooplankton can provide useful information on ecosystems and are an ideal indicator for assessing ecosystem health (Richardson, 2008). Any variation in zooplankton biomass has implications for biogeochemical cycling, trophodynamics, fishing and ecosystem services (Caroppo et al., 2013).

## MATERIALS AND METHODS

The research on the evaluation of the state of the zooplankton communities in the water basins in the southern area of Romania was carried out in between May-August 2023. Three types of water basins were chosen: systematic pond, semi-systematic pond and reservoir.
The definitions of water bodies used in this study are as follows (Leonte & Leonte, 2005):
- the *systematic pond* is located on a flat land with a low slope, obtained as a result of its

damming. Systematic ponds are made in excavation or filling, surrounded totally or partially by dykes, provided with supply, drainage and perimeter channels, equipped with hydrotechnical constructions and water supply, retention and drainage installations;
- the *semi-systematic pond* is located in the course of a valley, dammed at its narrowest point. The water supply is made from running water, springs, precipitation, pumping stations;
- the *reservoir* is an artificial lake, created by a dam that retains the water of a river, located upstream of a hydroelectric power plant in order to form a water reserve necessary for the production of electricity, but also for the water supply of some localities and for different tourist uses.

Systematic ponds are located within the Research and Development Station for Fisheries Nucet. The EC 1 Ilfov systematic pond (1 ha) is located within the Nucet experimental base and for the research carried out this basin was not fertilized.

The EC 1 Cazaci systematic pond (2.15 ha) is located within the Cazaci experimental base and for the research carried out, this basin was fertilized (8 tones manure/ha).

The ponds within Research and Development Station for Fisheries Nucet are used to grow cultured fish in summer I.

The Iaz no.7 Crevedia semi-systematic pond (4.8 ha) is located in Crevedia commune, Dâmbovița county. The function of the pond is fish farming, with the practice of recreational fishing.

The Bunget 2 reservoir (91.0 ha) is located in the village of Bunget, Văcărești Commune, Dâmbovița county, upstream of the Brătești reservoir and downstream of the Bunget 1 reservoir. The functions of the reservoir are: fish farming, electricity production and flood mitigation.

To evaluate the state of the zooplankton communities, the following structural parameters and biocenotic indices were calculated: average numerical density (N, ex/$m^3$), percentage numerical abundance (NA, %), total number of taxa (TNT), zooplankton biomass (g/$m^3$), the dominance index DI (Mc. Naughton & Wolf) and the Shannon-Wiener diversity index (H).

To determine the structure of the planktonic zoocenosis, a total of 20 samples were collected and analyzed. Water samples were taken from three points (from the supply, center and outlet area) and were collected from the surface horizon (0.2 - 0.5 m). After collecting, the sample volume (10 liters) was concentrated by filtration, using the planktonic net made of silk sieve no. 25 (mesh size being 40-50 μ/side).

The zooplankton concentrate was transferred into 100-150 ml glass vials. The sample thus obtained was preserved with 4% formalin. In the laboratory, the samples were concentrated by slow gravitational sedimentation for three weeks, after which the supernatant was removed by siphoning, without shaking the sample.

The zooplankton from the samples thus processed was analyzed qualitatively and quantitatively with a stereomicroscope and a microscope (Axio microscope Vert A.1 -Zeiss) in Kolkwitz type cells. The qualitative determination of the main zooplankton taxonomic groups: Rotifera, Cladocera, Copepoda was made according to: Dussart (1966), Negrea (1983).

*Numerical density* was calculated by counting all individuals belonging to each species. Finally, the number of individuals for each taxonomic group was added up, from which the total number of individuals in the analyzed sample resulted. The final result was reported in the number of exemplares per $m^3$, taking into account the amount of initially filtered water. The *average numerical density* was obtained by calculating the arithmetic average of the analyzed samples.

The *percentage numerical abundance* (NA, %) was calculated by relating the number of individuals of a species (ni) to the total number (N) of individuals in the sample.

$$NA = (ni /N)x100$$

The *total number of taxa* (TNT) was calculated for the representatives of the main groups (*Rotifera, Copepoda, Cladocera*).

*Zooplankton biomass* was calculated in wet matter.

The number of individuals of each species was multiplied by the corresponding individual mean value. Finally, the total biomass per taxonomic group was calculated by summation

and then the total biomass per sample, reporting the results in grams per cubic meter.

*The dominance index (Mc. Naughton, & Wolf)* was calculated according to the formula:

$$DI\ (\%) = \frac{Y1 - Y2}{Y} \times 100$$

where:

Y1 = numerical density of the most abundant species; Y2 = number density of secondary species as number density; Y = total number density. Dominance index shows the degree of influence that the first two species with the greatest numerical development have in a biocenosis.

*The Shannon-Wiener diversity index* is based on information theory and was calculated according to the formula:

$$H' = -\sum_{i=1}^{S} p_i \ln p_i$$

where:

$p_i$ - represents the numerical, percentage or biomass abundance of species i in the sample;

ln - is the natural logarithm (the logarithm to base e, where e=2.71);

S - the number of species.

The index reflects both species diversity and the evenness of their abundance in the community. The condition of the biotic communities is better in case of higher index value.

## RESULTS AND DISCUSSIONS

During the research period, along with the water samples collected to assess the state of the zooplankton communities, water samples were also collected for the analysis of the main physical-chemical parameters of the water (Figure 1).

Figure 1. Water sampling for analysis (own source)

The interpretation of the obtained results was carried out in accordance with the provisions of the "Regulations on the classification of surface water quality", correlated with the data from the specialized literature for waters used for fish farming (OMMGA no. 161/ 2006) (Table 1).

The values recorded during the course of the study shown in table 1, recorded the following characteristics:

The **pH** generally showed a neutral reaction and which falls within the recommended and favorable range for the life of aquatic organisms 7.2 - 7.6 upH.

The **alkalinity** of the water indicates the content of bases, carbonates and bicarbonates. The content of calcium bicarbonate $Ca(HCO_3)_2$ depends on the concentrations of calcium carbonate ($CaCO_3$), magnesium bicarbonate and $CO_2$ in the water . During the entire monitoring period, the alkalinity recorded values between 3.1-4.20 ml HCl/l, according to Ord. MMGA no. 161/2006 for aquaculture waters.

**Concentration of calcium ions ($Ca^{2+}$)** from the surface waters have recorded values that are below the maximum limits allowed for fish waters, and according to Ord. MMGA 161/2006 they fit into the first quality class. The calcium present in the water, expressed in mg/l, represents an element that has a special role for the development of aquatic organisms and the feeding of fish. Calcium ions along with magnesium ions are essential in the development and normal growth of aquatic organisms.

**The concentration of magnesium ions ($Mg^{2+}$)** in the surface waters recorded values that are in the optimal range for fish waters of the II-th category of use, according to Order 161/2006.

**$Ca^{2+}$/$Mg^{2+}$ ratio** falls within the optimal range for category II aquaculture waters.

**Organic substance** presented values that fall within the maximum limits allowed, according to the specialized literature (20-60 mg $KMnO_4$/l). In the case of anaerobic decomposition of proteins or odorless compounds, the amount of algae and bacteria affects the aquatic environment.

**Dissolved oxygen** in water is an important chemical factor that conditions the life of aquatic organisms, facilitates the mineralization of organic substances, influences the

photosynthesis of aquatic flora and microflora, influences metabolism, assimilation and the toxicity of some water compounds. The concentration of oxygen in the water depends on the temperature and clarity of the water. The factors that lead to the decrease of $O_2$ in the water are: increased water temperature, high turbidity, degree of water bloom, etc. Analyzing the dissolved oxygen values from table no. 1, it is found that the water falls into the I and II quality classes.

**Ammonia ($NH_3^+$)** can be present in water in molecular form, undissociated ($NH_3$) or dissociated, in the form of ammonium ions ($NH_4^+$). The ratio between the two forms of ammonia (dissociated and undissociated) depends on the pH and water temperature. The passage of $NH_4^+$ into $NH_3$ is achieved all the more strongly, the higher the temperature and the pH of the water is higher. Ammonium ions are non-toxic for fish, the toxicity of ammonium salts being given by the ammonia molecules. The dissociation depends on the pH of the water, the toxicity increasing proportionnally with the increase in the pH of the water due to the large amount of undissociated molecules in the solution. Ammonia was not present in the analyzed samples.

**Nitrates ($NO_2^-$)** recorded values between 0.008 and 0.012 mg/l, falling within the optimal values for the life of aquatic organisms. These values, according to Ord. MMGA no. 161/2006 regarding the classification of surface water quality, classify the waters from the samples taken, in quality classes I-II. The specialized literature also limits the values of nitrites to max. 0.3 mg/l. In quantities outdated nitrites become toxic and affect the health of aquatic organisms, even leading to deaths.

**Nitrogen anions ($NO_3^-$)** recorded values between 0.088-1.28 mg $NO_3^-$ /l, falling within the optimal values for fish growth. According to the nitrate content, the water from the analyzed samples is in quality class I, in accordance with Ord. MMGA no. 161/2006.

**Phosphorus** is a limiting factor of aquatic life. It is found in the form of phosphates in waters. Phosphates determine the productivity of a fish pond, the amount of phosphates measured in the analyzed samples is between 0.082-1.28 mg/l, falling within the limits provided by Ord. MMGA no. 161/2006 for aquaculture waters.

The **chlorines,** determined from the samples taken, presented values that fall within the maximum allowed, according to specialized literature. From the point of view of the content of chlorides in the water, it falls into category I of quality, as stipulated by Ord. MMGA no. 161/2006 regarding the classification of surface water quality.

Table 1. The average values of the main physical-chemical parameters of the water in the studied basins

| *No. crt.* | *The physical-chemical parameter* | | *UM* | *Parameter values* | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | **EC 1 Ilfov** *(systematic pond)* | **EC1 Cazaci** *(systematic pond)* | **Iaz no. 7 Crevedia** *(semi-systematic pond)* | **Bunget 2** *(reservoir)* | *Optimum according to quality standards* |
| | | | | *The average of the results obtained in the analysis* | | | | |
| 1 | pH | | pH units | 7.4 | 7.4 | 7.2 | 7.6 | 7-7.8 |
| 2 | Temperature | | $^0$C | 22.2 | 23.5 | 23.3 | 22.5 | 20-26 |
| 3 | Alkalinity | | mg/l | 190.4 | 189.1 | 232.4 | 256.4 | 200-400 |
| 4 | Calcium ($Ca^{2+}$) | | mg/l | 45.2 | 44.6 | 41.8 | 40.8 | 90-120 |
| 5 | Magnesium ($Mg^{2+}$) | | mg/l | 15.56 | 15.80 | 33.56 | 28.94 | 10-40 |
| 6 | $Ca^{2+}$ / $Mg^{2+}$ | | mg/l | 2.90 | 2.82 | 1.24 | 1.40 | 5 |
| 7 | Organic substance | | mg $KMnO_4$/l | 44.6 | 32.2 | 24.6 | 38.5 | 20-60 |
| 8 | Oxygen | | mg/l | 7.26 | 7.85 | 8.56 | 7.52 | 05-10 |
| 9 | Ammonia ($NH^+_3$) | | mg/l | lack | lack | lack | Lack | lack |
| 10 | Nitrates ($NO^-_3$) | | mg/l | 1.28 | 0.88 | 0.92 | 1.02 | 2.5-4 |
| 11 | Nitrites ($NO^-_2$) | | mg/l | 0.012 | 0.008 | 0.018 | 0.02 | 0.03 |
| 12 | Phosphates ($PO^{3-}_4$) | | mg/l | 0.108 | 0.086 | 0.082 | 1.28 | 0.05-1.5 |
| 13 | Chloride | $Cl^-$ | mg/l | 6.71 | 6.36 | 7.13 | 8.23 | 30 |
| | | Na Cl | mg/l | 11.10 | 10.52 | 11.69 | 13.44 | 20 |
| 14 | Ammonium ($NH^+_4$) | | mg/l | 0.36 | 0.24 | 0.64 | 0.88 | 0.5-1 |
| 15 | Total hardness | | ($^0$D) | 9.92 | 9.88 | 13.6 | 12.4 | 12 |

**Ammonium ($NH_4^+$)**. According to the ammoniacal nitrogen content, in accordance with Ord. MMGA no. 161/2006 regarding the classification of surface water quality, the analyzed samples fall into quality class I, with very small variations over the entire studied period.

**The total hardness** presented values between 9.92 and 13.6° D, values that fall within the limits accepted by the specialized literature.

*To evaluate the state of zooplankton communities,* the following structural parameters and biocenotic indices were analyzed: average numerical density (N, ind./$m^3$), percentage numerical abundance (NA, %), total number of taxa (TNT), biomass (g/$m^3$), the dominance index and the Shannon-Wiener diversity index (H) (Figure 2).

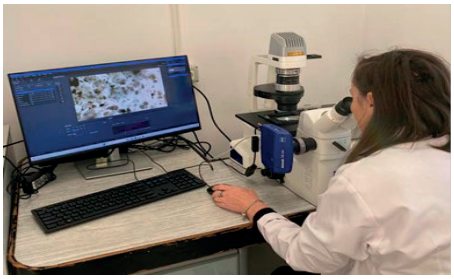

Figure 2. Microscopic analysis of zooplankton (own source)

*Average number density* (N, ex/$m^3$) of zooplankton in the analyzed samples varied significantly (Figure 3). The average number of representatives for the main groups (*Rotifera, Copepoda, Cladocera*) was: 345,250 ex/$m^3$ obtained in EC 1 Ilfov (systematic pond); 1,406,833 ex/$m^3$ obtained in EC 1 Cazaci (systematic pond); 163,500 ex/$m^3$ obtained in Iaz no. 7 Crevedia (semi-systematic pond); 400,250 ex/$m^3$ obtained in Bunget 2 (reservoir).

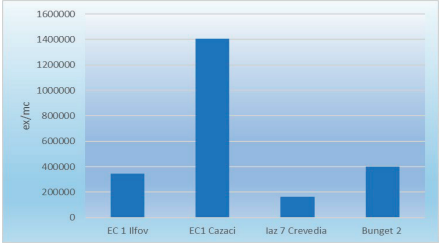


Figure 3. Average numerical density of zooplankton in the analyzed samples

The average with the lowest value was obtained in EC 1 Ilfov and the highest value was obtained in EC 1 Cazaci.

The *average numerical density* of zooplankton for each taxonomic group had minimum and maximum values, as follows:

- *Copepoda*: 24667 ex/$m^3$ (semi-systematic pond - Iaz no. 7 Crevedia) and 478833 ex/$m^3$ (systematic pond - EC1 Cazaci);
- *Rotifera*: 72167 ex/$m^3$ (semi-systematic pond - Iaz no. 7 Crevedia) and 383000 ex/$m^3$ (systematic pond - EC1 Cazaci);
- *Cladocera*: 7050 ex/$m^3$ (semi-systematic pond - Iaz no. 7 Crevedia) and 545000 ex/$m^3$ (systematic pond - EC1 Cazaci).

It is observed that the minimum limits for the three taxonomic groups were reached in semi-systematic pond (Iaz no. 7 Crevedia) and the maximum limits in fertilized systematic pond (EC 1 Cazaci).

*The percentage numerical abundance* (NA, %), varied in each water body type. In the systematic ponds, the highest values are recorded by the *Cladocera* taxonomic group (38.7% EC1 Cazaci and 44.0% EC1 Ilfov). The abundance of zooplankton in the EC 1 Ilfov is mainly due to the fertilizers distributed as part of the basin preparation works, before the start of the study. In Iaz no. 7 Crevedia the highest value was obtained by the *Rotifera* taxonomic group (69.5%), and in Bunget 2 reservoir the highest value was recorded by the *Copepoda* taxonomic group (49.5%) (Figure 4).

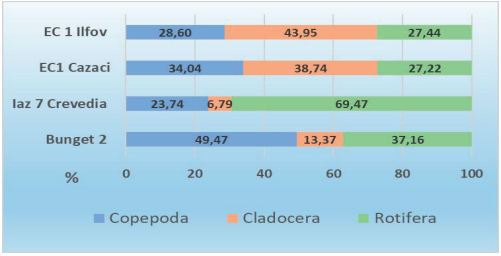


Figure 4. Numerical percentage abundance of zooplankton in the analyzed samples

*The total number of taxa (TNT)* is an important indicator of the diversity of hydrobiological communities. Following the qualitative and quantitative analysis of the zooplankton, the presence of a number of 24 taxa, which belong to the systematic groups: *Rotifera, Copepoda* and *Cladocera.* A number of 16 taxa belong to

the taxonomic group *Rotifera*, 3 taxa belong to the taxonomic group *Copepoda* and 5 taxa belong to the group *Cladocera*. The highest number of taxa was found in EC 1 Cazaci (20), and the lowest number was found in EC 1 Ilfov (15). The number of taxa encountered for Iaz no. 7 Crevedia was 17, and for Bunget 2 reservoir it was 18 (Figure 5).

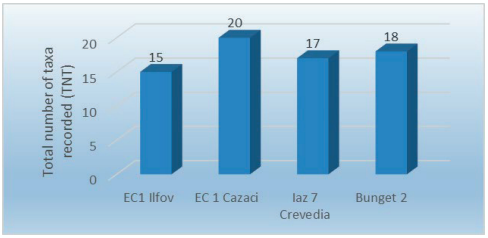


Figure 5. Total number of taxa (TNT) recorded in the analyzed samples

The taxonomic structures of zooplankton species identified for each water basin in the research are presented in Figures 6, 7, 8 and 9.
Following the qualitative and quantitative analysis of the zooplankton in **EC 1 Ilfov**, the presence of a number of 15 taxa is found (Figure 6). The systematic group *Rotifera* is represented by 10 species, *Copepoda* by 2 species and *Cladocera* by 3 species. The largest number of specimens was recorded by the species *Daphnia magna* (*Cladocera*) with 68288 ex/m$^3$ and the lowest number was obtained by the species *Euclanis* sp. (*Rotifera*) - 1885 ex/m$^3$.

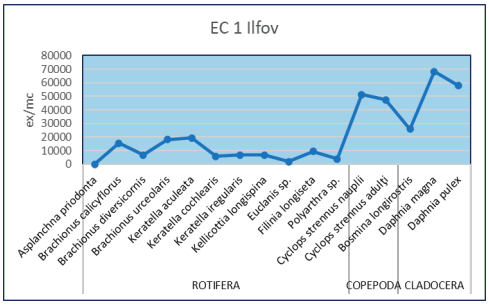


Figure 6. Taxonomic structure of the species identified in the zooplankton from the EC 1 Ilfov (fertilized systematic pond)

Following the qualitative and quantitative analysis of the zooplankton in **EC 1 Cazaci,** the presence of 20 taxa was found (Figure 7). The systematic group Rotifera is represented by 14 species, Copepoda by 2 species and Cladocera by 4 species. The highest number of specimens was recorded by the species *Cyclops strennus nauplii* (Copepoda) with 335183 ex/m$^3$ and the lowest number was obtained by the species *Polyarthra sp* (Rotifera) – 3830 ex/m$^3$.

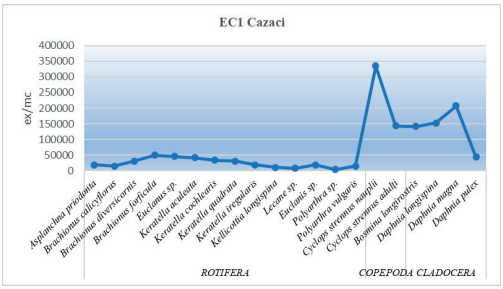


Figure 7. Taxonomic structure of the species identified in the zooplankton from the EC 1 Cazaci (unfertilized systematic pond)

The zooplankton analysis in **Iaz no. 7 Crevedia** showed the presence of 17 taxa (Figure 8). The systematic group Rotifera is represented by 11 species, *Copepoda* by 3 species and Cladocera by 3 species. The highest number of specimens was recorded by the adult *Cyclops strennus species* (*Copepoda*) with 15540 ex/m$^3$ and the lowest number was obtained by the *Daphnia cucullata* (*Cladocera*) species - 1622 ex/m$^3$.

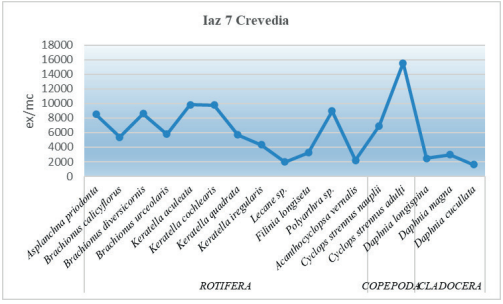


Figure 8. Taxonomic structure of the species identified in the zooplankton from the Iaz no. 7 Crevedia (semi-systematic pond)

The zooplankton analysis in **the Bunget 2 reservoir** showed the presence of 18 taxa (Figure 9). The systematic group Rotifera is represented by 12 species, *Copepoda* by 2 species and Cladocera by 4 species. The highest number of specimens was recorded by the adult *Cyclops strennus* species (*Copepoda*) with

108900 ex/m$^3$ and the lowest number was obtained by the *Euclanis sp.* (*Rotifera*) species – 120 ex/m$^3$.

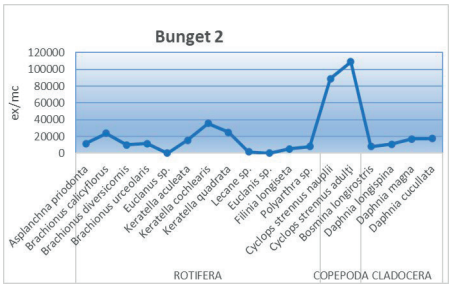


Figure 9. Taxonomic structure of the species identified in the zooplankton from the Bunget 2 (reservoir)

***Average biomass*** for the main taxonomic groups (*Rotifera, Copepoda, Cladocera*) had different values, depending on the average individual weight of each taxonomic group.

The total zooplankton biomass recorded for the 3 taxonomic groups is presented as follows:

- EC 1 Ilfov 45,940 g/m$^3$;
- EC1 Cazaci 76,779 g/m$^3$;
- Iaz 7 Crevedia 6,309 g/m$^3$;
- Bunget 2 - 11,004 g/m$^3$.

Thus, if for the taxonomic group *Rotifera* the lowest value was recorded in Iaz no. 7 Crevedia (semi-systematic pond) - 0.202 g/m$^3$, and the highest value was recorded in EC 1 Cazaci (unfertilized systematic pond)-1.048 g/m$^3$, for the *Cladocera* group, the average biomass had the minimum value recorded in the Bunget 2 (reservoir) - 5.046 g/m$^3$ and the highest value was recorded in EC 1 Cazaci-66.88 g/m$^3$. For the *Copepoda* taxonomic group, the average biomass had the minimum value recorded in Iaz no. 7 Crevedia -1.060 g/m$^3$ and the highest value was recorded in EC 1 Cazaci - 8.846 g/m$^3$ (Figure 10).

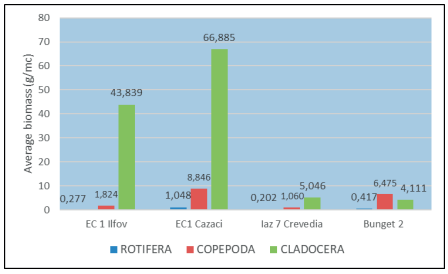


Figure 10. Average biomass for the main taxonomic groups of zooplankton in the analyzed samples

***Average Biomass*** is closely correlated with average weight for each individual taxonomic group.

The systematically non-fertilized pond (EC 1 Ilfov) recorded a zooplantonik biomass with 40.2% less than a systematically fertilized pond (EC 1 Cazaici).

The non-fertilized semi-systematic pond (Iaz 7 Crevedia) recorded a zooplantoik biomass with 91.8% less than a systematically fertilized pond (EC1 Cazaici).

The non-fertilized reservoir (Bunget 2) recorded a zooplantonik biomass with 85.7% less than a systematically fertilized pond (EC1 Cazaici).

***The Dominance Index*** (Mc. Naughton, & Wolf) (DI). Through the analysis of the dominance index, the degree of influence of the first two species with the greatest numerical development in an aquatic biocenosis was shown. So, following the results obtained, the best value was obtained in EC 1 Ilfov (fertilized systematic pond) - 19.78% and the lowest value was obtained in Bunget 2 (reservoir) - 4.95% (Figure 11).

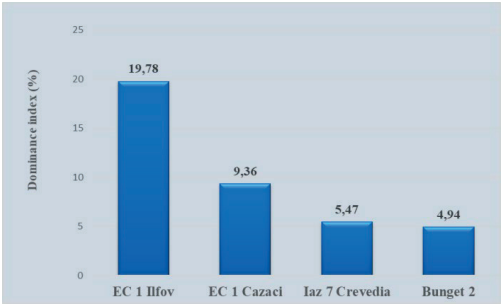


Figure 11. The Dominance Index (*Mc. Naughton & Wolf*)

***Shannon-Wiener diversity index*** To analyze the alpha-diversity of zooplankton communities based on numerical abundance, the Shannon-Wiener diversity index was calculated. Thus, according to the data obtained, the best condition of the zooplankton is at the Iaz no.7 Crevedia - 2.66, and the weakest condition was obtained in the Bunget 2 reservoir - 2.28 (Figure 12).

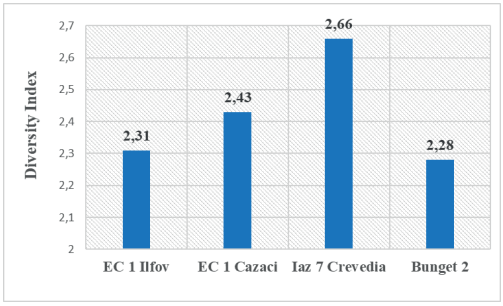


Figure 12. Diversity index (*Shannon-Wiener*)

## CONCLUSIONS

The research on the evaluation of the state of the zooplankton communities in aquatic basins in the Southern area of Romania was carried out in year 2023 and studied three types of water basins: systematic pond, semi-systematic pond and reservoir.

***From a chemical point of view***, most of the parameters in the analyzed samples fall into the II class of surface water quality, according to Order 161/2006.

The ***average numerical density*** of zooplankton for each taxonomic group had minimum and maximum values. Following the results obtained, it can be said that the average numerical density of zooplankton in the analyzed samples varied significantly for the three types of water basins. This fact was influenced by several factors, such as: the type of basin, technological interventions on water bodies, the time of day when the sample was taken, meteorological conditions.

***Average Biomass*** - Among the 3 non-fertilized basins (EC 1 Ilfov, Iaz no. 7 Crevedia and Bunget 2) the highest zooplankton biomass was recorded in EC 1 Ilfov (systematic pond), respectively 45,940 g/m$^3$. Compared to the systematically unfertilized pond (EC 1 Ilfov), the semi-systematic unfertilized pond (Iaz 7 Crevedia) produced a zooplantonik biomass with 13.7% less, and the unfertilized reservoir (Bunget 2) with 24% less.

***Dominance index***. The best value was obtained in EC 1 Ilfov -19.78% and the lowest value was obtained in the Bunget 2 reservoir - 4.95%. EC 1 Cazaci indicated a value of 9.36% and Iaz no. 7 Crevedia – 5.47%.

Analyzing the values of the ***Shannon-Wiener diversity index***, the better condition of the zooplankton was registered in Iaz no.7 Crevedia - 2.66, and the lowest condition was obtained in the Bunget 2 reservoir - 2.28.

EC 1 Cazaci indicated a value of 2.43 and EC 1 Ilfov - 2.31.

Zooplankton, as the most dynamic component of aquatic invertebrates, in the researches carried out, is characterized by an uneven development, disturbances of the population both in terms of quantitative and qualitative structure.

## REFERENCES

Caroppo, C., Buttino, I., Camatti, E., Caruso, G., De Angelis, R., Facca, C., Giovannardi, F., Lazzara, L., Mangoni, O., & Magaletti, E. (2013). State of the Article and perspectives on the use of planktonic communities as indicators of environmental status in relation to the EU Marine Strategy Framework Directive. *Biol. Apple. Mediterr., 20* (1), 65-73.

Leonte, C., & Leonte, D. (2005). *Fish constructions and facilities.* Iași, RO: Alfa Publishing House, p. 35.

Dussart, B. (1966). *Limnology, l etude des eaux douces.* Copenhagen, D: Politikens Publishing House Forlag.

Battes, K. P. (2010). *The study of the structure, dynamics and biomass of the zooplankton crustacean community with an emphasis on common species.* Clujană University Press, Abstract of the PhD thesis, 7-10. https://doctorat.ubbcluj.ro/sustinerea_publica/rezumate/2010/biologie/BATTES_KARINA_EN.pdf

Battes, K. P. (2018). *Ecology of planktonic microcrustaceans (Crustacea: Cladocera, Copepoda) from natural (Ştiucii Lake) and artificial (Ţaga Mare Lake) water bodies*. Cluj-Napoca, RO: Clujană University Press.

Lebedenco, L. (2020). Evaluation of the state of zooplankton communities in the conditions of the change of the aquatic environment. *Materials of the symposium "Functional changes of aquatic ecosystems in the context of anthropogenic impact and climate change"*, Chisinau, Republic of Moldova, 42-45.

Negrea, S. (1983). *RSR fauna, Crustacea*, vol. IV, fasc. 12. Bucharest, RO: Academy RSR Publishing House.

Pricope, F. (2011). *Secondary production of aquatic ecosystems.* Vasile Alecsandri" University of Bacău Faculty of Sciences Department of Biology, Ecology and Environmental Protection, 8-23.

Radu, S. (2019). *Water quality monitoring in reservoirs.* Dissertation work / Lower Danube University in Galati.

Richardson, A.J. (2008). In hot water: zooplankton and climate change. *ICES Journal of Marine Science*, 65, 279–295.