Abstract

The hydrobiology of canals in Eastern and Western Europe has been sparsely investigated. Therefore, I was motivated to study the hydrological and environmental factors which cause zooplankton diversity in Bydgoszcz Canal and the Noteć Canal (Poland). The first goal of my research was the assessment of zooplankton variability depending on the locations of the designated sites. The Bydgoszcz Canal sites showed the greatest diversity, abundance and biomass of zooplankton compared to sites in the Brda River or the Noteć Canal. The reason may be different tolerance to water movement. For example, slower water flow (in Bydgoszcz Canal's sites) directly effects zooplankton development by creating more stable growth conditions. The locks on the Bydgoszcz Canal reduce water flow. This had an indirect influence by increasing the number of macrophytes that create ecological niches, in turn benefitting the development of zooplankton organisms, especially crustaceans.

I also tried to determine the impact of human activity on quality of canals water. One of the symptoms of human pressure is an increase in trophy, therefore zooplankton indicators were applied. I used the rotifers to indicate the trophic state in canals, because they were the most numerous group of zooplankton both in terms of quality and quantity. During my study I assessed trophic state changes based on zooplankton indicators - rotifers (TSI_{ROT}) and an indicator based on Secchi disk visibility (TSI_{SD}) in artificial, slow-flowing and stagnant canal waters. The indices calculated on the basis of qualitative and quantitative data of rotifers correlated with the TSI_{SD} index. I found that rotifers taxonomic composition was typical for eutrophic and shallow waters. According to obtained results the rotifers seem to be an important indicator of trophic state in canals. Therefore, they might be included in the list of biological quality elements.

The canals are rich in various hydrological structures e.g. locks. I also study the variability of zooplankton near the locks, so the next goal of research was to determine how hydrotechnical constructions can affect the zooplankton of the canal. I assessed the variability of environmental conditions and zooplankton upstream and downstream of the locks. The hydrotechnical structures (locks) shaped the zooplankton community in canals. Zooplankton diversity, density and biomass were mostly higher at the sites upstream compare to the sites downstream of the locks. Only at site 1 the pattern was different. Both qualitatively and quantitatively, zooplankton was richer downstream of the lock than upstream of the lock. This may be due to the re-suspension of bottom sediments and the release of organic matter and

nutrients into the water. Water movement inside the lock may release additional food resources and organisms associated with these resources.

Based on the statistical analysis upstream of the locks, the concentration of chlorophyll affected the number of rotifers (Rotifera). Downstream of the locks, the temperature stimulated the development of zooplankton, especially crustaceans (Crustacea).

The canals seem to be a very attractive place to live for zooplankton organisms and the research conducted as part of the doctoral dissertation provides new data about these artificial ecosystems.

Keywords: artificial waterways, physico-chemical water parameters, rotifers, crustaceans, water flow