

## EVALUATION OF THE WATER QUALITY INDICATOR MACROZOOBENTHOS EXISTENT IN CRISUL REPEDE IN 2007

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### **Abstract**

*The purpose of this paper is to display aspects of monitoring the surface waters based on the macrozoobenthos biological indicator.*

*The macrozoobenthos was evaluated in 2007, in 21 different locations of the Crisul Repede river. In order to set up a list of the existent species, it has been taken into consideration different water quality parameters that favor the existence of the phytoplankton, influencing thus the quality of the water.*

**Key words:** phytoplankton, water.

### **INTRODUCTION**

For the purpose of realizing limnological researches and the monitoring of the surface waters quality, in accordance with the requirements stipulated within the Water Framework Directive, it turns out that the macrozoobenthos samples are necessary and representative (quantitative and qualitative researches). The macrozoobenthos samples provide information both concerning the taxonomic composition and the density of the macrozoobenthos taxa. The growth and the development of the macrozoobenthos depend both on the abiotic factors of environment and the biotic factors (competition, pressure of the herbivorous animals and parasitism).

### **MATERIALS AND METHODS**

In order to achieve our objectives, the following steps undertaken were to identify the representative sections, taking samples, performing laboratory analysis and data processing. There were used accredited methodologies of analysis and evaluation of the results.

The samples were taken during 2007, namely, in different campaigns organized (2-3): the frequency of the sampling activity depended on the type of the monitoring program (observation or operational) of every section. There were monitored 21 sections: Crisul Repede – am Alesd. Crisul Repede – am Oradea, Crisul Repede – Tarian, Cropanda – Tileagd, Uileac – Ineu de Cris, Tasad – Osorhei, Peta – am. Sanmartin, Peta – av. Oradea, Alceu – Toboliu,

Secatura – Pestis, Corhana Dobrinesti – Cacuciul Vechi, Alunis – Braisoru, Chijic – Sacadat, Mnierea – am. Galaseni, Dragan – am. Dragan, Crisul Repede – av. Suncuius, Iad – Bulz, Crisul Repede - Cheresig, Secatura – Pestis, Margauta - Margau. The act of taking macrozoobenthos samples was performed in accordance with the instructions mentioned by the standards *Water quality – Guide for quantitative and qualitative sampling of the macrozoobenthos from the internal waters*. In order to analyze the invertebrate animals existent in the rivers, there were taken quantitative and qualitative samples.

The sub-basin of the Crisul Repede river was monitored on 21 different locations, out of which 2 locations were defined as CBSD (Crisul Repede – upstream Alesd and Peta – upstream Sanmartin). CBSD means “the best available location”.

Table 1

Dominant species in monitored sections on main water courses

|                              |                                                   |     |
|------------------------------|---------------------------------------------------|-----|
| Crisul Repede - Tarian       | Bythinia tentaculata Linne,Godeanu2002            | BTL |
|                              | Gammarus R. fossarum,Koch,Godeanu2002             | GRF |
|                              | Rhitrogena semicolorata Curtis 1834               | RS  |
| Crisul Repede - av. Suncuius | Ancylus fluviatilis O.F.Muller                    | AF  |
|                              | Gammarus C.roeselli Gervais                       | GRF |
|                              | Rhitrogena semicolorata Curtis                    | RS  |
|                              | Rhyacophila dorsalis Curtis                       | RD  |
|                              | Hydrpsyche angustipenis Curtis                    | HA  |
| Crisul Repede - am.Alesd     | Unio pictorum(Linne1758)                          | UP  |
|                              | Nais communis Piguet                              | NC  |
|                              | Gammarus Rivulogammarus fossarum Koch,Godeanu2002 | GRF |
| Crisul Repede - Cheresig     | Bithynia leachi Scheppard                         | BL  |
|                              | Unio pictorum Linne                               | UP  |
|                              | Anodonta cygnea Linne                             | AC  |
| Crisul Repede - av. Huedin   | Haemopsis sanguisuga,Linne1758,Godeanu2002        | HS  |
|                              | Chironomus plumosus,Linne,Godeanu2002             | CP  |
|                              | Haemopsis sanguisuga,Linne1758,Godeanu2002        | HS  |
| Crisul Repede - am. Oradea   | Gammarus C.roeselli Gervais                       | GR  |
|                              | Hydropsyche instabilis,Curtis,Godeanu2002         | HI  |
| Crisul Repede - Saula        | Gammarus Rivulogammarus fossarum Koch 1835        | GRF |
|                              | Gammarus C.roeselli Gervais                       | GR  |

As it is displayed within Table no. 1, there was discovered on the main water-course a high number of macrozoobenthos representatives species. The majority of taxa were found out on the region Crisul Repede – av. Suncuius.

Table 2

Dominant species in monitored sections on ssecondary water courses

|                            |                                               |     |
|----------------------------|-----------------------------------------------|-----|
| Cropanda - Tileagd         | Haemopsis sanguisuga, Linne 1758, Godeanu2002 | HS  |
|                            | Hydropsyche instabilis Curtis, Godeanu2002    | HI  |
| Dragan - am. Dragan        | Gammarus Rivulogammarus fossarum Koch         | GRF |
|                            | Stenophylax stellatus                         | SP  |
|                            | Sericostoma personatum Kirbi&Spence           | AN  |
|                            | Anabolia nervosa Curtis                       | AN  |
| Mniera - am. Galaseni      | Gammarus Rivulogammarus fossarum Koch         | GRF |
|                            | Astacus astacus Linnaeus                      | AA  |
| Uileac - Ineu de Cris      | Nais communis Pignet                          | NC  |
|                            | Gomphus vulgatissimus Linne                   | GV  |
| Peta - av. Oradea          | Bythinia tentaculata Linne                    | BT  |
|                            | Gyraulus albus O.F.Muller                     | GA  |
|                            | Haemopsis sanguisuga Linne, Godeanu2002       | HS  |
|                            | Physa acuta Draparnaud, Godeanu2002           | PA  |
|                            | Nais communis Pignet1906, Godeanu2002         | NC  |
|                            | Bythinia leachi Scheppard                     | BL  |
| Iad - Bulz                 | Gammarus Rivulogammarus fossarum Koch         | GRF |
|                            | Sericostoma personatum Kirbi&Spence           | SP  |
|                            | Hydropsyche instabilis Curtis                 | HI  |
| Alceu - Toboliu            | Nais communis Pignet, 1906                    | NC  |
|                            | Nais pardalis Pignet                          | NP  |
| Secatura - Pestis          | Gammarus R.fossarum Koch                      | GRF |
|                            | Heptagenia sulphurea Muller                   | HS  |
| Peta - Sanmartin           | Melanopsis parreyssi Muhlfeld                 | MP  |
|                            | Gyraulus albus (O.F.Muller1774)               | GA  |
|                            | Viviparus acerosus rumanicus                  | VAR |
|                            | Nais communis (Pignet1906)                    | NC  |
| Margauta - Margau          | Gammarus Rivulogammarus fossarum Koch         | GRF |
|                            | Gammarus roselli Gervais 1835                 | GRF |
|                            | Anabolia nervosa Curtis                       | AN  |
|                            | Stenophylax stellatus                         | SS  |
| Alunis - Braisoru          | Gammarus roselli Gervais, 1835                | GRF |
|                            | Gammarus Rivulogammarus balcanicus Karaman    | GRB |
| Chijic - Sacadat           | Gammarus Rivulogammarus fossarum              | GRF |
|                            | Heptagenia sulphurea Muller 1776              | HS  |
| Dobrinesti - Cacuciu Vechi | Gyraulus albus O.F.Muller 1774                | GA  |
|                            | Gammarus Rivulogammarus fossarum Koch         | GRF |
| Tasad - Osorhei            | Gerris Aquarius paludum Fabricius             | GAP |
|                            | Dytiscus marginalis Linne                     | DM  |

As it is displayed within Table no. 2, there was discovered on the secondary water-course a high number of macrozoobenthos representatives species. The majority of taxa were found out on the region Peta – av. Oradea, Margauta - Margau.

In Figure no. 1, one can notice a significant existence of the macrozoobenthos on main watercourses, on the tributary streams. The most diverse macrozoobenthos is discovered in the following regions: Crisul Repede – am. Oradea, Crisul Repede – av. Huedin.

In Figure no. 2, one can notice a significant existence of the macrozoobenthos on secondary watercourses, on the tributary streams. The most diverse macrozoobentos is discovered in the following regions: Peta – av. Oradea, Peta – Sanmartin, Cropanda – Tileagd, Mnierea – am. Galaseni, Iad – Bulz, Dragan – am. Dragan.

According to the Order 161/2006, (Ordinul 161/2006, Ministerul Mediului și Gospodăririi Apelor ) the annual average values of the saprobic index depending on the macrozoobenthos, were situated between the limits 1,53 and 2,53. These values classify the water quality of the monitored regions in the quality classes I, II and III.

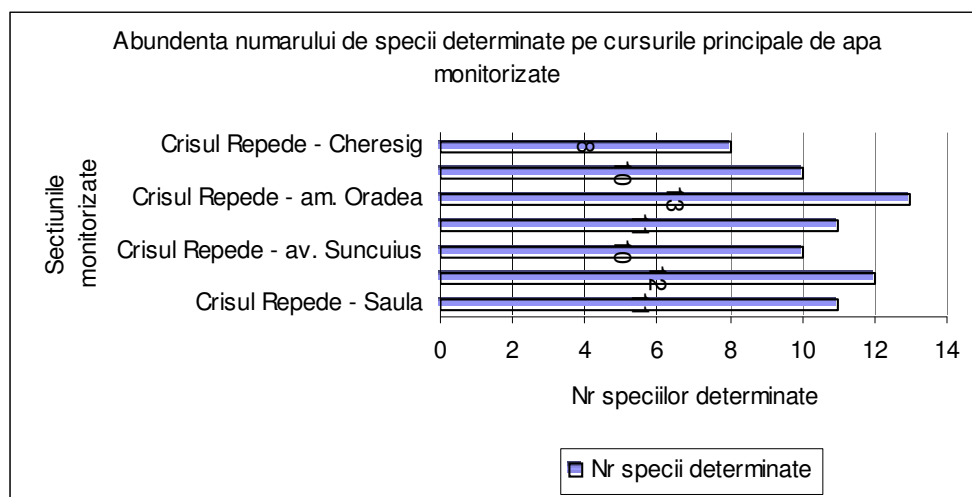


Fig. 1. Abundance of macrozoobenthos species on the main-course sections water of Crisul Repede river in 2007

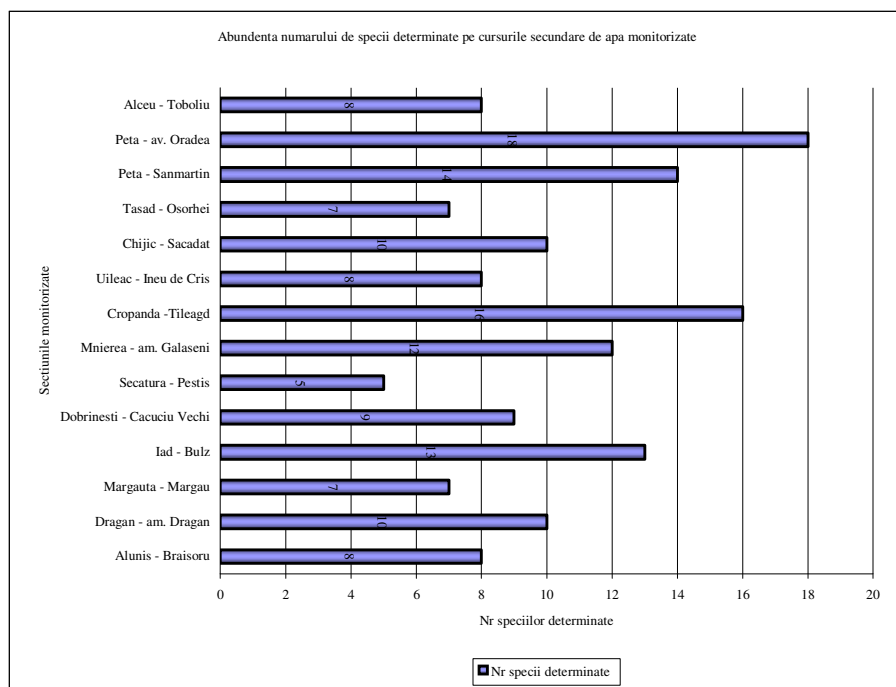


Fig. 2. Abundance of macrozoobenthos species on the secondary course sections water of Crisul Repede river in 2007

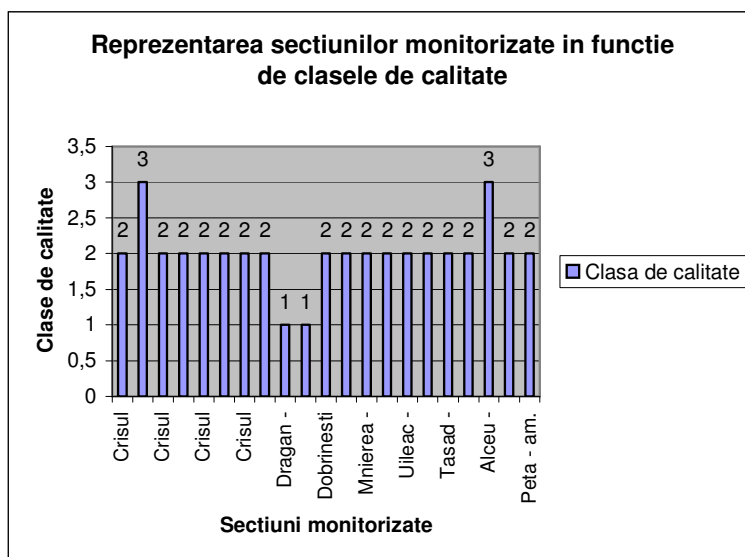


Fig. 3. Representation of sections monitored by macrozoobenthos in quality classes

Figure no. 4 comes to underline that out of the total areas that were studied based on their macrozoobenthos in 2007, 80% of the sections belong to water quality class II, 10% of the sections belong to water quality class I, while 10% of them were placed in the class III. Now, in what concerns the areas placed in the quality class II, the value of the saprobic index is situated between the limits 1,8 and 2,3, while as for those situated in the quality class III, the saprobic index value is situated between the limits 2,3 and 2,7, and for the areas placed in the quality class I, the value of the saprobic index is situated behind 1,8. (Studiu privind elaborarea sistemelor de clasificare si evaluare globala a starii apelor de suprafata conform cerintelor DCA 2000/60/CEE pe baza elementelor chimice, biologice si hidromorfologice).

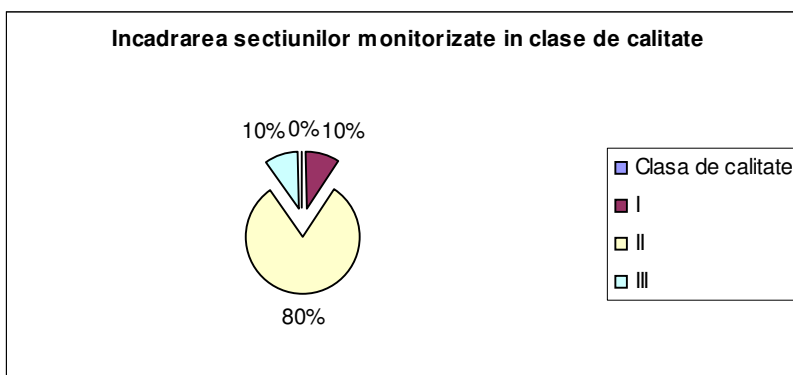


Fig. 4. Framing sections monitored by macrozoobenthos in quality classes

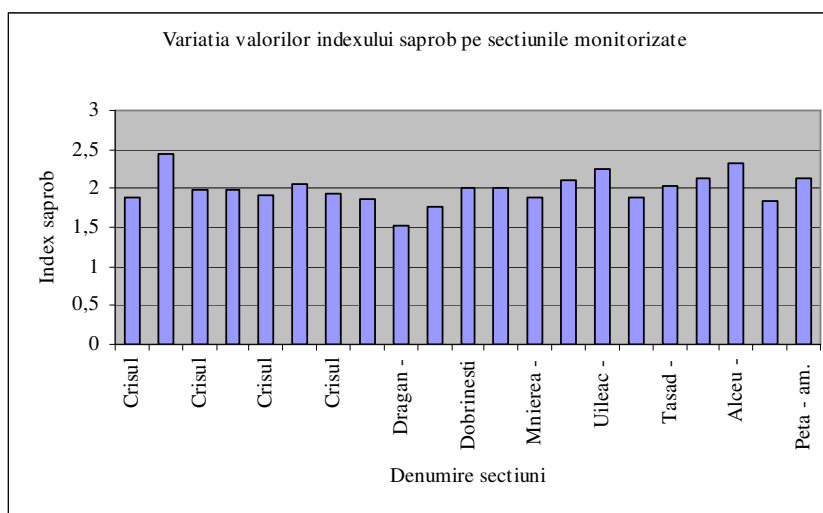


Fig. 5. Variation of the average values of IS

Out of the total of macrozoobenthos species found in Crisul Repede river in 2007, the majority is represented by the species that belong to the gastropode group, oligocheta group, trichoptera group and bivalvia group.

Figure no. 5 presents variation of the average values of saprobic index in monitored sections.

## CONCLUSIONS

The evaluation of the existent macrozoobenthos in Crisul Repede river, in 2007, was based on the analysis of the samples taken from 21 different locations. Based on the analysis referring to taxonomic composition, it was ascertained the existence of a high variety of taxa.

A rich number of macrozoobenthos was recorded on the main stream, namely in the section Crisul Repede – am. Oradea, Crisul Repede – av. Huedin.

In what concerns the secondary streams, , the most diverse macrozoobenthos can be traced in the sections Peta – av. Oradea and Cropanda - Tileagd. After having first determined the values of the saprobic index, we have obtained a classification of the watercourses, depending on the existent macrozoobenthos, namely a classification referring to the water quality classes, in accordance with the Order 161/2006: 2 sections belonged to the water quality class I, 17 sections belonged to the water quality class II, while 2 sections belonged to water quality class III. The water quality alteration necessarily implies a rise of the anthropological impact, as waste water – impact: specific composition changes, the disappearance of sensitive taxa, changes in abundance of invertebrate fauna, local biota devastation, disruption of food chains, energy production – impact: stop migration of benthic invertebrates, fish – impact: over exploitation of aquatic organisms.

The analysis of absolute frequency in ind./m<sup>2</sup> of the macrozoobenthos provides valuable information concerning its area of expansion. (Îndrumar “Metode de analiză biologică pentru urmărirea evoluției calității apelor”, ICPGA, 1978). The macrozoobenthos, from the quantitative point of view, was characterized by finding a number of organisms. This parameter, on the whole period when the samples were taken, had oscillatory values in all the watercourses that were analyzed. The maximum number of organisms was recorded during summer months. The type of the impact on the Crisul Repede river was represented by the confluence of the Peta creek, by disposals of industrial plants from the city of Oradea (e.g. Sinteza SA), by discharge of wastewater treatment plant of Oradea, by industrial water disposals SC Mobil Tileagd SA, SC Sectia Impregnant Traverse Tileagd SA, geothermal water

disposal from (locality) “1 Mai”, disposal: geothermal water, plant of Sanmartin, RA Airport of Oradea, storage lake of Alceu and storage lake of Tileagd.

Although there exists a diverse anthropological impact upon Crisul Repede river, the taxonomic spectrum of the macrozoobenthos is pretty rich.

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