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ANTROPIC IMPACT ON WATER QUALITY IN THE LOWER MURES BASIN

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Abstract: *Water is life, it is an environmental factor without which man would not be able to carry out any kind of activity, being necessary both for daily personal consumption and for the development of industries. Water leakage on the earth's surface is the mechanism by which erosion sculpts the natural environment, leading to the creation of valleys and delts with fertile surfaces favorable to the development of human centers. It is a major topic of interest that this environmental factor is the most polluted of all. The work aims to present the water quality of the Mures River on the section Savarsin - Arad - Nadlac for a period of three consecutive years, namely,2017, 2018 and 2019. The analyses were carried out within the Mures Water Basin Administration. Following water analyses carried out by the Water Quality Laboratory of the Mures Water Basin Administration, the results were compared and interpreted with the physico-chemical quality standards of Order 161 from 2006. Based on the analyses carried out, it was found that most indicators fall into the higher quality classes, with the exception of the biochemical oxygen consumption (CBO_5), whose 2017 values were in the third quality class, and then improved their values thus reaching the second quality class from 2018. As well as the chemical oxygen content (CCO-Cr) which in 2017 and 2018 is in the quality class III, then in 2019 reaching the second quality class. The rest of the indicators are in the first and second quality classes.*

Keywords: water quality, nutrients, pollutants, anthropogenic impact, quality indicators

• Introduction

Water is the environmental factor most affected by pollution, and water pollution is the cause of 25% of hospital cases recorded annually.
Water is also hygiene factors, energy factor, transport factor, raw material indispensable to technological activities, as well as a source of leisure.
Inland waters are the environment most affected by human activities. Quality deterioration is done physically, chemically, biologically and radioactively, ranging from minor damage, to damage that turns certain rivers into real surface leaks of some canal waters.
Rivers are the most used surface flowing waters to get rid of waste, on the logic that "let them be taken by the water to the valley and so we get rid of them". This has led to situations where some waters from the area of discharge of certain pollutants become unusable for any kind of use over tens or hundreds of kilometers. Rivers carry not only what comes from industry and human settlements, but also what is washed from farmland and zootechnical farms.

• Matherial and methods

The Mures River is part of the Mures river basin, located in the western part of Romania, springing from the Hasmasul Mare Mountains, the Eastern Carpathians.
According to ArcGIS, the hydrographic basin (including the Ier channel) has a total area of 28418km^2, thus representing 11.97% of the country's area. The hydrographic network consists of 798 cadastral watercourses, 10861 km long and an average density of 0.39 km/km^2. Under the Management Plan of the Mures Hydrographic Basin, the criteria for analysis met, only 711 of the watercourses. (Fig. 1)

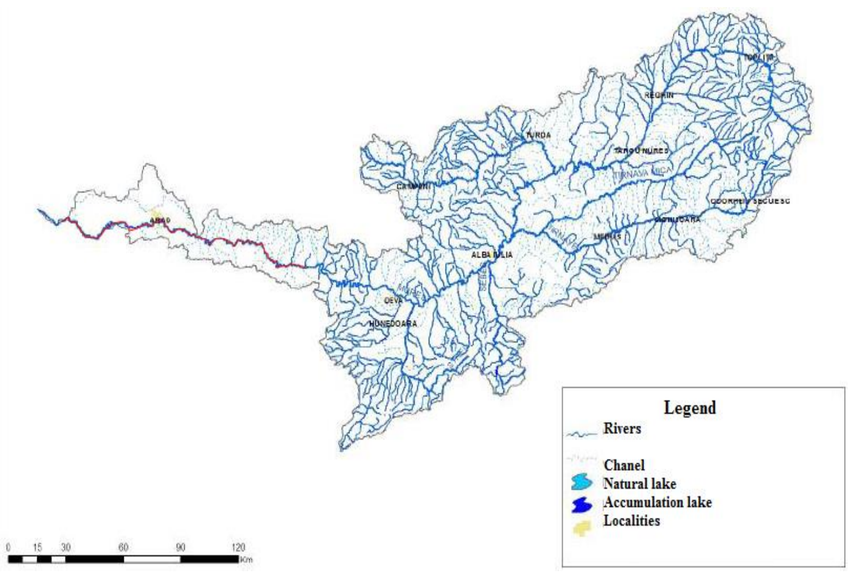

Fig. 1. Control section taken on the route Savarsin - Arad - Nadlac from the Mureș river basin

The following indicators were targeted for assessing the ecological status/ecological potential of the chemical status respectively: biochemical oxygen consumption ($CBO_{5),}$chemical oxygen content (CCO-Cr), dissolved oxygen, total nitrogen (N total), ammonium ($N\text{-}NH_{4),}$nitrites ($N\text{-}NO_{2),}$nitrates ($N\text{-}NO_{3),}$total phosphorus (total P), phosphates ($P\text{-}PO_{4),}$anion-active detergents, total phenols, dissolved arsen, dissolved chromium (Cr3++ Cr6+), dissolved copper (Dissolved), dissolved zinc, dissolved nickel and dissolved lead.

• Results and discutions

The comparative analysis of 2017, 2018, 2019 tracks the status of all indicators analysed. With regard to biochemical oxygen consumption (CBO_5), there is obvious an improvement in water quality in this respect becausein 2017 CBO_5 was in the third quality class, in 2018 it improved its condition thus reaching quality Class II, and in 2019 remaining in the same quality class.
Comparing the chemical oxygen content (CCO-Cr) during the three-year period, there is a slight progress , especially in 2019 in which the chemical oxygen content is classified in the second quality class, until then it is found in the third quality class during 2017 and 2018.
In the case of the total nitrogen indicator (Total N) we also have a change in values over the course of all three years, with values falling within the second quality class.
As regards the ammonium regime ($N\text{-}NH_4$), it is classified during the three years studied in quality class I, also showing a slight variation.
Nitrites ($N\text{-}NO_2$) during all three years of analysis fall into the same quality class, i.e. in Class II even though they show a slight lysting.
The nitrogen content ($N\text{-}NO_3$) is slightly varied, however, during the three years taken into account, the quality Class II threshold has not been exceeded.
From the point of view of phosphates ($P\text{-}PO_4$), they are in a slight, continuous growth but not affecting the quality class of which they belong, i.e. not having sufficient values to leave quality class I.
According to the samples analysed, we can also see a slight decrease in dissolved chromium (Cr3++ Cr6+), which is classified throughout the study period in quality class I.
During 2017 dissolved nickel values were in quality class I, then in 2018 in the Arad area there was a major increase that ranked the 2018 river values in terms of nickel in quality Class II, returning back to quality class I. in 2019
According to the analyses we note that the dissolved plumb indicatorshows an increase over the three years, so in 2017 and 2018 it ranks in the first quality class, then in 2019 it reaches the quality class II.

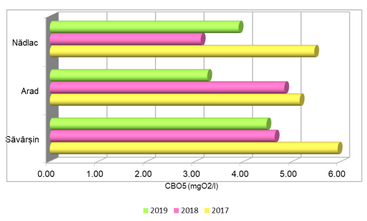

Fig.2 Evolution of biochemical oxygen consumption

Fig.3 Concentration of chemical oxygen content

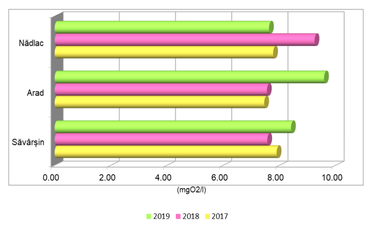

Fig.4 Level of dissolved oxygen

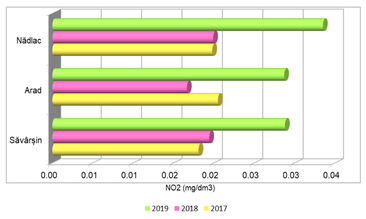

Fig.5 Nitrites levels

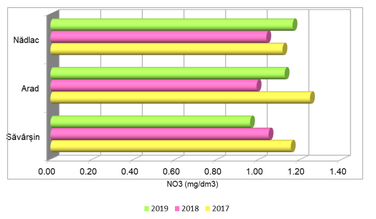

Fig.6 Nitrogen content

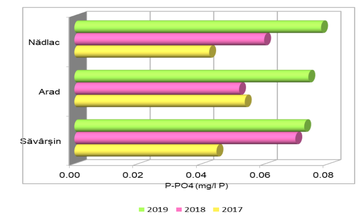

Fig.7 Evolution of Phosphates

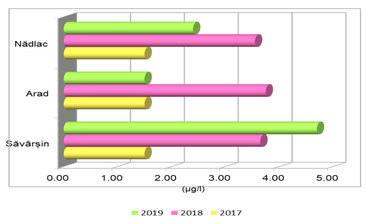

Fig.8 Levels of total phenols

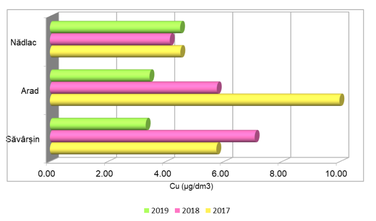

Fig.9 Concentration of dissolved copper

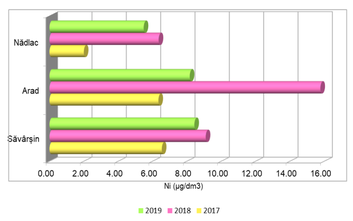

Fig.10 dissolved nickel level

Conclusions

Water nutrients (nitrogen, ammonium, nitrites and nitrates, phosphates) have low values that have not exceeded the quality class II level, which shows that the impact of agriculture on water through the fertilizations used is reduced..
In the metal category (Cu, Fe, Ni, Cr), water has very good variations between class I and second quality.
Pers overall, the water quality of the lower basin of the Mures River presents very good quality indicators, it is noted that from 2017 to 2019 there is a tendency to improve them, thus minimizing the impact of industry and agriculture on water.