A STUDY OF SOME QUALITY PARAMETERS OF THE NERA RIVER

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Abstract

In this paper we are monitored some quality parameters of the Nera river for to estimate de quality of water's Nera river . The Nera River is 132.5 km long, its hydrographic basin area is 1363 km2, and the density of its hydrographic network is 0.42 km/kmp. The quality of the water of the Nera River was monitored during the years 2006-2008, in four surveillance points, as follows: Pătăşel, Bănia, Sasca Română, and Naidăş, according to the 161/2006 standards in act. Water was sampled in the above mentioned surveillance points, and then analysed in the laboratories of the Romanian Waters Agency in Timişoara. We are analyzed water acidity, water dissolved oxygen, suspension and phenol mater amounts in the waters of the River Nera.

Key words: quality parameters, water acidity, water dissolved oxygen, suspension and phenol mater

INTRODUCTION

The Nera River has its source in the Semenic Mountains, south from the Baia Mare a Vulturilor Depression, through three thin water streams (whose flows are rather variables during the year) and it flows into the Danube (after forming, along 15 km, the natural border with Serbia). The Nera River is 132.5 km long, its hydrographic basin area is 1363 km2, and the density of its hydrographic network is 0.42 km/km2.

The Nera River has dug its spectacular gorges in the chalk (22 km long, a length record among similar geo-morphological units in the country). Ceramic fragments in the caves along the gorges (dated from the Neolithic), the presence of the settlements (belonging to the natives from Sasca Română and Şopotul Nou) and the fact that each wall of the gorges has a name (Cârşia Mare, Cârşia Foeroaga Mică, Cârşia Şoimului, Cleanţul Prehodului, etc.) prove that the area has been continuously inhabited along the millennia.

Along this sector of the gorges, the Nera River crosses the Cheile Nerei – Beuşniţa National Park, including the nature reserve with the same name.

MATERIAL AND METHOD

Water pollution refers to the alteration of the physical, chemical, and biological features of the water, produced directly or indirectly by human activities, and that makes the water unfit for normal use as it used to be previously.

The quality of the water of the Nera River was monitored during the years 2006-2008, in four surveillance points, as follows: Pătăşel, Bănia, Sasca Română, and Naidăş, according to the 161/2006 standards in act. Water was sampled in the above mentioned surveillance points, and then analysed in the laboratories of the Romanian Waters Agency in Timişoara.

The assessment of the water quality was done depending on the concentration of the quality indicators value and on the river flow at the time of the sampling.

pH value

pH value shows water acidity – alkalinity. The value 7.0 means neuter pH. Natural waters are slightly alkaline (pH between 7.2-7.4). pH range for potable water is 6.8-8.5. In Germany, the same range is 6.5-9.5.

Water dissolved oxygen amount

Water dissolved oxygen amount varies depending on the atmospheric pressure, on water temperature, on mineral salt content, on organic substance content, etc.

Oxygen has a relatively low solubility in water (it is inversely proportioned with water temperature); for certain particular values of the temperature, salinity, and atmospheric pressure, the amount of water dissolved oxygen represent a balance concentration (saturation).

The balance concentration of the dissolved oxygen depends on water temperature (for an atmospheric pressure of 760 mm Hg).

Time fluctuations of the oxygen saturation also depend on the following: oxygen release as a result of photosynthesis (macrophytae, algae), oxygen consumption by the bodies of the ecosystem, depth and stratification of the water, water organic substance load, water strong reducer load that occur in ponds with deposits of organic mud and with water stratification: sulphur hydrogen (H2S), ferrous sulphate (FeS), and methane (CH4).

The amount of water dissolved oxygen is being determined on a daily basis or whenever necessary, and particularly when the fish swim right below the water surface, when the fish gather by the water edge, when there is excessive development of the algae, and when aquatic insects show up.

Nitrate amount

Besides agricultural activities, human agglomerations also contribute to water pollution by nitrates and nitrites when they do not fit collection (sewage) and cleaning standards (lack of standards, lack of cleaning steps, improper functioning, etc.).

We also monitored suspension and phenol mater amounts in the waters of the River Nera as a result of the pollution in the area, of the discharge of the used waters and of other polluting sources, given their noxiousness.

RESULTS AND DISCUSSION

The following figures show the evolution of the main indicators of water quality for three consecutive years - 2006, 2007, and 2008.

The Pătăşel Sector

Located at 27.223 km from the springs, the Carpathian Mountains ecoregion, the type of the water body is Roo1a, and the 3 sampling campaign months was May.

The area is located on mica-schist crystal rock. Draining the southern part of the Semenic Mountains, the river changes its route at Pătaş – from north-south into north-east-south-west.

The route changing is determined by the lithological nature of the area: the river enters the Bozovici intra-mountain depression that was formed by the deepening of a straight area of crystal schist of the Semenic Mountain.

Acidity, i.e. water pH, ranges between 7.0-7.7, with higher values in 2008, while the amount of dissolved oxygen is smaller, i.e. between 8.8 and 10.30 mg/l, with a maximum in 2008, compared to the limit admitted of 6.2, which depends on water temperature, air pressure, oxidable substance content, and micro-organism content.

The amount of suspended matter is above limits compared to the limits stipulated by the standards in act (10 mg/l), i.e. between 28 and 34 mg/l, with a maximum in 2007, which denotes no pollution. The values of the physical and chemical indicators are within 1st class limits.

The Bănia Sector

Located at 38.52 km from the springs, the Carpathian Mountains ecoregion, the type of the water body is Roo5a, and the 3 sampling campaign months was May.

The sector is located by an auto-route bridge in Bozovici, in an area with insignificant pollution sources.

The amount of dissolved oxygen is between 8.6 and 10.10 mg/l compared to the limits accepted by the standards in act (6.2 mg/l), with maximum values in 2008, while the suspended matter amount also was much above admitted limits, i.e. 32-2 mg/l, with maximum values in 2007, as shown in Figure 2.

In 2007, iron content was 1.00 mg/l above the limit of 0.3 mg/l, with pollution from the natural environment since there are no pollution sources in the area.

As for phenol content, there was an increase in 2008 of 2.5 micrograms/l compared to the standard limit of 1 mg/l.

The Sasca Română Sector

The Sasca Română Sector is located upstream from the locality Sasca Română, at the Oravița flowing point.

Located at 85.37 km from the springs, the Carpathian Mountains ecoregion, the type of the water body is Roo4a, and the 3 sampling campaign months was May.

Suspension matter also was above admitted limits in this sector, with maximum values in 2007.

Dissolved oxygen also had values above standard values, as well as iron content did. Water quality ranged within the 2nd quality class.

The Naidăş Sector located at 106.994 km from the springs, the Carpathian Mountains ecoregion, the type of the water body is Roo12a, and the 3 sampling campaign months was May.

Water pH ranged between 7.6 and 8.1; the amount of suspension matter also was above the values stipulated by the standards in act; the amount of nitrates was also above standard values, with a maximum value in 2008; the amount of phenols was much above standard limits, with a double value in 2006.

The amount of detergents increased much above normal limits, i.e. it ranged between 8.0 and 11.0 micrograms/l compared to 0.1 micrograms/l as stipulated by the standards in act.

The sector is located downstream from some pollution sources of little importance in the Bozovici and Sasca area, with water quality ranging within 2nd quality class.

Figures 1, 2, 3, 4, and 5 show the evolution of the main indicators of water quality in the River Nera and their evolution per years and per surveillance sectors.

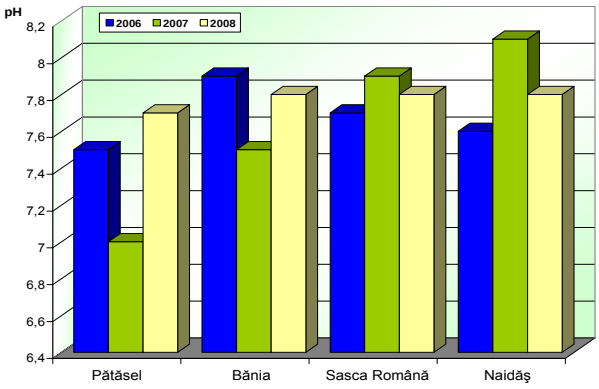

Fig. 1. Evolution of pH per sectors

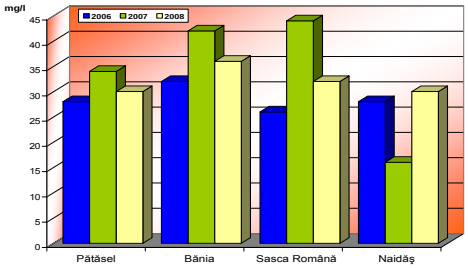

Fig. 2. Evolution of suspension matter per sectors

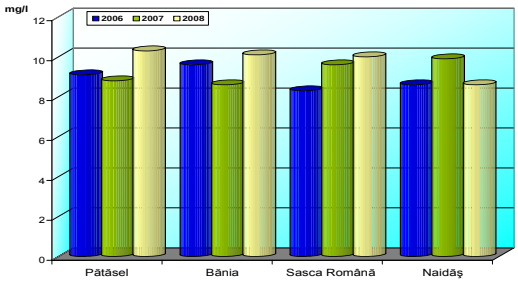

Fig. 3. Evolution of dissolved oxygen amounts per sectors

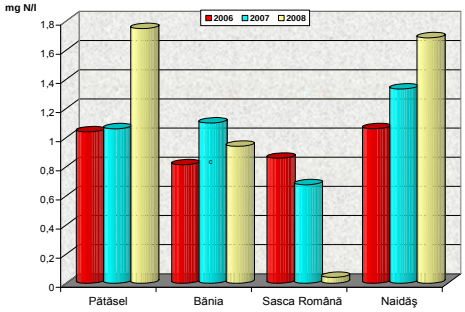

Fig. 4. Evolution of nitrate amounts per sectors

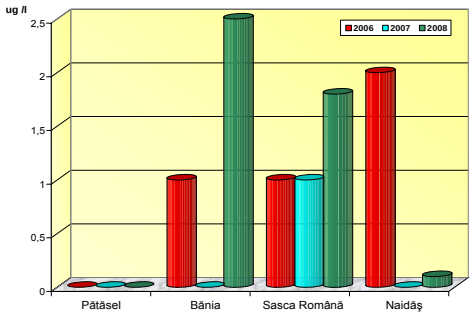

Fig. 5. Evolution of phenol content per sectors

CONCLUSIONS

The river flow was between 3.87 and 44.2 m3/s for the 4 sectors during the period 2006-2008.

The quality of the Nera River water was monitored during the years 2006-2008 along 4 surveillance sectors, i.e. Pătăşel, Bănia, Sasca Română, and Naidăş.

From the point of view of water quality, as a result of the assessment of the main quality indicators for the 4 control sectors, we can say that the River Nera can be classed as 1st and 2nd quality according to the standard 161/2006.

After a thorough evaluation of the most important chemical indicators we analysed from the Pătăşel, Bănia, Sasca Română, and Naidăş control sectors we could see they have no negative – toxic or otherwise – impact on the human body and that they result in no changes of the water features that could be easily identified or that limit the water uses.

The River Nera is a low-pollution river, though it crosses highly-frequented tourist areas.

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