STUDY OF NUTRIENTS AND SOME TOXIC AND SPECIFIC POLLUTANTS FROM CRIŞUL REPEDE RIVER

Gîtea Daniela*, Iovan Vasile*, Paşca Bianca*, Pallag Anamaria*

*University of Oradea, Faculty of Medicine and Pharmacie, 29 N. Jiga St., 410048 Oradea, Romania, e-mail: gitea_daniela@yahoo.co.uk

Abstract

Study of nutrients and some toxic and specific pollutants of water from Crişul Repede river were made by following chemical indicators over a period of ten months of 2010, from january to october: nutrients (ammonium, nitrates, nitrites, total nitrogen, orthophosphates, total phosphorus), salinity (alkalinity), toxic pollutants (barium, zinc).

Key words: Crişul Repede river, nutrients nitrates, nitrites, fosfor, bariu, zinc.

INTRODUCTION

Factors that lead to water pollution are varied and numerous and they can be grouped into:

- **demographic factors,** represented by the number of population in a specific area, observing that the pollution is proportional to population density.
- **urbanistic factors,** corresponding to development of human settlements which use large quantities of water that return to nature in the form of wastewater, heavily polluted.
- **industrial or economic factors**, represented by the level of economic development and especially a region's industrial the purposes increase pollution along with industry growth.

Pollution, though regarded as a general phenomenon can be differentiated into several types, grouped as follows:

- **biological pollution** - bacteriological, virological and parasitological - directly linked to human prezeţa. It is the oldest type of pollution and belongs to the characteristic areas developing or underdeveloped.
- **physical pollution** especially with radioactive substances, but also caused by thermal or insoluble elements or floating, or sediments.
- **chemical pollution** on which we stop the utmost, is the penetration of chemicals in water ranging from the easily degradable organic, toxic to the long persistence and remanence, this type of pollution can be met both areas economically advanced and lagging behind in the fan with the highest enrollment, so that pollutants, as well as the consequences [8].

MATERIAL AND METHOD

Water samples were collected by Crişul Repede river, upstream of Oradea, together with employees of the National Administration, Romanian Waters "Basin Water Administration of Criş Water.

Tracking physical indicators was done over a period of ten months of 2010, from january to october.

Determination of nitrite in water

Nitrites in the water came from incomplete oxidation of ammonia in the presence of nitrifying bacteria. They represent a more advanced stage of decomposition processes of organic substances containing nitrogen and therefore their presence or increase of water concentration shows a normal old pollution (days-weeks) and therefore less dangerous. The presence of ammonia and nitrites Co shows a continuous pollution. Sometimes reducing nitrites and nitrates may come in the presence of flora and reducing the environmental temperature is higher (summer).

Methods for determining nitric acid in water are mainly based on diazotare reactions, in acid and subsequent coupling with amino derivatives. Conservation of nitrites in water samples is made by adding salts of Hg (II) and by adding chloroform in water samples can be preserved azotiții over 100 days.

Principle of a method: nitrite reacts with sulphanilic acid in strongly acidic medium, resulting diazonium salt, which coupled to a pH = 2 to 2.5 with α-naphthylamine, azo compound forms a purple colored red.

Determination of nitrates in water

Nitrates in water came from the soil, especially after the mineralization of organic pollutants such as fertilizers or pesticides protein or containing nitrogen. Nitrates can be a factor for development of aquatic algae or other plant.

Principle of a method: nitrates are able to react with phenol-disulphonic acid forming nitro, yellow, whose intensity is proportional to the concentration of nitrates.

Determination of phosphorus in water

In water, phosphorus is mostly in the form of phosphates. They come through dissolution of minerals and then accompanied by fluoride anion, or water pollution by chemical fertilizers, detergents, alkalis, leaking plumbing, etc.. Due to algae or microorganisms consume the phosphorus, to analysis, samples of water conservation is necessary.

Phosphates come the water by industrial waste water pollution with pesticides and fertilizers and detergents. It promotes eutrophication of natural basins have role in the development of algae.

Principle of a method: phosphate reacts with ammonium molybdate to form ammonium fosfomolibdatul that the presence of a reductant, giving rise to a blue colored complex, colorimetrically.

Determination of water alkalinity

Water alkalinity is given by the presence of bicarbonates, carbonates alkaline and alkaline hydroxides teroşi.

Principle of a method: neutralization of a quantity of water analyzed with a dilute acid in the presence of indicator.

Determination of specific toxic pollutants of natural origin

Determination of barium in the water

Water barriers may exist in the form of carbonate or chloride, so natural, especially in pollution. Principle of a method: barium is precipitated with sulfuric acid as barium sulphate in alcohol medium in the presence of indicator thorin.

Determination of zinc in water

Zinc, the weak acid solution (pH = 4) reacts with ditizona, forming zinc ditizonat complex, colored red, which is extracted with carbon tetrachloride. The color intensity is proportional to the concentration of the complex formed is measured spectrophotometrically and zinc at a wavelength of 535 nm.

RESULTS AND DISSCUSIONS

Nutrient values from Crisul Repede river falls within limits for ammonium, nitrate and organic nitrogen, water is placed in first class quality. And for nitrogen, total nitrogen, phosphorus, orthophosphates and water falls in Class I and II quality. There is an increase of parameters far beyond the limits imposed by class quality in june 2010.

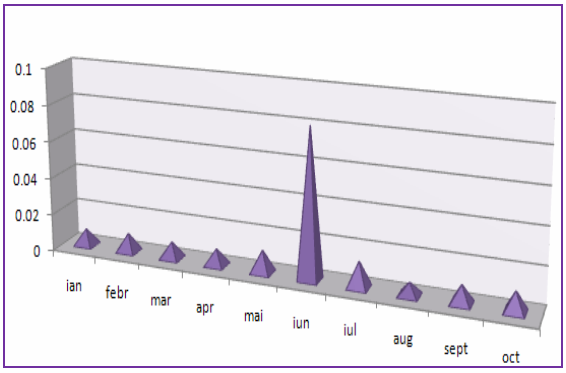

Fig. 1. Variation of ammonium and nitrogen content

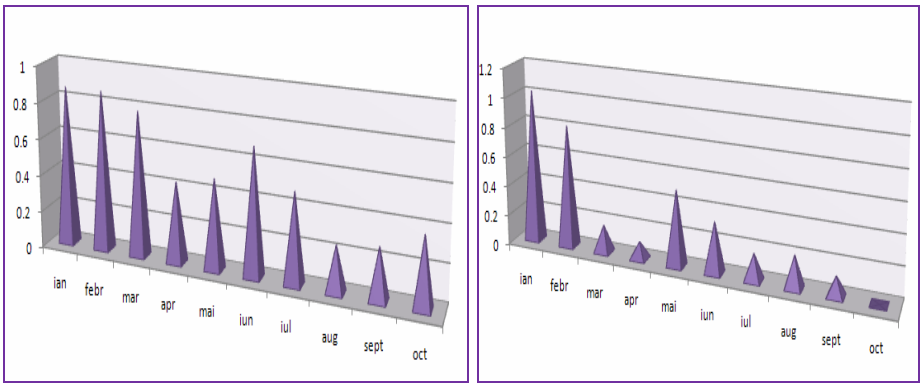

Fig.2. Variation of nitrogen and organic nitrogen

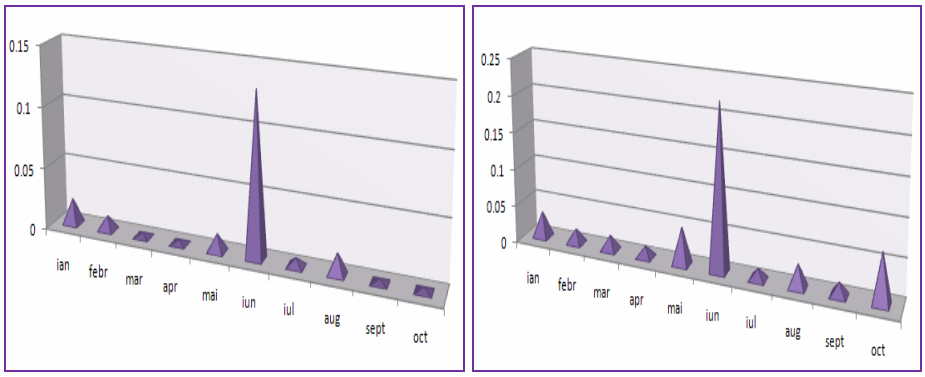

Fig.3. Variation of nitrogen and organic nitrogen

The analysis values indicated by the salinity from river water can fit Crişul Repede in Class I of quality, even if from plot shows a wide variation of values.

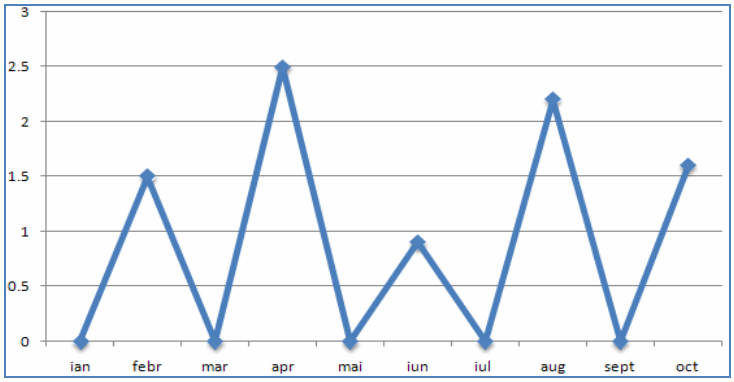

Fig.4. Variation of alkalinity

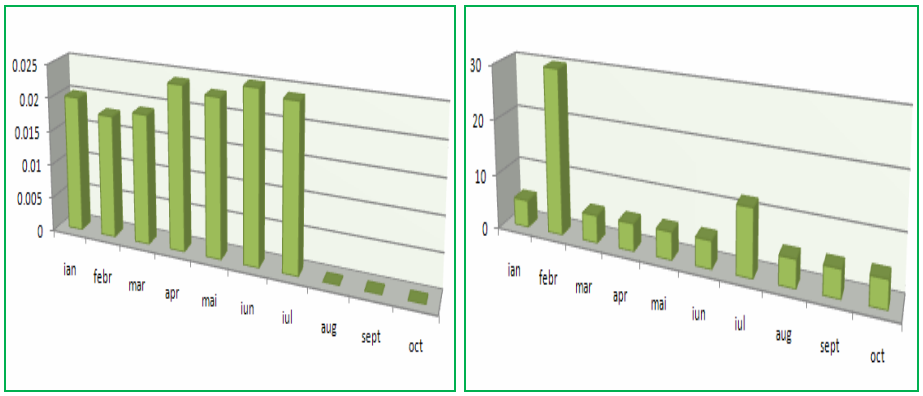

Fig.5. Variation of content of barium and zinc

CONCLUSIONS

✓ Tracking physico-chemical indicators was done over a period of ten months of 2010, from January to October: nutrients (ammonium, nitrates, nitrites, total nitrogen, orthophosphates, total phosphorus), salinity (alkalinity), toxic pollutants (barium, zinc).

✓ Dates presented in the paper reveals a predominant water I quality in the sector analyzed Crisul Repede, upstream of Oradea, although in june were observed values exceed some limit on the following indicators: nitrogen, total nitrogen, orthophosphates, total phosphorus .

✓ In february and july there was an increase in the concentration of zinc.

REFERENCES

1. Charles San Juan (1994), Natural Background Soil Metals Concentrations in Washington State. Toxics Cleanup Program, Department of Ecology
2. Hadnagy, A. (1978), Contribuţii la studiul aluviunilor recente din Munţii Bihorului, în Nymphaea, Folia Naturae Bihariae, VI, Oradea

3. Helsel, D.R., Hirsch, R.M. (2002), Statistical Methods in Water Resources, U.S. Department of the Interior, U. S. Geological Survey
4. Ianovici, V. şi colab. (1976), Geologia Munţilor Apuseni, Editura Academiei RSR, Bucureşti
5. Luca, C., Duca, Al., Crişan, Al., (1983), Chimia analitică şi Analiza instrumentală. Editura Didactică şi Pedagogică, Bucureşti
6. Măhăra, Gh. (1977), Cîmpia Crişurilor, Studiu fizico-geografic, din Cercetări în Geografia României, Editura ştiinţifică şi enciclopedică, Bucureşti
7. Pătroescu, C., Gănescu, I. (1980), Analiza Apelor, Editura Scrisul Românesc, Craiova
8. ***, Statistical Guidance for Ecology Site Manager, Washington State Department of Ecology. Toxics Cleanup Program, 1992
9. ***, Monografia hidrologică a bazinului hidrografic Crişuri, Studii de hidrologie, XXIV, IMH, Bucureşti, 1968
10. ***, Protecţia mediului. Calitatea apei. Acte de bază, Institutul Europeandin România, Bucureşti, 2004
11. ***, Normativul privind clasificarea calităţii apelor de suprafaţă în vederera stabilirii stării ecologice a corpurilor de apă. Ministerul Mediului, Monitorul Oficial, Nr 511 bis, iunie, 2006.