# EVALUATION OF WATER QUALITY IN THE PRUT RIVER, SCULENI - IASI AREA BY DETERMINING SOME PHYSICAL-CHEMICAL INDICATORS

**Valerica Gîlcă[1], I. Gîlcă[1], D. Simeanu[1], Cristina Simeanu[1], Elena Ungureanu[2], R. Radu Rusu[1]**

*[1]Faculty of Animal Sciences, University of Agricultural Sciences and Veterinary Medicine of Iasi, Romania*
*[2]Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine of Iasi, Romania*

**Abstract**

*In 2018, a series of researches were carried out regarding the main water quality indicators in the Prut river, Iasi county, Sculeni area. Following the taking and carrying out of physico-chemical analyzes on the collected samples, it was found that most of the water indicators in the Prut river do not exceed the maximum allowable concentration, according to the norms written in the specialized literature. Small exceedances were registered for the following indicators: chlorides, CCO-Cr, $Ca^{2+}$, $Mg^{2+}$, which indicates that the water in the Prut river has a relatively good quality, most indicators fall within the limits imposed for surface water of category II.*

**Keywords**: indicators, water, analysis, values, river

## INTRODUCTION

Water is an extremely important natural resource, so the quality of surface water is strongly affected by activities in various economic sectors such as: industry, agriculture, transport, etc. It is well known that surface water is a source of drinking water, and each process of water use leaves its mark on its quality.

As a result of the economic development the surface waters have undergone morphological changes, the river courses have been changed most of the time, and the areas near the rivers are most often subject to the drying technologies or used for agriculture and industry. The many destinations of surface waters profoundly affect the quality of the natural cycle with negative consequences. The obvious signs of the pollution process can be seen due to the lack of fish, the presence of foams on the surface of the water, as well as other combined effects of chemicals that affect aquatic ecosystems.

*Corresponding author:
m_valerica_univagro@yahoo.com
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In order to maintain the quality of surface water in 2000, the Water Framework Directive was drafted, following the analysis of the proposals of local and regional authorities, water producers and consumers, water agencies, industry and agricultural authorities, agencies of environmental protection and non-governmental organizations. The objectives of this directive are to obtain an adequate quality of all underground and surface water sources. A program of measures is required, which aim to obtain and follow the standards of water quality and emission concentration levels.

## MATHERIAL AND METHOD

The collection and River was carried out for 8 months (January, February, March, April, May, June, July, September) in 2018.

The determination of the physico-chemical parameters of the analysis of water samples from the Prut water was carried out in the laboratory of chemical analysis of the Faculty of Animal Husbandry of the University of Agricultural Sciences and Veterinary Medicine "Ion Ionescu de la Brad" Iasi.

In order to carry out the research, two samples of water were collected each month

using sampling vessels, apparatus for measuring pH, oxygen and fixing reagents.

The physico-chemical parameters of the water were determined by standardized analytical methods using the apparatus as: thermometer, Inolab type Ph-meter, Thermo conductometer, oven-binder, reflux system, HACH molecular absorption spectrophotometer, model DR20000, Wincler bottles, incubator with cooling ET618, T80 molecular absorption spectrophotometer.

Reagents used was: sodium oxalate 5 mmol/l, potassium permanganate 2 mmol/l, sulfuric acid 7.5 mmol/l, potassium chromate, silver nitrate, potassium bichromate, silver sulfate, double iron and ammonium sulfate, manganese sulphate, alkaline iodide, 1:3 sulfuric acid, sodium thiosulphate, coloring reagent, mixture of sulfuric and phosphoric acid, 2m sodium hydroxide, 5% potassium peroxide, ascorbic acid, acid solution II, 2N sodium hydroxide, murexide indicator, ammonium chloride, eriochrome black T indicator, bromcrezole green indicator, 0.1N hydrochloric acid, 1% phenolphthalein, Ph=10 buffer solution, methylene blue neutral solution, methylene blue acid solution, chloroform and glassware.

## RESULTS AND DISCUSSIONS

Following the researches carried out in 2018 for a period of 8 months (January, February, March, April, June, July, September), regarding a series of physico-chemical indicators of water from the Prut river, Iasi county, Sculeni area, have obtained some results presented in the tables and figures below.

Table 1 Water quality indicators from the Prut River in 2018 (January, February, March, April)

| Indicator | U.M. | C.M.A. | Nr. samples | Average concentration | | | |
|---|---|---|---|---|---|---|---|
| | | | | January | February | March | April |
| Temperature | ºC | | 2 | 3,00 | 2,50 | 7,00 | 11,00 |
| pH | | 6,5-8,5 | 2 | 7,82 | 7,66 | 7,72 | 7,80 |
| Fixed residuex | mg/l | 500 | 2 | 276,50 | 258,00 | 251,00 | 249,00 |
| Total suspensions | mg/l | | 2 | 19,20 | 22,40 | 20,18 | 18,00 |
| Chloride | mg/l | 25 | 2 | 26,85 | 25,24 | 24,97 | 25,17 |
| CCo-Cr | mg/l | 10 | 2 | 7,64 | 9,27 | 11,76 | 12,68 |
| Turbiditty | ºUTF | | 2 | 9,50 | 18,00 | 17,00 | 13,00 |
| Dissolved oxygen | mg/l | min.9 | 2 | 12,69 | 12,20 | 12,10 | 10,69 |
| $CBO_5$ | $mg/O_2/l$ | 3 | 2 | 2,26 | 2,37 | 2,13 | 1,97 |
| $NO_2$ | mg/l | | 2 | 0,05 | 0,05 | 0,04 | 0,03 |
| $NO_3$ | mg/l | | 2 | 5,41 | 8,24 | 8,79 | 9,39 |
| $P\text{-}PO_4$ | mg/l | 0,1 | 2 | 0,06 | 0,04 | 0,04 | 0,04 |
| P-total | mg/l | 0,15 | 2 | 0,12 | 0,05 | 0,05 | 0,05 |
| $Ca^{2+}$ | mg/l | 50 | 2 | 55,60 | 54,30 | 53,43 | 57,53 |
| $Mg^{2+}$ | mg/l | 12 | 2 | 14,22 | 13,58 | 13,02 | 13,54 |
| Total hardness | ºd | | 2 | 12,00 | 11,45 | 11,27 | 11,22 |
| Temporary hardness | ºd | | 2 | 9,82 | 9,48 | 9,65 | 9,46 |
| Permanent hardness | ºd | | 2 | 2,18 | 1,97 | 1,62 | 1,76 |
| $SO4^{2-}$ | mg/l | 60 | 2 | 29,52 | 32,07 | 32,56 | 33,27 |
| Phennols | mg/l | 0,001 | 2 | 0,003 | 0,002 | 0,002 | 0,002 |
| Total alkalinity | | | 2 | 3,42 | 3,40 | 3,37 | 3,26 |
| Permanent alkalinity | | | 2 | 0,22 | 0,10 | 0,15 | 0,12 |
| $CO_3$ | mg/l | | 2 | 12,50 | 11,40 | 9,86 | 8,50 |
| Total Fe | mg/l | | 2 | 0,48 | 0,56 | 0,51 | 0,53 |

Table 2 Water quality indicators from the Prut River in 2018 (May, June, July, August)

| Indicator | U.M. | C.M.A. | Nr. samples | Average concentration | | | |
|---|---|---|---|---|---|---|---|
| | | | | May | June | July | August |
| Temperature | ºC | | 2 | 18,00 | 22,00 | 24,50 | 24,00 |
| pH | | 6,5-8,5 | 2 | 7,35 | 7,41 | 6,95 | 8,07 |
| Fixed residuex | mg/l | 500 | 2 | 210,00 | 198,00 | 215,00 | 209,00 |
| Total suspensions | mg/l | | 2 | 102,20 | 76,00 | 29,35 | 31,7 |
| Chloride | mg/l | 25 | 2 | 23,39 | 19,80 | 19,60 | 16,79 |
| CCo-Cr | mg/l | 10 | 2 | 19,00 | 17,06 | 18,65 | 8,08 |
| Turbiditty | ºUTF | | 2 | 103,00 | 59,50 | 32,00 | 29,00 |
| Dissolved oxygen | mg/l | min.9 | 2 | 8,57 | 8,74 | 10,40 | 7,74 |
| $CBO_5$ | $mg/O_2/l$ | 3 | 2 | 1,64 | 1,35 | 1,77 | 0,77 |
| $NO_2$ | mg/l | | 2 | 0,11 | 0,07 | 0,04 | 0,02 |
| $NO_3$ | mg/l | | 2 | 6,68 | 4,33 | 4,69 | 6,91 |
| $P\text{-}PO_4$ | mg/l | 0,1 | 2 | 0,05 | 0,04 | 0,02 | 0,07 |
| P-total | mg/l | 0,15 | 2 | 0,12 | 0,07 | 0,03 | 0,12 |
| $Ca^{2+}$ | mg/l | 50 | 2 | 55,13 | 52,43 | 53,45 | 51,12 |
| $Mg^{2+}$ | mg/l | 12 | 2 | 11,16 | 5,30 | 10,61 | 11,14 |
| Total hardness | ºd | | 2 | 10,52 | 9,35 | 11,12 | 10,04 |
| Temporary hardness | ºd | | 2 | 8,26 | 8,40 | 8,68 | 8,70 |
| Permanent hardness | ºd | | 2 | 2,26 | 0,95 | 2,44 | 1,34 |
| $SO4^{2-}$ | mg/l | 60 | 2 | 25,10 | 25,63 | 24,37 | 26,42 |
| Phennols | mg/l | 0,001 | 2 | 0,004 | 0,007 | 0,02 | 0,012 |
| Total alkalinity | | | 2 | 2,85 | 3,00 | 2,95 | 3,10 |
| Permanent alkalinity | | | 2 | 0,07 | 0,01 | 0,01 | 0,20 |
| $CO_3$ | mg/l | | 2 | 9,00 | 3,00 | 5,71 | 12,00 |
| Total Fe | mg/l | | 2 | 3,71 | 3,88 | 2,94 | 2,13 |

## CONCLUSIONS

Following the taking and carrying out of physico-chemical analyzes on the collected samples, the following aspects were found:

- most of the water indicators in the Prut river do not exceed the maximum allowable concentration, according to the norms inscribed in the specialized literature;
- small exceedances were registered for the following indicators: chlorides, CCO-Cr, $Ca^{2+}$, $Mg^{2+}$, which indicates that the water in the Prut river has a relatively good quality, the most indicators are within the limits imposed for surface waters of category II.

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