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A PHYSICAL-CHEMICAL CHARACTERIZATION OF THE MIRIÑAY RIVER, ARGENTINA, BY GRAPHICAL METHODS

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A graphical method is applied to display the physical-chemical characteristics of the Miriñay River, Corrientes Province, Argentina. The graphical results show the following parameters: pH, alkalinity, chlorides, hardness, dissolved oxygen, N-ammonium, conductivity, and total dissolved solids. The graphical patterns allow easy identification and highlighting of water body characteristics.

INTRODUCTION

Water quality data generated by many researchers often include many physical and chemical parameters whose interpretation becomes difficult and complicated because the results are not presented in a manner that is easily understood.

To understand the quality of water and its trends, data must be compared and correlated spatially and over time. These comparisons can show characteristic variations, and can be used to show whether or not water quality is acceptable according to local and international standards.

To make the task of data interpretation easier, this paper presents a global and versatile tool for visualizing the water quality properties of a body of water.

The tool is applied to an analysis of the water quality in the Miriñay River, Corrientes Province, Argentina.

METHODOLOGY

Analyses

The physical-chemical analyses were carried out using volumetric, colorimetric and instrumental methods. Standard technical methods were used (AOAC, 1984; APHA, 1989, CEPIS, 1995). The laboratory where the analyses were carried out followed protocols according to GEMS/WATER programs. U.S. EPA Standard Methods for the examination of Water and Wastewater were used for water monitoring procedures.

Parameters

The following parameters were measured: pH, alkalinity, chlorides, hardness, dissolved oxygen, N-ammonium, conductivity, and total dissolved solids (total residual).

Experimental

Tables 1 to 3 show the parameters that are represented graphically in the Figures. The monitoring points along the Miriñay River were the following bridges: Point number 1: bridge on provincial route 123, Point number 2: bridge on provincial route 126, and Point number 3: bridge on provincial route 14.

Table 1. First Expedition Miriñay River, Year 2000

Expedition 1			
Physical-Chemical Analysis - Averages			
Parameter	**1**	**2**	**3**
Conductivity	121,60	184,00	333,40
pH	7,35	7,37	7,01
Total residual	220,00	383,00	373,00
Chlorides	9,50	24,50	56,50
Alkalinity	25,40	24,30	31,00
N-ammonium	0,65	0,76	0,78
Oxygen Dissolved	5,50	6,15	5,20
Hardness	36,00	39,00	51,50

Table 2. Second Expedition, Miriñay River, Year 2000

Expedition 2			
Physical-Chemical Analysis - Averages			
Parameter	**1**	**2**	**3**
Conductivity	28,55	31,00	25,95
pH	5,38	5,71	5,90
Total residual	90,00	102,50	81,50
Chlorides	5,90	7,90	5,90
Alkalinity	18,20	24,60	17,00
N-ammonium	0,92	0,55	0,55
Oxygen Dissolved	N/D	N/D	N/D
Hardness	19,50	18,00	19,00

Table 3. Third expedition, Miriñay River, year 2000

Expedition 3			
Physical-Chemical Analysis - Averages			
Parameter	**1**	**2**	**3**
Conductivity	118,70	194,65	182,85
pH	6,40	6,90	6,85
Total residual	26,00	34,50	66,00
Chlorides	27,00	53,50	50,00
Alkalinity	38,50	51,00	59,00
N-ammonium	0,27	0,21	0,31
Oxygen Dissolved	6,70	7,05	6,55
Hardness	36,00	47,00	52,00

Observations

Figure 1 shows the physical-chemical variations represented in the diagrams along the length of the Miriñay river for different sampling times. It also shows the changes in parameter values which reflect the variation in river quality depending on location and the climatic conditions.

Figures 2 and 3 are example diagrams showing the method used to construct the graphic.

CONCLUSION

This work reports some information about the physical-chemical characteristics of the Miriñay river, and also offers the possibility to contrast its water quality with other water bodies studied by this task group in Corrientes, Argentina.

The characteristics are represented graphically in a comprehensible and clear way. The method also allows one to infer facts about the quality of the water body. For rivers, it can point out those sections where they have changed significantly, and reaches where it is possible to study the effects of pollutants that can modify some of the represented parameters substantially. It is also possible to see and evaluate the autoregeneration processes that can take place, and to measure the progress of programs of water control pollution.

The method is also a valuable and useful tool for generating maps of water body quality, and the behavior of different stages or steps in wastewater treatment for industrial and municipal effluents.

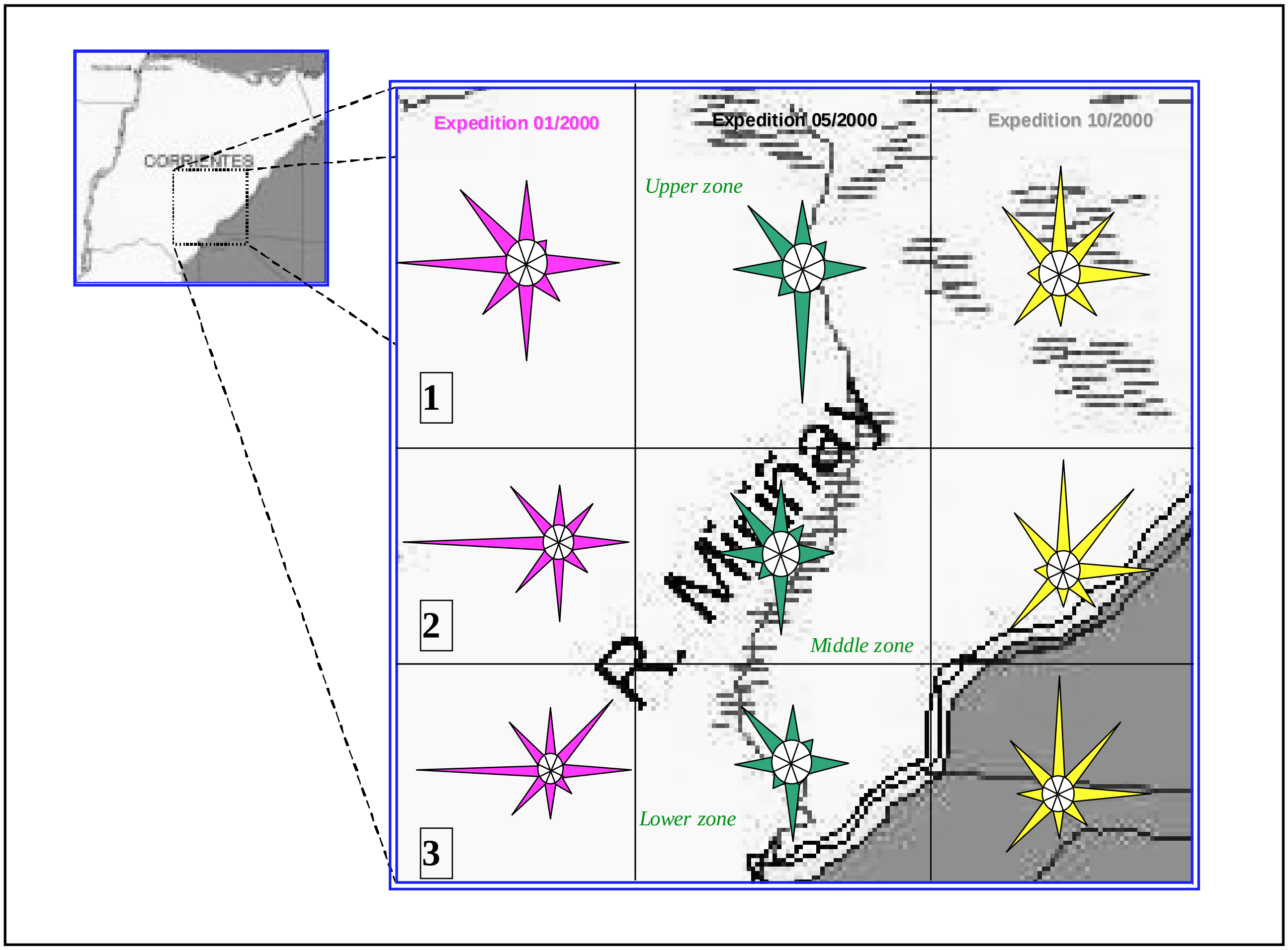

Figure 1. River characteristics at three location and at three sampling events.

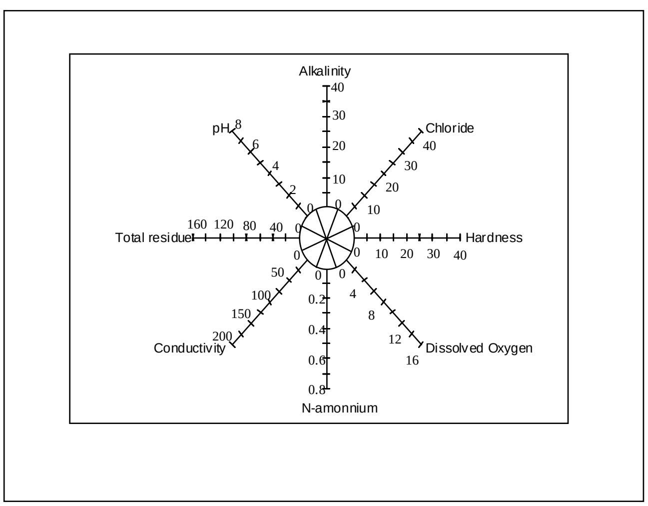

Figure 2. Standard diagram.

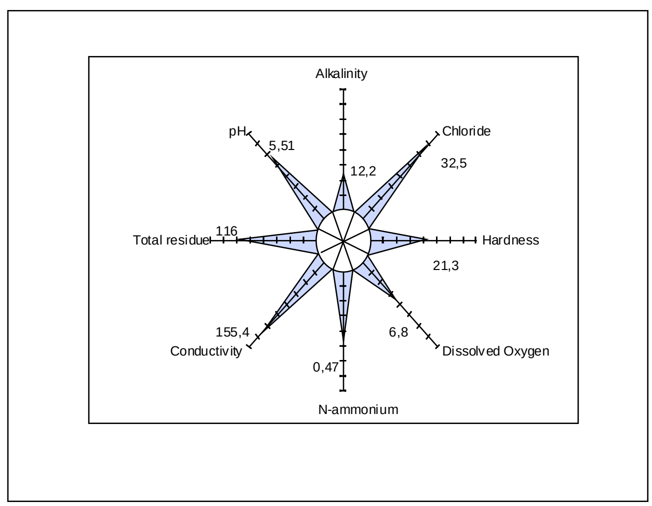

Figure 3. Example diagram.

pH:	**5,51**	**Dissolved Oxygen:**	**6,8 mg/l**
Alkalinity:	**12,2 mg/l**	**N-ammonium:**	**0,47 mg/l**
Chlorides:	**32,5 mg/l**	**Conductivity:**	**155,4 μS/cm**
Hardness:	**21,3 mg/l**	**Total Residue:**	**116 mg/l**

The scales can be defined for each case by operator preference to allow the best visualizations. The graphics presented in this paper were made with the PowerPoint© software of Microsoft.

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