

## ANALYSIS OF PHYSICAL FACTORS OF POLLUTION IN THE WEST JIU

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### **Abstract**

*The water is an indispensable factor of life and also has an important role in ecological balance and its pollution is a serious problem with the current population. The water pollution is altering the physical, chemical and biological characteristics of their being produced directly or indirectly, natural or man-made, the polluted water is unfit for normal use. One of the most important properties of water, in addition to temperature, color and electrical conductivity, is turbidity. In this paper we present a method of determination of turbidity and electrical conductivity. The method is based on the measurement of luminous intensity weakening which passed through a liquid containing suspended solid particles are absorbed or released. Following these measurements can be verified and determination the degree of pollution and what are major pollution sources.*

**Key words:** pollutants, water

### **INTRODUCTION**

Water is an essential factor of life and also plays an important role in the ecological balance and its pollution is a current problem with serious consequences for the population.

Water pollution represents quality alteration of physical, chemical and biological characteristics, being produced directly or indirectly, natural or human, polluted water unfit for normal use.

Water pollution must be regarded not only as a potential human and biotic risk, but as disruption of aquatic ecological systems. For complex characterization of water is necessary to take into account many physical and chemical factors, among which are:

- temperature
- color and turbidity
- suspensions
- the content of dissolved substances
- the content of dissolved oxygen
- oxidized organic content
- chemical interactions of water

Industrial and agricultural pollution sources contribute to the pollution of water resources by discharging pollutants specific to the type of activity conducted. Thus, it can evacuate organic matter, nutrients (food, chemicals, fertilizers, pulp and paper, animal farms, etc.),

heavy metals (mining and manufacturing, chemical industry, etc.) and hazardous organic micropollutants (organic chemical industry, oil industry, etc.) (Naşcu and Jäntschi, 2006).

In this paper we propose to determine the physical factors of pollution of the West Jiu.

### **OVERVIEW OF BASIN JIU**

Jiu basin is located in the south - western Romania.

The contour of the basin is limited:

- To the north, the heights of the mountains Suriani, Parang, Retezat, Cerna, who split the basin tributaries Mures, SebesStreiuului and CernaMures;
- To the west, the high peaks of the hills and platforms, near to the town of Sarbatoarea, and among towns Sarbatoarea - Segarcea - Macesu detaching it from the Cerna - Danube Bahnei, Topolnita, Blahnita and Desnatuiului;
- To the east limit of Jiu basin, follows a narrow ridge which separates at the Olt River, up near the Craiova. Jiu south enters the Romanian Plain and basin boundary follows a line that would unite the villages Leu - Ghizdavesti - Bechet;
- South boundary is formed by the river Danube. Within these limits, the Jiu river basin covers an area of 10,080 km<sup>2</sup> and has a length

of about 260 km and an average width at the top of 60 km and about 20 km to the bottom

(Figure 1).

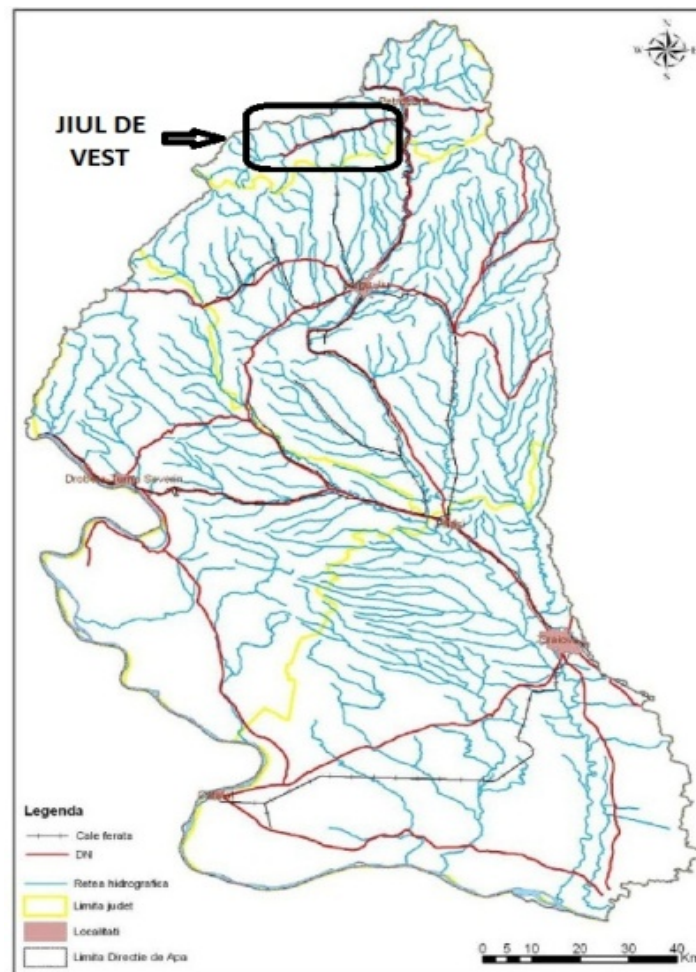


Figure 1. Basin of Jiu.

Hydrographic basin Jiu identifies 275 rivers with areas greater than 10 km<sup>2</sup>, 14 lakes and 12 lakes with an area exceeding 50 hectares.

Jiu is a 1st order tributary of the Danube and confluence at 692 km upstream of the mouth of the river into the Black Sea.

Jiu river has a length of 339 km, average slope 5 ‰, a convolution coefficient of 1.85 and a basin of 10,080 km<sup>2</sup>. The hydrographic network totalling 3876 km. Flashy stream is 0,38km<sup>2</sup> being superior to the national average (0,33km<sup>2</sup>) (Management Plan).

Formed by the union of two main tributaries: the West Jiu which comes from Retezatul Mic in step Cerna-Jiu, separating the basin Jiu River of Cerna, the upper reaches of the river is known as the River Cimpuselu and East Jiu what comes from the southern slopes of the mountains Surianu at altitudes around 1500 m. all this sector of West Jiu, Jiu East and their tributaries are having a mountain character with

slopes between 30-18 ‰ and 120-25 ‰ Jiu for tributaries. This explains the general physiognomy of the valleys, characterized by narrow, deep V-shaped, lacking a major bed with large alluvial material (rocks, gravel, etc.) (Wikipedia).

## RESULTS AND DISCUSSIONS

West Jiu river flows parallel to the ridge south of Retezat Mountain and north of the Mountain Vilcan and has a length of 51.4 km before of the confluence with the East Jiu.

To determine the degree of pollution of the West Jiu with suspended solids and for measuring the electrical conductivity of water, in order to verify that that the water samples were taken from the river of points: Campusel, Buta, Valea de Pesti, Mine Uricani, Tusu, Carolina, Rosia, Paroseni Thermal Power Plant, Danutoni and Coroesti (Figure. 2).



Figure 2. Location of sampling points

Using Pulfrich photometer (Figure 3) was analyzed the turbidity of samples, this method is based on measuring the luminous flux intensity weakening when passing through a liquid containing solid particles in suspension which is absorbed or released (Iușan et al.,1981; Stanci, 1999).



Figure 3. Photometer Pulfrich

With the aid of the calibration graph of concentration versus absolute turbidity, we can determine the concentration of suspended solids in the samples, the results are shown in Table 1.

Water in nature contains, according to source various solutes. The conductivity in the case of aqueous solutions is influenced by the

concentration of substances, which are used as the indicator of mineralization of water. The conductivity is the property of the solutions to allow electric current to pass through them. The conductivity change when ions of different substances (salts, acids, bases) in contact with water. For rapid measurement of electrical conductivity we used conductivity meter GT12 (Figure 4) (Iușan et al.,1981; Stanci, 1999).



Figure 4. Conductivity meter GT12

The working principle of this device is based on measuring the voltage across a pair of electrodes, well-defined geometrically, when introduced into the liquid under test. The results are shown in Table 1.

Table 1. The concentration of suspended solids and electrical conductivity of samples

Location of sampling points	Tr	T	Concentration (mg/l)	Conductivity ( $\mu\text{S/cm}$ )
Campusel	103,09	2,47	1,1	50
Buta	181,81	4,36	4,3	54
Baraj Valea de Pesti	188,68	4,54	4,5	68
Mina Uricani	526,32	12,63	19,0	72
Tusu	500,00	12,00	18,0	76
Carolina	666,67	16,00	25,1	85
Rosia	909,09	21,82	33,9	150
Baraj Paroseni	500,00	12,00	18,0	73
Uzina electrica Paroseni	625,00	15,00	23,4	90
Coroesti	666,67	16,00	25,1	97
Danutoni	714,28	17,14	27,3	98

## CONCLUSIONS

Factors of pollution from the West Jiu river as it results from measurements are:

- Sewage of the cities located along the West Jiu (Uricani, Lupeni, Vulcan)
- Water discharged from Uricani Mine, Lupeni, Paroseni, Vulcan
- Paroseni Thermal Power Plant
- Preparation plant Coroesti
- Rosia river

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