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## MARAMURES COUNTY DRINKING WATER QUALITY

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### Introduction

Surface water and groundwater represent the main sources of drinking water in Romania. Ammonium, iron, manganese and arsenic are the main potential pollutants that can be found in groundwater. In high concentrations or long term consumption they can have a dangerous effect on the human health when present in drinking water. Ammonia can have a compromising effect over the desinfection process efficiency leading to taste and odour problems. Excess iron and manganese can modify the drinking water organoleptic characteristics (turbidity, colour) making it hardly acceptable for human consumption. Long term arsenic consumption can have a dangerous effect over the human body like skin cancer, cardiovascular diseases and dermal lesions. In Romania, drinking water is controlled by the national Drinking Water Quality Act no. 458/2002, republished in 2011. For this reason, the present study focused on determining drinking water quality according to the national legislation.

### Materials and methods

Six drinking water sources from Maramures County were analysed within the study. Maramures county is situated in north of Romania, covering 6304 km<sup>2</sup>, having a population of more than 478.659 people. The geographic locations are presented in figure 1.

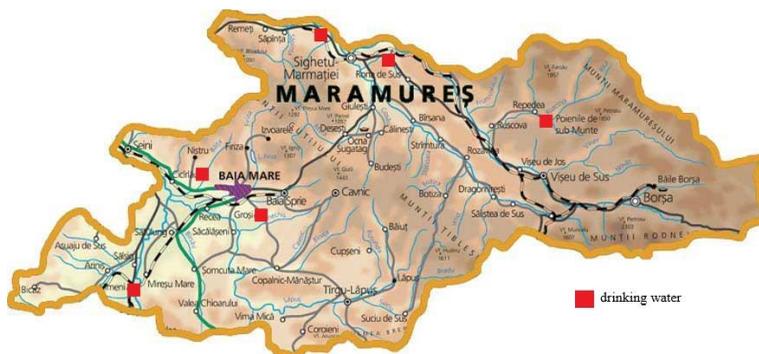


Figure 1. Study area map

The samples were collected from the following locations: Ardasat, Grosii Tiblesului, Rona de Jos, Poienile de sub Munte, Sarasau, Ulmeni and were analysed according to the national Drinking Water Quality Act no. 458/2002, republished in 2011.

Ardusat, Sarasau and Ulmeni drinking water treatment flows use raw groundwater while in Rona de Jos, Poienile de sub Munte, Grosii Tiblesului raw surface water is used.

Parameters determination was done according to the following standard methods:

- iron, manganese and arsenic – SR EN ISO 11885:2009
- ammonium – SR ISO 7150-1:2001
- turbidity – SR EN ISO 7027-1:2016
- hardness – SR ISO 6059:2008.

### **Results and conclusions**

Drinking water quality from all of the locations is presented in Table 1.

**Table 1.** Drinking water quality from the selected locations

Quality parameter	Ardusat	Grosii Tiblesului	Rona de Jos	Poienile de sub Munte	Sarasau	Ulmeni	MAC (Act no. 458/2002)
NH <sub>4</sub> <sup>+</sup> (mg/L)	<b>0.63-2.17</b>	0.02-0.13	0.08-1	0.05-0.11	0.1	0.12-0.4	0.5
Fe <sub>t</sub> (µg/L)	18.9- <b>206.8</b>	11.5-41	54-123.4	12.5- <b>319.6</b>	15.2-40.7	93.9-177	200
Mn <sub>t</sub> (µg/L)	20.1-46.7	3.8-15	10.2-13.1	4.6-17.7	3.1-4.2	<b>70.7-637</b>	50
As (µg/L)	<b>16-25</b>	<2-3.7	<2	<2	<2	<2	10
Turbidity (NTU)	1.6-3.2	0.7-3.2	1.2- <b>7.1</b>	<1- <b>18.7</b>	<1	<1-1.7	5
Hardness (German degree)	5.6-6.9	<b>3.9-4.2</b>	4.9-8.6	6.4-14	10.3-10.6	19.6-21.8	≥5

Concentrations that exceed the maximum admissible concentration (MAC) for ammonium, iron, manganese and arsenic can be found in locations that use raw groundwater as water source for potabilisation, while turbidity concentrations over MAC can be observed in locations that use raw surface water.

In order to bring the identified non-compliant parameters within the limits regulated by the national legislation, drinking water treatment flows must be completed accordingly.