



The Anniversary Scientific "Geographia Napocensis" Conference, Cluj-Napoca, România, October 3-6, 2019 Dynamics and Territorial Impact of Physical-Geographic Processes and Phenomena

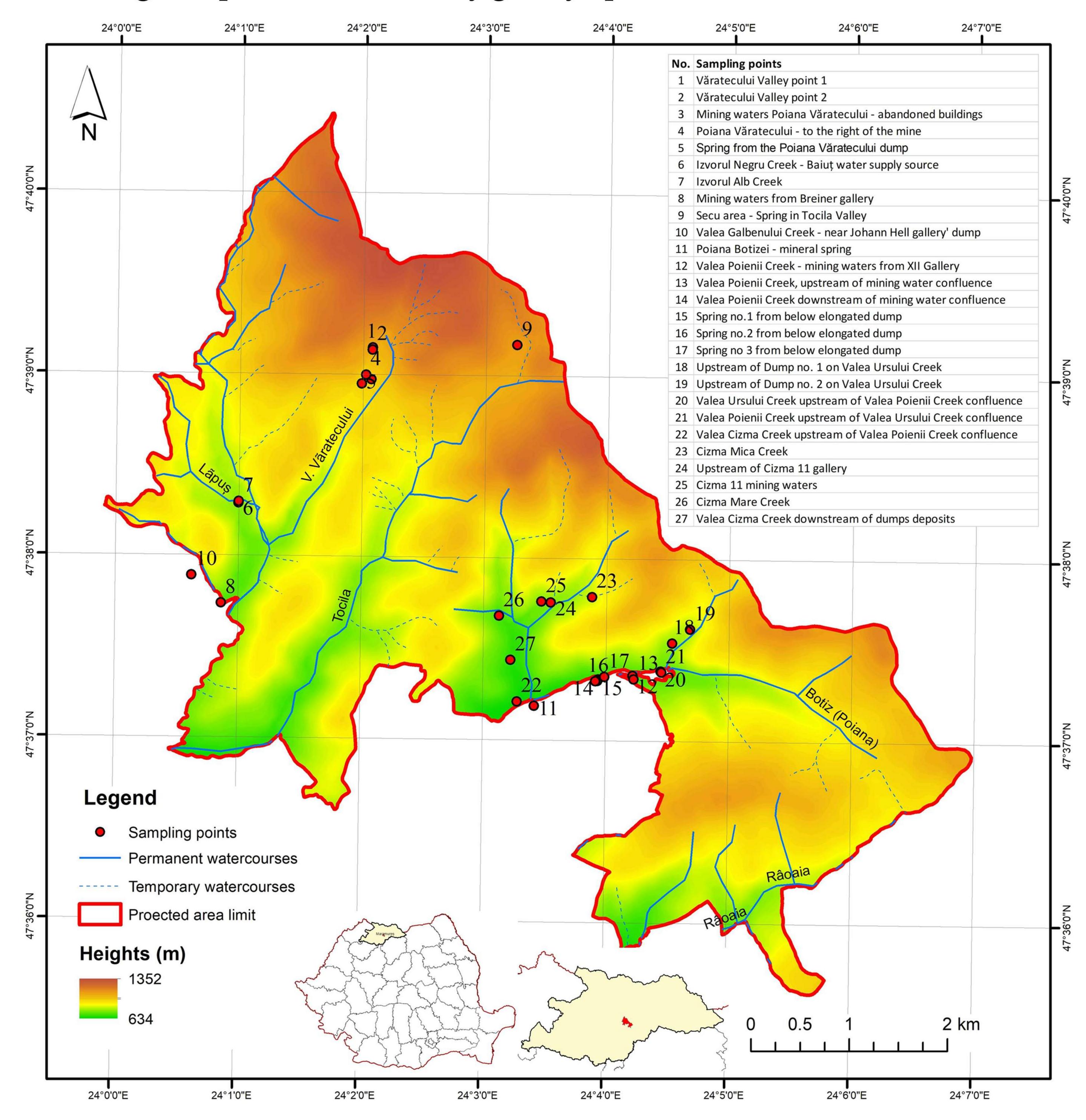
Study of Physico-Chemical Parameters of Water Resources in Strâmbu-Băiuț Protected Area

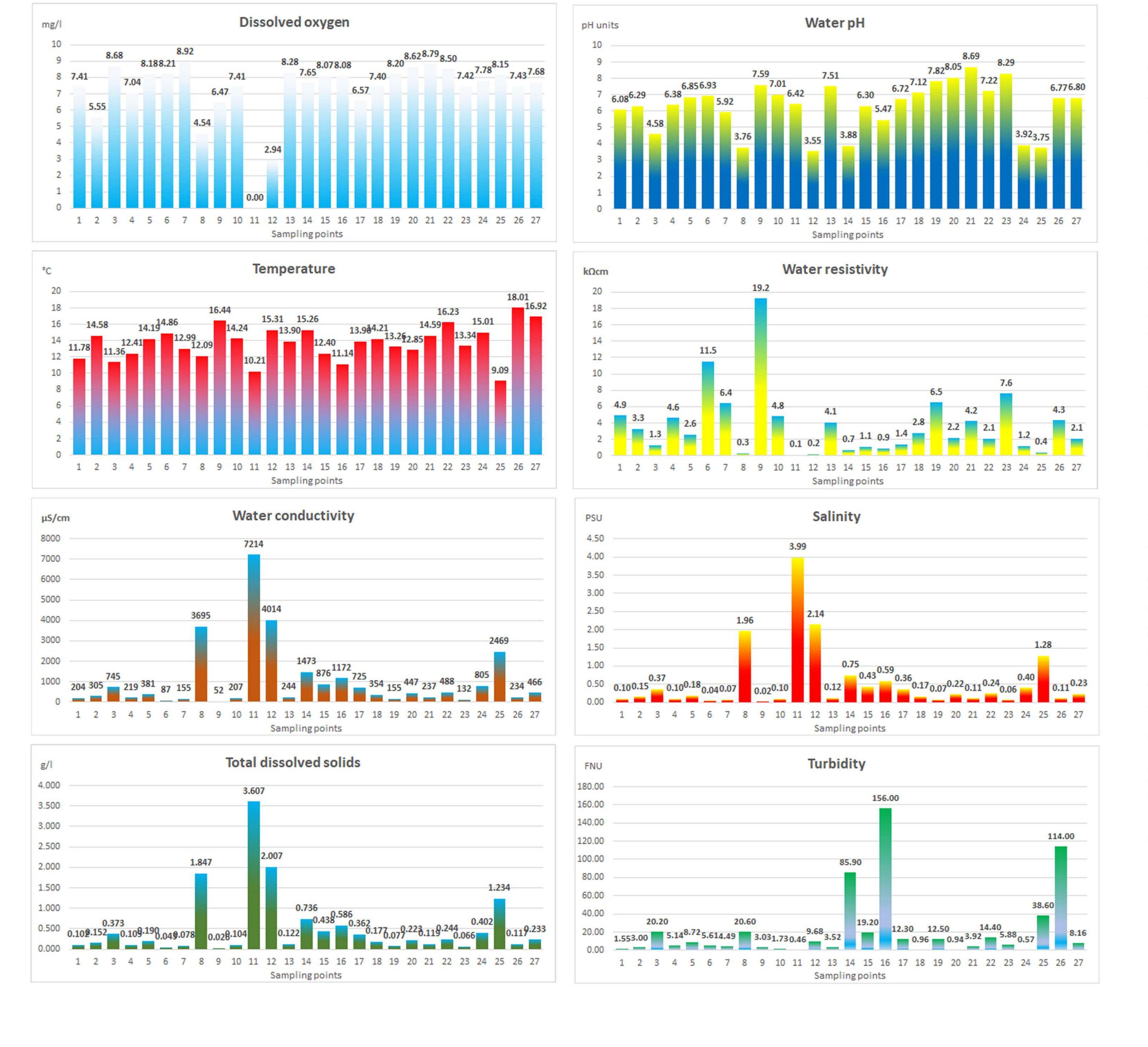
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ABSTRACT. – Study of Physico-Chemical Parameters of Water Resources in Strâmbu-Băiuț Protected Area. The present study is focused on the evaluation of present quality state of water resources (rivers and underground waters) into a protected area, defined by a historic mining activity. The area is situated in Maramureș County, covering an area of nearly 30 km2 and was established in order to protect one of the most well-preserved virgin forest area in Romania. The area is also representative for the presence of large carnivores and raptors. The existence of old mining works, carried out in Băiuț, until 2006, when the last mine was closed, generated locally, the appearance of sensitive points, regarding the environmental quality of aquatic conditions. The study is based on the field investigation trip carried out in August 2019. In order to estimate the water quality state, a portable multiparameter HI 9828 and a portable turbidimeter HI 98713 were used. Also, for geolocation references we used an Android application called Mobile Topographer. The investigated parameters were: pH, water temperature and conductivity, total dissolved solids, salinity and water turbidity.

INTRODUCTION. - The protected natural area called "Codrii seculari de la Strâmbu Băiuț" occupies an area of 2962 ha and preserve the first virgin mixed forest identified and protected by the WWF Romania organization. As of July 2017, around 20% of the area was added to the UNESCO World Heritage Sites, togheter with other seven beech forests in Romania. The protected area overlaps the upper basin of Lăpuș, a right tributary of Someș, with which it converges at Tăuții-Măgherăuș, having an average liquid flow of 19.3 m³/s. The river has a total length of 112 km and a reception area of 1875 km². The hydrography of the protected area is represented by the tributaries of the Lăpuș river, which drains the Lăpuș Mountains. Thus, in the western part the course of Lăpușului is formed at the confluence of White Spring and Black Spring creeks. Moreover, on the second mentioned watercourse there is a catch outlet that serves with good quality water a part of the inhabitants of Băiuț village. Beyond the confluence mentioned, Lăpușul receives from the left Valea Văratecului, whose river basin is strongly modified by the presence of mining dumps, formed near very gallery opened in this area.

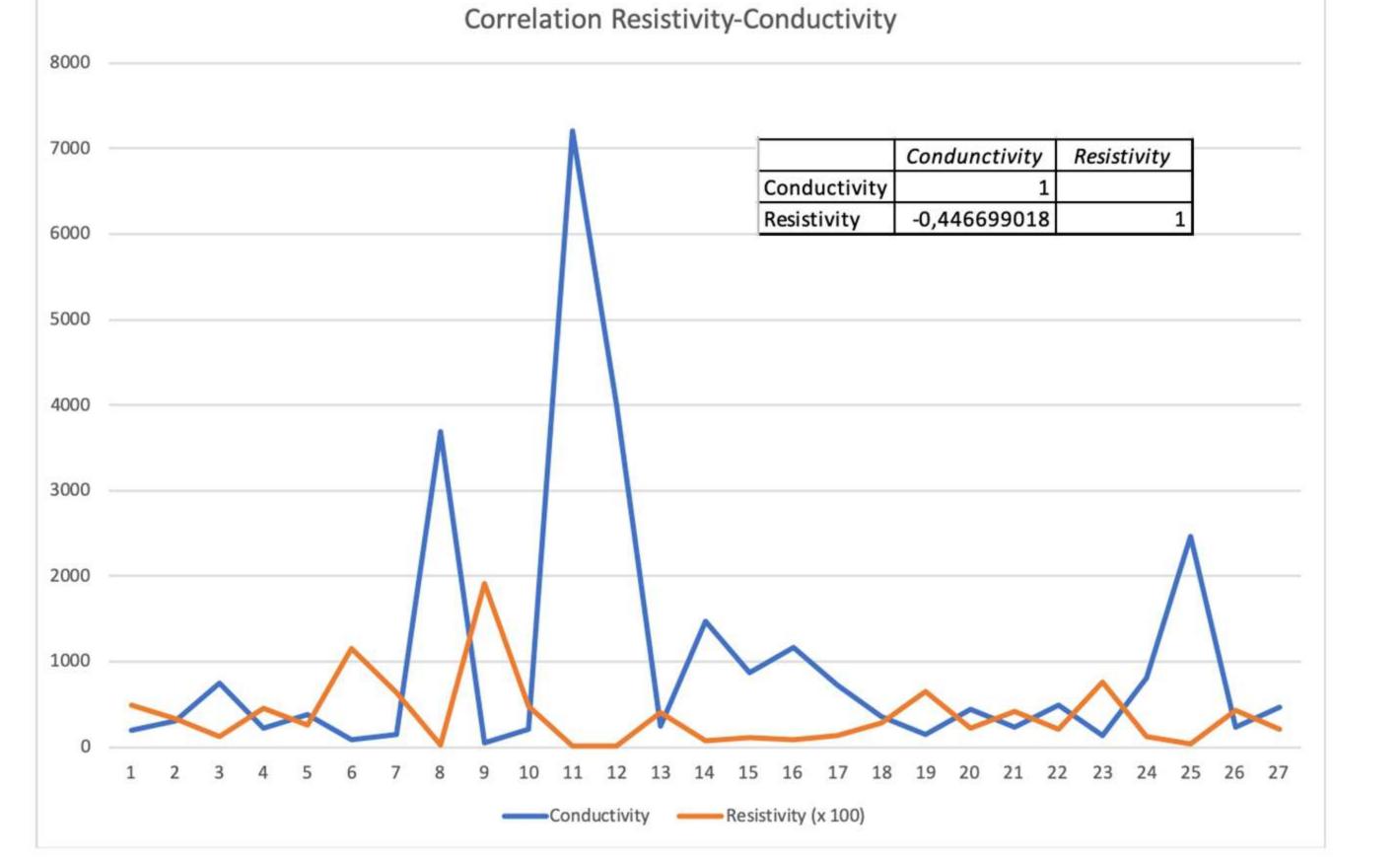


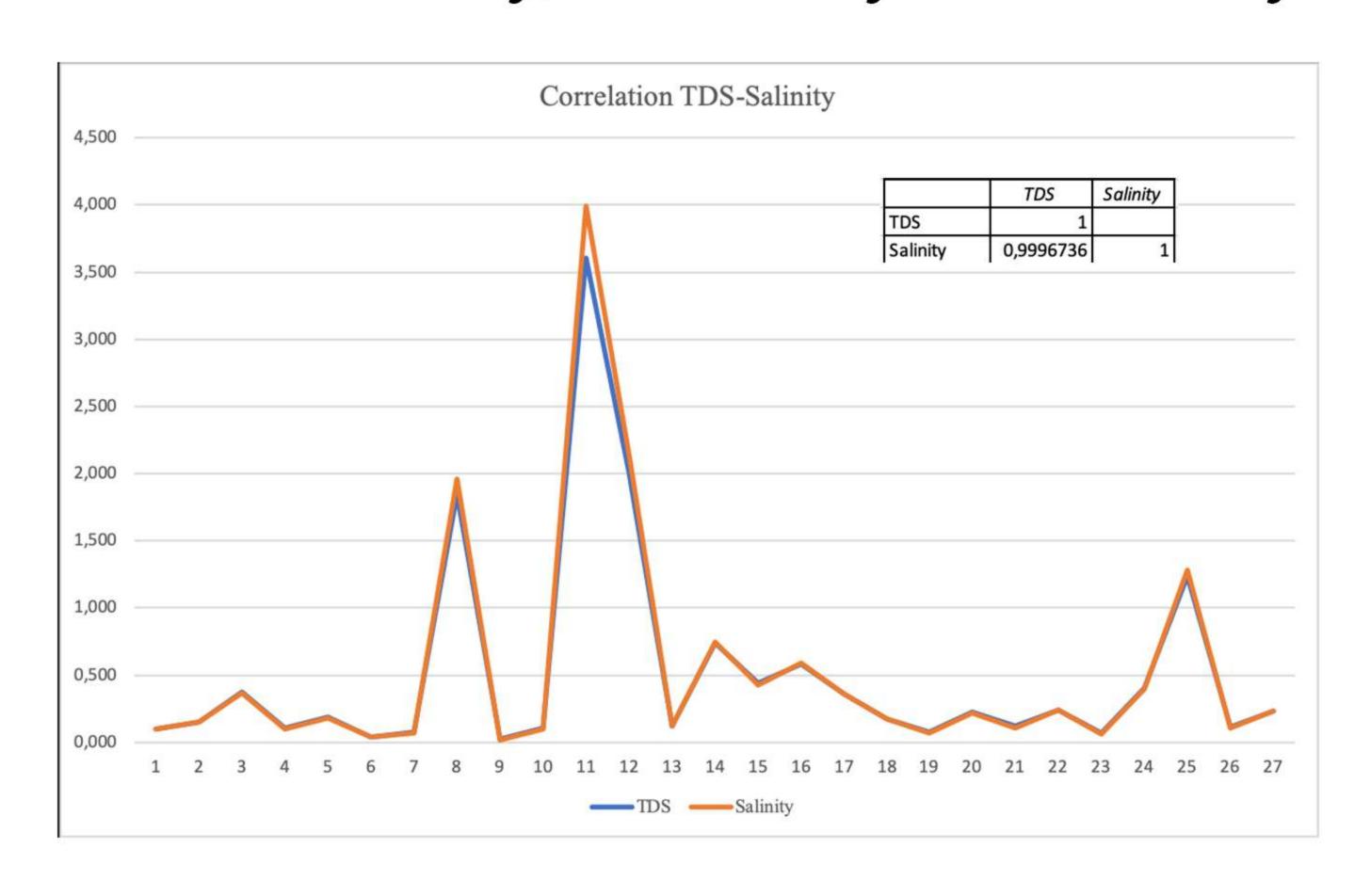


MATERIALS AND METHODS. The evaluation of water environment' quality from the perimeter of the protected area was carried out through expeditionary campaigns deployed in two distinct intervals, respectively on July 19-21 and August 9, 2019. The approach was based on the principles of representativeness, following the assessment of water quality, in key points. The determinations were made with the help of portable devices, respectively the Hanna Instruments HI 9828 multiparameter, and Hanna Instruments HI 98713 turbidimeter. In-situ monitoring operations allowed the evaluation of 11 parameters: dissolved oxygen, water pH, pH-mV, water temperature, electrical conductivity, resistivity, total dissolved solids (TDS), salinity, oxidation-reduction potential (ORP), oxygen saturation. During the campaigns, determinations were made in 27 distinct points (see table on the right side of the presented map), distributed on the main hydrographic arteries in the protected area, but also from its periphery.



RESULTS. From the analysis of the data obtained on the field, a quite wide difference of the dissolved oxygen values was observed. Thus, the smallest value of 2.94 mg/l was recorded at the exit of the mine waters from the XII gallery located on the Poienii Valley while the highest value was 8.92 mg/l marked in the Izvorul Alb Creek. Water pH is an indicator that expresses the acidity or alkalinity of the water sample. The distribution of the determined values is quite wide, between 8.69 pH units on Poienii Valley, upstream of the confluence with the Ursului stream and 3.55 pH units at the point associated with the mine waters discharging from the XII gallery located on Poienii Valley. Water temperature is a parameter in strict dependence with air temperature, often being a benchmark in assessing the quality of the aquatic environment. The range of reference data obtained attests that the maximum value was detected on Cizma Mare Valley, on August 9, respectively 18.01 °C, while the minimum value was recorded in the drainage mine waters. gallery XI from Valea Cizma, of just 9.09 °C. The electrical conductivity indicates the capacity of the water to transmit the electric current, based on the presence in the aquatic environment of a significant quantity of dissolved salts. The highest values were recorded at the boulder in Poiana Botizei (over 7200 µS/cm), followed by the mine waters in the Poienii Valley which are evacuated through the XII gallery (about 4000 µS/cm) and those from the Breiner gallery. (approximately 3700 µS/cm). The turbidity of water refers to the opacity determined by very fine particles, invisible to the naked eye, which are in a state of suspension in the liquid, which diffuses and reflects a ray of light. The values measured at the level of the protected area revealed a fairly wide gap, determined by the highlighting of points with very high values (over 100 UNF), as is the case with the observation point identified at source level 2 (UNF 156) from the base of the dump. longitudinal, placed parallel to the Poienii Valley and the car access road, dump that resulted from the excavations made in gallery XII. High values were also detected in the mine waters of the Cizma XI and Breiner galleries. The lowest turbidity value was associated with the observation point associated with the burrow from Poiana Botizei (0.46 UNF). The vast majority of sampling points are in the range 0.5 - 20 UNF. Also, two correlation diagrams are presented below between conductivity, resistivity and salinity.





CONCLUSIONS. The determinations made on the surface waters and those from the underground, in the area of the site of community importance ROSCI0285 The Secular Woods from Strâm-bu-Băiuţ highlighted a specific situation for the mountain areas, with robust and extensive forests. In general, the waters are well oxygenated, have a low turbidity, a neutral to basic character, with moderate to cold heat, reduced values of the dissolved suspensions, respectively of salinity. Sporadically, the presence of mine waters, drained from the mining galleries, of the EM Băiuţ mines, also highlighted significantly different situations from a qualitative point of view. Thus, acid waters have been recorded, with high turbidities and salinities, very high conductivities and sometimes even poorly oxygenated conditions.