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Mining activities have been carried out for about 120 years in Eastern Serbia. Currently, in Eastern Serbia, there are four active copper mines, three in the Bor mining area and one in the Majdanpek mining area. The ore deposits in these mining areas are porphyry copper deposits. Pollution of the environment in the Bor mining area began after the opening of the Bor mine in 1903. The pollution is most pronounced on river water downstream of the mine. However, the effects of long-time pollution on groundwater along polluted rivers downstream of the Bor mine are not clear. Therefore, the aim of this study is clarification and understanding groundwater contamination downstream of the Bor mine. Groundwater samples were collected in catchment areas of Timok, Pek and Porečka Rivers, including the Bor and Majdanpek mining areas, as well the areas far from the mining sites. All water samples were filtrated using cellulose acetate hydrophilic filters with a pore size of 0.20  $\mu\text{m}$ . For heavy metals and arsenic analysis, the samples were acidified by concentrate ultrapure  $\text{HNO}_3$ . In order to know whether mining activities lead to groundwater pollution or not, a procedure including the creation of geochemical maps and estimation of the threshold values was applied.

The pH values of groundwater ranged from 6.4 to 8.8. Most of the groundwater samples are Ca-Mg- $\text{HCO}_3$ -type water. However, some groundwater samples collected along the polluted rivers in Slatina, Rgotina and Vražogrnac Villages are Ca-Mg- $\text{SO}_4$ -type water. Concentrations of Cu, As, Fe and Mn in groundwater samples collected in the area downstream of the Bor mine do not differ much in concentrations of these elements outside the mining area. On the other hand, high concentrations of  $\text{Ca}^{2+}$  and  $\text{SO}_4^{2-}$  were recognized in groundwater along polluted rivers, ranging from 90 to 511 mg/L and from 73.5 to 1111 mg/L, respectively. Groundwater samples in the area downstream of the Bor mine had concentrations of  $\text{Ca}^{2+}$  and  $\text{SO}_4^{2-}$  below the maximum admissible concentrations for drinking water according to the Serbian standard. However, based on the estimated threshold values of  $\text{Ca}^{2+}$  and  $\text{SO}_4^{2-}$ , actual concentrations exceeded the threshold values. Therefore, it is thought that groundwater along polluted Bor and Bela Rivers has pollution by the mining activities of the Bor mine. The same environmental evaluation was carried out for groundwater in the Majdanpek mining area. However, elevated concentrations of  $\text{Ca}^{2+}$  and  $\text{SO}_4^{2-}$  in groundwater from the Majdanpek mining area are not present.

Appropriate components for environmental evaluation of groundwater in mining areas in Eastern Serbia are  $\text{Ca}^{2+}$  and  $\text{SO}_4^{2-}$  which can be present as aqueous species without precipitation in groundwater having neutral pH. Heavy metals are not appropriate because they precipitate in solutions having neutral pH. The procedure used in this study is appropriate for the evaluation of the environmental impact on groundwater.