

## **On the heavy elements content of sediments and rocks from two semiclosed ecosystems: proglacial lake Bâlea (Fagaras Mountainins) and crater lake St. Ana (Harghita Mountains)**

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Within a complex scientific program of surveying the Alpine semiclosed ecosystems, the content of seven heavy elements (Sc, Cr, Co, As, Sb, Br and Se) as determined by Instrumental Neutron Activation Analysis in 29 samples of sediments and adjacent rocks from proglacial lake Bâlea (Fagaras Mountainins) and crater lake St. Ana (Harghita Mountains) has been used to establish at which extent these elements could be considered as having an anthropogenic nature. Sc is used as reference elements, as its content was not influenced by any anthropogenic activity. Digital radiography as well as sediments granulometry were also used to get more quantitative data about investigated sediments. Principal component analysis performed in Q as well as R mode was used to evidence the relationship between sediments and neighbour rocks as well as between heavy elements themselves.

Bâlea Lake with an area of 19.5 ha is a typical high altitude (2050 m) proglacial lake while St. Ana Lake area of 4.6 ha and situated at an altitude of 950 m is the unique crater lake in Romania. Although Bâlea as well as St. Ana lakes have different location and origin, they are characterized by a total absence of any source of industrial pollution.

Both lakes collect pluvial water from relative restricted areas (about 234 ha in the case of lake Bâlea and 147 ha for the lake Sf. Ana) so the mineralogical and element composition of their sediments will reflect the geochemical characteristics of surrounding geological formations. Accordingly, the sediments of Lake Bale are expected to reflect the mineralogical composition of the neighbour Suru formation, mainly consisting of metamorphic rocks such as amphibolitic schists, quartzo-felspatic gneissic rocks and mylonites as well as limestones. The sediments of Lake St. Ana, which occupies the bottom of now extinct Ciomatu volcano, mainly consists of fragments of weathered andesite together with an appreciable amount of vegetal detritus, the last one originated from the coniferous and deciduous forests that cover the caldera walls. It is worth mentioning that in the case of Bâlea Lake, the maximum thickness of sediments is not greater than 85 cm, while in the case of St. Ana Lake, sediments thickness is greater than 4 m. This fact reflects the environmental peculiarities of both lakes.

Final data showed that the average content of all seven elements was different for the two lakes, sediments content being relatively closed to average content of surrounding formations. PCA allowed us to establish that in the case of R-mode analysis, all elements form two similar clusters, regardless the lake, while in the case Q-mode analysis, the samples form few clusters, reflecting their location.

At the same, by comparing the sediment contents with those of surrounding rocks as well as with the numerical values stated by Romanian Regulations concerning the Environmental Pollution, it was established that, although their average content was different for the two lakes, all considered heavy elements could be regarded as natural, without any visible traces of anthropogenic influence.