ABSTRACT

The objective of this thesis was to examine groundwater quality of the Krušné hory Mts. crystalline complex. The state of water quality in the years 2000–2002 was statistically evaluated and confronted with current drinking water standard. Changes in water chemistry were analyzed thereupon over the period of 1986–2008. Finally, the assessment of impact of altitude, vegetation cover and litology on groundwater quality in the Krušné hory Mts was carried out.

While the region had been exposed to acid deposition since the 1860s, the most intense fossil fuel combustion occurred between 1960 and 1989, resulting in acidification of the groundwater bodies via atmosphere deposition of sulphuric and nitric acid. Today, this is reflected by low alkalinity as well as excess of sulphates in water. Desuphurizing units were installed on major sources of sulphur emissions in the 1990s which helped reduce sulphur oxides in the atmosphere a great deal. Nevertheless, for the time being sulphates continue to dominate in groundwater and their concentraction decline turns out slower than anticipated. Nitrate and chloride concentrations dropped considerably over the period of 1986–2008 as did base cations, especially calcium. This has led to a major drop in total dissolved solids by 25–40 % in 23 years.

The results of this study demonstrate that granitic rocks as well as soils developed on them show little resistance to influx of hydrogen cations. As a consequence, groundwaters in catchments where granites dominate are lower in pH values and exhibit excessive concentrations of iron, aluminum, arsenic and beryllium. Conversely, ortogneisses and paragneisses show a higher degree of resistance towards acid input, the outcome of which are groundwaters with higher pH values, total dissolved solids and lower concentrations of trace minerals. It has also been noted that groundwater bodies in catchments with coniferous forests tend to be low in pH values as well as concentrations of all major constituents, including suphates. Contrary to that, groundwater under deciduous forest and unforested land is less affected by acid deposition.