Optimizing the monitoring scheme for groundwater quality in the Lusatian mining region

Beate Zimmermann, Christian Hildmann, and Michael Haubold-Rosar

Research Institute for Post-Mining Landscapes (FIB e.V.), Brauhausweg 2, 03238 Finsterwalde, Germany
(b.zimmermann@fib-ev.de)

Opencast lignite mining always requires the lowering of the groundwater table. In Lusatia, strong mining activities during the GDR era were associated with low groundwater levels in huge parts of the region. Pyrite (iron sulfide) oxidation in the aerated sediments is the cause for a continuous regional groundwater pollution with sulfates, acids, iron and other metals.

The contaminated groundwater poses danger to surface water bodies and may also affect soil quality. Due to the decline of mining activities after the German reunification, groundwater levels have begun to recover towards the pre-mining stage, which aggravates the environmental risks. Given the relevance of the problem and the need for effective remediation measures, it is mandatory to know the temporal and spatial distribution of potential pollutants. The reliability of these space-time models, in turn, relies on a well-designed groundwater monitoring scheme.

So far, the groundwater monitoring network in the Lusatian mining region represents a purposive sample in space and time with great variations in the density of monitoring wells. Moreover, groundwater quality in some of the areas that face pronounced increases in groundwater levels is currently not monitored at all. We therefore aim to optimize the monitoring network based on the existing information, taking into account practical aspects such as the land-use dependent need for remedial action. This contribution will discuss the usefulness of approaches for optimizing spatio-temporal mapping with regard to groundwater pollution by iron and aluminum in the Lusatian mining region.