Excerpt from

Geochemical

ATLAS

Federal Republic of Germany

Distribution of heavy metals in waters and stream sediments

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Sampling

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Hannover 1985 (Digital processing and provision 2022)

FEDERAL INSTITUTE for GEOSCIENCES and NATURAL RESOURCES

In Commission: E. Schweizerbart'sche Verlagsbuchhandlung (Nägele u. Obermiller), Stuttgart

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ISBN 3-980 1097-0-4

Hannover 1985

Editor: Dr. D. Pfeiffer

Publisher address[2]:

Bundesanstalt für Geowissenschaften und Rohstoffe
Stilleweg 2, D-30655 Hannover

Distribution[2]:

E. Schweizerbart'sche Verlagsbuchhandlung
(Nägele u. Obermiller),
Johannesstr. 3A, D-70176 Stuttgart; Tel.: +49 711/351456-0

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[1] At the time of digital provision, the authors mentioned are no longer active in the BGR for reasons of age. The digital processing was carried out by U. Rauch, Bundesanstalt für Geowissenschaften und Rohstoffe, Dienstbereich Berlin, Wilhelmstraße 25-30, D-13593 Berlin, Email: uwe.rauch@bgr.de, geochemischeatlanten@bgr.de.

[2] The addresses were updated to the status of the year 2022.

2.3.1.1 pH and Conductivity

Comparison of the maps of pH and conductivity with the geological map shows up numerous significant similarities indicating that these factors are closely interrelated.

The peat bogs of North Germany, the granites and gneisses in the Harz Mountains, the Black Forest and eastern Bavaria, the Bunter Sandstone areas of Hesse and the Rhineland-Palatinate, for example, all have relatively acidic surface waters (pH of 4 - 6) and low conductivity values. On the other hand, limestone areas are characterized by alkaline waters (pH of 7 - 9) and higher conductivity values. The main variations in pH and conductivity are caused by the different solubilities and reactivities of the different outcropping rocks and soils in water.

In certain region, this natural equilibrium is being disturbed by man's activities. The burning of fossil fuels (coal, oil and gas) releases large quantities of sulphur and nitrogen oxides into the atmosphere lowering the pH of rain. In areas of calcareous rock, rain with pH values between 3 and 5 is more or less fully neutralized and the effects minimized. But in areas of granite and sandstone, no natural buffer is present and the pH of the naturally soft, acidic (from atmospheric CO_2) waters in such areas is reduced even further by "acid rain".

As a consequence of the above, the environmental conditions in these areas become modified to such a degree that, coupled with other detrimental effects due to exhaust fumes, heavy metals etc., serious damage to the vegetation may take place. Among the anthropogenic influences, a desired effect on pH and conductivity values may be caused by intensive use of mineral fertilizers in agriculture. Although these measures are intended to increase the pH and conductivity, they may simultaneously introduce pollutants (nitrate and cadmium) into the groundwater.