Sulfur Acidic Lakes in Germany: What Has to be Done? Helmut Klapper, Walter Geller and Martin Schultze. UFZ Centre for Environmental Research Leipzig-Halle Department of Inland Water Research, Magdeburg, Germany. The problem: The rapid decline of brown coal mining, to about 30% in the new "*Länder*" of Germany, has produced many new lakes within a few years. These lakes filled with groundwater very often are affected by acidification from pyrite oxidation. Their water is dark red, the pH 2 to 4 with the consequence of high metal content and absence of bicarbonate. Depending on the base binding capacity of the oxidised rock layers, the acidic conditions may last for decades, and, therefore, countermeasures are needed. Decision criteria for an active water quality management are (1) the urgent demand for fish-waters and recreational areas, (2) the need of new jobs in the post-mining landscape, and (3) the desirability to conserve some of these limnologically unique lakes as objects for science. In nature are also examples of sustainable bacteriological sulfate reduction. One case study was performed on the meromictic lake *Waldsee*. The aerobic epilimnion is acidic, the anaerobic monimolimnion, however, is neutral. The preferred microhabitat is the boundary layer between the two main strata, where plankton synthesise the organic material, necessary for sulfate-reducing bacteria. In another case the carbon source stems from urban sewage. The 11km-long Lake *Laubusch*, serving as a drainage for sewage water, reduces sulfate in the heavy loaded hypolimnion and in the macrophyte stands. The good fish stock of this lake is the basis for sport fishing. The mining lake *Senftenberger See* is an example of neutralisation by river water. After 1.5 exchanges of the lake volume the pH shifted from acidic to neutral in the manner of a titration curve. Experience with anaerobic technology was gained during our development of an in-lake denitrification plant. In a reservoir with nitrate content above drinking water standard, a straw-filled steel cage 20 x 60 x 1.50 m was positioned on the bottom. Nitrate-rich water together with a carbon source was pumped through this *aufwuchs* reactor. After eight weeks the whole hypolimnion was free of dissolved oxygen and free of nitrate because of nitrate respiration. For the task at issue here, the long-term biological desulfurication in mining lakes,

research is likewise focused on the hypolimnion and the sediments as preferable places for sustainable treatment.

Conclusions

- Large lakes threatened with acidification should preferably be filled with surface water.
- In smaller and deeper lakes, conditions suitable for sulfate-reducing bacteria may be created by adding or producing degradable carbon sources.
- In too-shallow lakes, the stratification must be stabilised by installing barriers against wind-induced mixing.
- Besides this final in-lake treatment, all possible means of abating acidification at the sources should be implemented where applicable.