

System-integrated Environmental Biotechnology: Remediation of Polluted Groundwater and Surface Water

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The project is part of the Strategy Fund instrument of the Hermann von Helmholtz Association of German Research Centres (HGF). This Biotechnology project has DM 8.7 million at its disposal for the funding period from 1998 to 2001. The objective of this project is to design innovative technologies for the remediation of acidified mining lakes and polluted groundwater in close co-operation between the centres and industry. Currently, the potential offered by environmental biotechnology has by no means been exhausted. In order to achieve this, the entire context of polluted ecosystems of interest was analysed. In addition to analysis of individual microbial reactions, the diverse interactions within the entire system, e.g. between biotic and abiotic processes and between pollutants and matrix, as well as the long-term behaviour and follow-up reactions, are being investigated. Understanding these complex processes then enables the technology developed to be directly applied wherever the pollutants are found.

Two main biotechnological strategies are being pursued:

- (1) Selective stimulation of the autochthonous microbiota
- (2) Augmentation of the microbial biocenosis by bacterial strains isolated for enhanced reduction or elimination of certain pollutants under field conditions

These techniques are being developed and tested at two model sites: (1) In order to develop strategies for the remediation of sulphur-acidic lignite mining lakes, enclosures have been set up in a lake in the Lausitz district for analysis and modulation of the relevant microbial processes. (2) In situ investigations of decontamination of particularly toxic and ecologically alarming chloroaromatic compounds in the groundwater are being performed at a test site in Bitterfeld (Saxony-Anhalt) using a pilot plant positioned directly in the aquifer. The approach adopted involves co-operation of scientists and engineers. The system-integrated environmental biotechnology promises ecologically sustainable solutions which can be adapted to similar problems all over the world.