

## **Water and contaminant flow in an aquifer under urban stress**

**ANDREAS MUSOLFF<sup>1</sup>, SEBASTIAN LESCHIK<sup>1</sup>, GERHARD STRAUCH<sup>1</sup>, SASCHA OSWALD<sup>1</sup>, FRIDO REINSTORF<sup>2</sup> & MARIO SCHIRMER<sup>3</sup>**

<sup>1</sup> *UFZ - Helmholtz Centre for Environmental Research, Department of Hydrogeology, Permoserstrasse 15, D-04318 Leipzig, Germany  
[andreas.musolff@ufz.de](mailto:andreas.musolff@ufz.de)*

<sup>2</sup> *Water and Recycling Management, University Magdeburg-Stendal, Breitscheidstrasse 2, D-39114 Magdeburg, Germany*

<sup>3</sup> *Eawag-Swiss Federal Institute of Aquatic Science and Technology, Department Water Resources and Drinking Water, Ueberlandstrasse 133, PO Box 611, D-8600 Duebendorf, Switzerland*

**Abstract** Urban groundwater resources are a matter of growing concern. Surface sealing and the urban subsurface infrastructure, such as water mains and the sewage system, can influence groundwater quality and quantity. To this end, groundwater deterioration within an urban watershed was assessed. An extensive monitoring programme concerning groundwater quality was combined with a numerical 3-D groundwater flow model of the study site. Results of the quality assessment revealed a pronounced influence of urban land use on the groundwater concentrations of the inorganic contaminants nitrate and boron. Within the urbanized part of the study area groundwater recharge is high and characterized by a fast response to rainfall. Here, the high degree of surface sealing does not necessarily contribute to surface runoff and enables fast infiltration of rainwater to groundwater through cracks and joints. Annual water and contaminant flow from the study area were estimated using the numerical groundwater model.

**Key words** urban groundwater; monitoring; groundwater recharge; pharmaceuticals and personal care products; contaminant mass flow