

Strategic monitoring to account for rapid variations in the nitrate concentration of groundwater and surface water

**FRANS VAN GEER^{1,2}, JOACHIM ROZEMEIJER³, YPE VAN DER VELDE⁵,
HANS PETER BROERS^{1,3,4} & GERRIT DE ROOIJ⁶**

1 *TNO Geological Survey of the Netherlands, PO Box 80015, NL-3508 TA Utrecht, The Netherlands*

frans.vangeer@tno.nl

2 *Department of Physical Geography, Utrecht University, PO Box 80115, NL-3508 TC Utrecht, The Netherlands*

3 *Deltares, PO Box 85467, NL-3508 TA Utrecht, The Netherlands*

4 *Vrije Universiteit Amsterdam, Dept. of Hydrology and Geo-Environmental Sciences, De Boelelaan 1085, 1081 HV Amsterdam, the Netherlands*

5 *Soil Physics, Ecohydrology and Groundwater Management Group, Wageningen University, PO Box 47, NL-6700 AA Wageningen, The Netherlands*

6 *Soil Physics Department, Helmholtz Centre for Environmental Research GmbH – UFZ Theodor-Lieser-Straße 4 / 06120 Halle (Saale), Germany*

Abstract As part of two PhD projects, we installed ion-selective electrodes and passive samplers for monitoring nitrate concentrations in a 7 km² catchment and compared the results to grab samples. We also monitored nitrate concentrations at the catchment outlet. We tested the effectiveness of these monitoring approaches to estimate the long-term pattern in concentrations and loads at the catchment outlet. In addition, we built a regression model to predict the short-term variations in nitrate concentration. We used commonly available measurements of precipitation, discharge and groundwater head as explanatory variables. In this paper we present a comparison of different approaches to monitoring, and we discuss the potential of the ion-selective electrodes and passive samplers for practical nitrate monitoring.

Key words water quality; nitrate monitoring strategies; ion-selective electrodes; passive sampling; nutrient loads; nutrient leaching; catchment hydrology; groundwater protection