



A national scale monitoring network for nutrients in agriculture dominated headwaters in the Netherlands

H.P. Broers (1,2,3), J. Rozemeijer (1), and J. Klein (1)

(1) Deltares, Utrecht, The Netherlands, (2) VU University, Dept. Of Hydrology and Geo-Environmental sciences, Amsterdam, The Netherlands, (3) Geological Survey of the Netherlands TNO, Utrecht, The Netherlands

Although specific monitoring networks exist in the Netherlands which assess the leaching of nutrients to surface waters and groundwater, none of them was capable to quantify the effects of nutrient reduction schemes to agriculture dominated headwaters. Thus, an important link was missing which relates the nutrient concentrations measured in shallow groundwater at farm scale to nutrient concentrations measured at the scale of Water Framework Directive water bodies. A new network was composed using existing monitoring locations and water quality time series owned by the 24 water boards in the Netherlands. Only monitoring locations were selected where no other pollution sources, such as water sewage treatment plants were influencing water quality. Eventually, 168 monitoring locations were selected to assess compliance to environmental standards and 80 for trend analysis. Compliance was tested applying environmental quality standards (EQS) based on summer averaged concentrations, which are set by the water boards and which are water type and location dependent. Compliance was strongly weather dependent, and only 24% of the locations complied for N and P under all weather conditions. Trends were assessed using a combination of seasonal Mann-Kendall tests and Theil-Sen robust lines for individual time series, and aggregating those trends to acquire median and average trend slopes for the sand, clay and peat regions in the Netherlands. Significant downward trends were demonstrated for N and P over the whole period (slopes between $-0,55$ mgN/l and -0.015 and 0.02 mg P/l per 10 year). Slopes were even more pronounced for winter concentrations of N (-0.89 mg N/l per 10 year). The slopes were relevant and environmentally significant in relation to the height of the EQS and were attributed to the effective reduction of nutrient leaching as the result of adapted farming practices. The presentation will highlight and evaluate choices in the design of the newly composed network, including the use of existing monitoring data and its probable effect on the outcomes of the network.