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Modelling of transport routes of nitrogen and phosphorus in the Drentsche Aa catchment

Jan Roelsma, Dorothee van Tol-Leenders, and Marian van Dongen
Netherlands (jan.roelsma@wur.nl)

In the Netherlands groundwater and surface water is highly loaded with nitrogen and phosphorus. This is partly caused by the the high degree of intensive agriculture. In order to reduce the loading of groundwater and surface water with nitrogen and phosphorus, understanding of the origin of these nutrients is important. Not only by taking into account the sources of nutrients, but also by considering the transport routes of nitrogen and phosphorus. Measures can be taken at the level of sources of nutrients but also at the level of transport routes.
In the framework of the project Catchment Monitoring the transport routes of nitrogen and phosphorus in the catchment of the Drentsche Aa were determined. The observed water discharge of the stream system of the Drentsche Aa was subdivided into different levels of depth of the origin of the groundwater. This method is called Hydrograph Separation. The observed nutrients in the surface water of the Drentsche Aa were linked to the origin of the different levels of depth of groundwater. By applying this to the catchment of the Drentsche Aa the results showed that 70% of nitrogen in surface water originated from the shallow soil system (unsaturated zone and phreatic groundwater). For phosphorus 55% of the amount of phosphorus in the surface water originated from this shallow system.
The leaching of nitrogen and phosphorus to groundwater and surface water for the catchment of the Drentsche Aa was calculated by using the ANIMO simulation model. The results of this model allows the user to study the spatial distribution of nitrogen and phosphorus leaching.
The calculations for the Drentsche Aa catchment showed that the magnitude of the nitrogen load to the surface waters was strongly related to land use: high nitrogen loads from agricultural areas and low nitrogen loads from nature areas. Within the agricultural areas, the variation in loads of nitrogen was low. The spatial distribution of phosphorus leaching showed a different picture. The model study showed that phosphorus loads to surface waters mainly originated from the agricultural land near the stream system. These were, in most cases, soils with shallow groundwater levels.
Mapping of the nitrogen and phosphorus leaching is important for taking measures. Measures to reduce phosphorus loading of surface waters have the most effect on those locations with the highest level of loading.