Geophysical Research Abstracts
Vol. 13, EGU2011-4339, 2011
EGU General Assembly 2011

Improved simulation of groundwater and riparian processes in catchment water quality models

Ann van Griensven, Girma Yimer, and Linh Hoang
UNESCO-IHE, Hydroinformatics and Knowledge Management, Delft, Netherlands (a.vangriensven@unesco-ihe.org)

The European Water Framework Directive aims for obtaining a good status in all water bodies. The guidelines for the directive make a clear distinction between the surface and the groundwater. The groundwater has however a dual role: at one hand, it is a 'water body', while at the other hand, a groundwater can also be seen as a source of pollution towards the surface water and may hence threaten the aquatic ecology. The latter role is however often underestimated or overlooked both by managers as by scientists. To tackle this issue, the EU funded project 'AQUAREHAB' aims at testing and promoting novel remediation technologies with the dual goal to improve the status of the groundwater bodies, as well as to protect the surface water bodies from toxic pollution. This study presents the improved modeling for 2 different catchments.
The Zenne river is polluted by organic toxic that originate from groundwater below the industrial site 'Vilvoorde-Machelen'. In order to quantify the pollution to the surface water, a combination of contaminant groundwater model and recharge model for the riparian zone have been implemented. These linked models allow for the computation of the fluxes considering (1) the transport and transformation processes of the contaminants from source to river using MODFLOW and RT3D (2) the degradation of the pollutants in the riparian zone and (3) the quantification of the recharge rate. The fluxes are further linked to the catchment model SWAT and the river model HEC-RAS.
In the Odense river basin, the transport and conversion of nitrates, from the groundwater to the surface water is investigated using the Soil and Water Assessment Tool. In order to better represent the groundwater-soil profile interaction, few modifications have been done on the source codes of the SWAT model. The main adaptation is to link the groundwater height to the soil water profile in such a way, that during high stages of the shallow aquifer, the soil profile gets saturated from the bottom upwards. The latter modification also allows for a better representation of the 'saturated flow processes' and a better activation of the tile drainage, a common practice in the agricultural land of the Odense basin. In addition, a different denitrification rate is applied for the water of the shallow aquifer that reached the soil profile which has favorised conditions for denitrification due to the availability of a higher carbon source and by a better representation of the riparian processes.
It can be concluded that it important to improve the groundwater modules of catchment models, and that the riparian zone has a crucial role for the contaminants fluxes from the groundwater to the surface water.