



Assessment of the Factors Controlling Nitrate Retention in Riparian Zones in the Seine River Basin

F. Curie (1,2), A. Ducharne (2), H. Bendjoudi (2), G. Billen(2), P. Viennot (3), C. Viavattene (3)

(1) GEGENA, Université de Reims Champagne Ardenne, France, (2) UMR Sisyphe, Université Paris 6, France, (3) Ecole des Mines, Fontainebleau, France
(florence.curie@ccr.jussieu.fr)

Wetlands are important ecosystems capable of achieving many environmental functions. Their location at the interface between terrestrial and aquatic environments governs a wide range of buffering actions like flooding control, sediment traps, and sources and water quality improvement, in particular by the retention of phosphorus and nitrogen, the main nutrients responsible for eutrophication. The objective of this study was to understand the factors controlling nitrate retention in the riparian zone of catchments of the Seine river basin (78 650 km²).

The study consisted of over 250 catchments (mean area = 1472 km²) which were monitored regularly over 2 years (wet and dry) for nitrate concentration in the river. The nitrate concentration in the river resulted from the mixing of two sources (the surface runoff and the base flow) and the retention in the riparian zone.

Two budget approaches for estimating the nitrate sources were tested in this study. The first approach took into account data easily available at the scale of the Seine basin such as land use and measured data of flow rates and groundwater concentrations. The second approach used the results provided by the crop model STICS coupled to the hydrogeological model MODCOU developed for the Seine river basin by the Ecole des Mines. We assessed the reliability of these two approaches by comparing their results.

The estimation of these two sources allowed us to obtain a theoretical nitrate concentration before riparian zone without influence of wetlands nitrate retention. By comparing these theoretical concentrations with measured concentrations in the river,

we calculated a retention rate for each surveyed catchment. We attempted to relate retention rates to potentially important factors such as land use, climatic conditions (temperature and rainfall) and geomorphological characteristics (basin size, wetland size or length of the river).