Geophysical Research Abstracts, Vol. 8, 04434, 2006
SRef-ID: 1607-7962/gra/EGU06-A-04434

Sewage inputs and accumulation of nutrients in the bed sediments of a temporary Mediterranean river

A. David, J.L. Perrin, B. Picot and **M.G. Tournoud**

Hydrosciences Montpellier, JRU CNRS - IRD - Université Montpellier 1 - Université Montpellier 2, France (tournoud@msem.univ-montp2.fr / +33 (0)467144774)

In the Mediterranean basin, small rivers are characterized by an alternation of long dry periods cut by floods events. During the dry period, which duration varies from 2 to 6 months, the riverbed falls completely dry except in some sections where anthropogenic inputs contribute to feed the river. Downstream from the inputs, nutrients and other pollutants are accumulated in the riverbed when there is no flow to flush them away. Very few studies have been carried out for evaluating accumulation of nutrient in such conditions, while it is of main interest for the application of the European water framework directive in temporary rivers.

In this study, accumulations in the bed sediments were quantified over an 85-day period during spring low flow conditions through in-situ measurements by sediment traps. The experiment took place in a small Mediterranean river along a 1.4-km long reach located downstream from a sewage input. Cross sections along the reach are about 2-meter wide and present a dense riparian vegetation, with straight walled banks. The riverbed consists of stones and gravels, with a small proportion of fine sediments ($<$ 2 mm). Boxes containing clean sediments were set at four stations (including a reference station upstream the input). Sediment samples were collected at a 3-week time step in the boxes, together with water samples. The sewage water was sampled at the same time. Sediment samples were analysed for grain size distribution, ash free dry mass, total nitrogen and total phosphorus. Water samples were also analysed for total nitrogen and total phosphorus.

On 85-day experiment, the three stations located downstream the sewage input showed a positive accumulation for both total nitrogen and total phosphorus, while the reference station did not show any accumulation. During the experiment, diminution of to-

tal phosphorus contents was observed at some stations. Accumulation rates observed at the station just downstream the sewage input presented the maximum values: 1.27 g-N.m-2.d-1 and 0.28 g-P.m-2.d-1. The accumulation rates then decreased downstream: 0.22 g-N.m-2.d-1 and 0.08 g-P.m-2.d-1 for the station located 40 m downstream and 0.17 g-N.m-2.d-1 and 0.01 g-P.m-2.d-1 for the station located 920 m downstream. Obviously, accumulations of nutrients in the bed sediments are due to losses of nutrients in the water column. However, accumulations in the sediments only explained 6 and 15% of total losses in the water column (respectively for nitrogen and phosphorus). Some hypothesis could explain these low values: (i) local measurements in the sediment boxes do not allow to evaluate the spatial heterogeneity of the accumulation processes within the reach, so retention rates were perhaps underestimated, (ii) input nutrient loads were not measured continuously, so their fluctuations were not taken into account, (iii) “self-purifying capacity” of the river plays a significant role, so nutrient loads in the water column decrease within a short distance downstream the input. Indeed, the nitrification associated to the denitrification is proved to be an important component of the nitrogen cycle downstream from the sewage input, and could thus explain a huge part of the nitrogen loss.