



## **Sewage inputs and accumulation of faecal bacteria in the bed sediments of a temporary river flowing into the Thau lagoon**

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In the Mediterranean basin, many small rivers are characterized by an alternation of long dry periods (2 to 6 months), interrupted by short floods events. During the dry period, the riverbed falls almost dry except in the sections where anthropogenic inputs from sewage plants contribute to feed the river. Due to the lack of flow, nutrients and other pollutants are not flushed away and accumulate in the riverbed downstream from the input. Very few studies have been carried out to evaluate the accumulation of bacteria of sanitary concern in such conditions, although it is of main interest for the application of the European water framework directive in temporary rivers. In this study, we evaluate the bacterial load present in the river Vène that flows into the Thau lagoon, where shellfish production remains the major economic activity.

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 the river Vène 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 washed 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, thermotolerant coliforms (CTT) and faecal streptococcus (SF). Water samples were also analysed for

thermotolerant coliforms (free living form or fixed form on  $3\mu\text{m}$  particles) and streptococcus.

During the 85-day experiment, from March to April 2005, the maximum increase of faecal bacteria concentration in water was in the range of 87/100ml to 915/100ml for SF and in the range of 705/100ml to 38 700/100ml for CTT, with CTT mean abundance always being greater than SF abundance. At the same time in the sediment, the increase was from 3.33  $10^2$  to 8.53  $10^5$ /100ml for SF and 4.90  $10^3$  to 3.70  $10^4$ /100ml for CTT, with SF mean abundance always being greater than CTT abundance. The analysis of fixed form CTT versus free-living CTT revealed that 70% of CTT were attached to large sediment particles ( $>3\mu\text{m}$ ). These results demonstrate the sedimentation and accumulation of faecal bacteria in sediments.

This phenomenon represents a potential reservoir of faecal bacteria and their subsequent input that could flow in the lagoon during sudden and extreme flood events. Such input of bacterial contaminants may have significant consequences on shellfish production.