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Microbial inputs to Mediterranean coastal waters from urbanized basin

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Continental human activities are mainly responsible for the contamination of coastal waters. Anthropogenic pressures and more specifically urban activities represent diffuse and point sources of pollution that release contaminants on impervious surfaces and into drainage and sewage networks. Surface leaching, land runoff and floods are the key factors driven by rain events causing the transfer of contaminants from the points of emission to receiving waters. The sharp characteristics of Mediterranean rainfall patterns, long dry periods cut by short rainfall events, strengthen the river dynamics and contaminant transfer. Since fast changes in urbanized areas are observed around the Mediterranean Sea, the contaminant inputs and the apportionment of the sources to coastal pollution are key issues for integrated coastal water management.

This study deals with fecal pollution of surface waters through the use of two indicators of anthropogenic and land storage contamination. The fecal indicators bacteria (FIB) are Thermo Tolerant Coliforms (TTC) and Faecal Streptococci (FS). The study site is the bay of Aigues-Mortes, a very attractive site for summer seaside tourism and winter retirement in southern France.

Measurements were conducted at the basin outlets and downstream of spots of anthropogenic activities such as a hospital zone, a densely populated area, a waste disposal landfill and a peri-urban area. River discharge measurements and water samplings were concurrently processed. The river discharge was measured in-situ with a Doppler current profiler and water samples were characterized for TTC and FS concentrations. The hydrometeorological conditions were assessed for the given day using the antecedent precipitation index calculated from local observed precipitations.

Current FIB inputs from the basin to the sea were calculated from in-situ measurements, combining discharge and concentration. Statistical linear regression models were established to link calculated daily FIB inputs to the antecedent hydrometeorological conditions.

The apportionment of the FIB loads from the selected spots of anthropogenic activities is discussed and compared to the simulated load at the basin outlet.