

Biofilm composition and anthropogenic pressure: Case of Venice lagoon

M. WILDI¹, S. LE FAUCHEUR¹, F. BERNARDI AUBRY²,
R. ZONTA² AND V.I. SLAVEYKOVA¹

¹University of Geneva, Institute Forel, 10, route de Suisse, CH-1290 Versoix, Switzerland

(correspondence: vera.slaveykova@unige.ch)

²Istituto di Scienze Marine / Arsenale - Tesa 104, Castello 2737/F, 30122 Venezia, Italy

Highly touristic and world-famous for its cultural richness, the lagoon of Venice is also a natural ecosystem with a high biodiversity and which possesses one of the largest wetlands in Mediterranean region. However this natural environment is under increasing anthropogenic pressure and copes with various inputs of contaminants. The objective of the present study was thus to evaluate the effects of the contaminants present in the lagoon towards periphyton assemblages. These epilithic biofilms are composed of microorganism communities, which live attached to substrata in natural waters. They play important roles in the biogeochemical cycles of major and trace elements, and are a significant source of food for grazers. Negative effects on periphytic communities could thus jeopardize the geochemical cycle of nutrients and metals in natural waters.

Periphyton was grown on artificial substrata in the lagoon at five different sites experiencing industrial, agricultural and urban influences. After 14 days, they were examined for their composition with epifluorescence microscopy coupled with the use of fluorescent dyes. Biotic quantification was performed using DAPI[®] whereas exopolymeric substances (EPS) were obtained using Concanavalin A Texas Red[®]. The algal fraction was measured using their natural autofluorescence. In parallel the major cationic and anionic composition of the waters was determined, as well as the amount of toxic trace metals. Biofilms collected at the urban site were found to be mainly composed of bacteria and other heterotrophic organisms, which produce a great amount of EPS, whereas those from agricultural sites had a significant abiotic fraction colonized by bacteria, which also secreted significant quantities of EPS. By contrast, biofilms collected in the non-polluted and industrial polluted sites (both marine areas) had the same composition, as well as the highest autotrophic fraction. This study showed that the composition of the biofilms living in the lagoon of Venice varied as a function of their environmental conditions and correlated with the degree of anthropisation.