

Quantification of microbial biodiversity and functionality in river sediment

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Introduction:

Microorganisms have been recognized to play a key role in nutrient cycling, (im)mobilization of metals, and detoxification of pollutants in sediments. In turn, microbial communities are influenced by local geochemical conditions. When river systems are exposed to anthropogenic disturbances, like eutrophication or chemical pollution, phylogenetic diversity as well as the abundance of various functional groups within sediment-associated microbial communities may be affected.

To address these effects, microbial biodiversity and the abundance of functional microbial groups in polluted river sediment were studied [1] over time.

Methods: Mesocosms filled with Ebro delta sediment covered with river water were exposed during 6 months to chlorinated organic compounds or to a high nutrient concentration. A mesocosm with the same Ebro sediment material, but untreated, was used as reference system. The microbial biodiversity and the abundance and activity of aerobic, nitrate-reducing, sulfate-reducing, iron-reducing, organohalide respiring, and methanogenic microorganisms was studied. Therefore, both culture dependent (MPN) as well as culture-independent (qPCR) methods were used.

Results: The microbial biodiversity was significantly reduced by addition of extra nutrient, but was not influenced by pollution with chlorinated organic compounds. In addition, individual microbial species were influenced by both eutrophication as well as by addition of the chlorinated compounds. However, the abundance and activity of functional microbial groups were not influenced by the applied treatments.

Discussion: The microbial community present in the Ebro-sediment was diverse and robust for the applied pollution. Extrapolation of these results to other sediments, or under other geochemical conditions, have not been made yet. However, other studies reported before that no differences were found between presence of functional microbial groups among Ebro sediment samples taken over a spatial and temporal gradient. [2].

References: [1] van der Zaan et al. (2010) *FEMS Microbiol Ecol* **74**:72-82; [2] Tas, (2009) *Thesis Wageningen University*