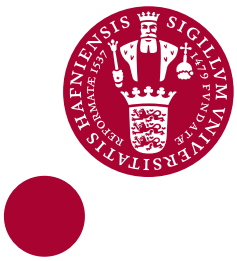

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COMPLEX MICROBIAL COMMUNITIES AS ECOTOXICOLOGICAL INDICATORS OF WATER QUALITY

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Complex microbial communities may serve as ideal and ecologically relevant toxicity indicators. We here report an assessment of frequently used methods in microbial ecology for their feasibility to detect toxic effects of the environmentally important surfactant linear alkylbenzene sulfonate (LAS) on microbial communities in lake water and treated waste water. The two microbial communities were evaluated for changes in community structure and function over a period of 7 weeks in replicated aquatic microcosms amended with various levels of LAS (0, 0.1, 1, 10 or 100 mg/l) and inorganic nutrients. In general, the two communities behaved similarly when challenged with LAS. Following lag periods of 1 to 3 weeks, LAS was degraded to non-toxic substances. Denaturing gradient gel electrophoresis of 16S rRNA gene fragments and [3H]-leucine incorporation were the most sensitive assays with effect levels of 0-1 and 1-10 mg LAS per l, respectively. Community-level physiological profiles and pollution-induced community tolerance determinations using Biolog microplates demonstrated less sensitivity with effect levels of 10-100 mg LAS per l. Total cell counts and net uptake of inorganic N and P were unaffected even at 100 mg LAS per l. Interestingly, different microbial communities developed in some replicate microcosms, indicating the importance of stochastic events for community succession. We conclude that microbial community-level toxicity testing holds great promise and suggest a polyphasic approach involving a range of independent methods targeting both the structure and function of the tested microbial communities.