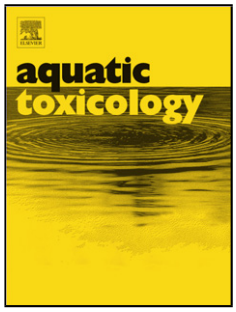

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Testing wastewater treatment plant effluent effects on microbial and detritivore performance: a combined field and laboratory experiment

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Highlights:

- Using a Community and Ecosystem Function (CEF) approach, we quantified the effects of WWTP effluent on the performance of microbes and detritivores associated to organic matter decomposition, a key ecosystem process.
- Microbes and detritivores (*Echinogammarus berilloni*) performance were measured combining a laboratory experiment under a range of effluent concentrations with a field *in situ* BACIP experiment.
- Samplings were repeated over time to examine its influence in the diagnosis of the effects of the effluent.
- Measured responses were clearer in the laboratory experiment, with the lack of response in the field attributed to the dilution of the effluent in the stream water.
- None of the measured variables in any of the experiments followed the predicted subsidy-stress response.
- Differences in microbial respiration and exo-enzymatic activities among effluent treatments increased with incubation time.

ABSTRACT

The amount of pollutants and nutrients entering rivers via point sources is increasing along with human population and activity. Although wastewater treatment plants (WWTPs) greatly reduce pollutant loads into the environment, excess nutrient loading is a problem in many streams. Using a Community and Ecosystem Function (CEF) approach, we quantified the effects of WWTP effluent on the performance of microbes and detritivores associated to organic matter decomposition, a key ecosystem process. We measured organic matter breakdown rates, respiration rates and exo-enzymatic activities of aquatic microbes. We also measured food consumption and growth rates and RNA to body-mass ratios (RNA:BM) of a dominant amphipod *Echinogammarus berilloni*. We predicted responses to follow a subsidy-stress pattern and differences between treatments to increase over time. To examine temporal effects of effluent, we performed a laboratory microcosm experiment under a range of effluent concentrations (0, 20, 40, 60, 80 and 100%), taking samples over time (days 8, 15 and 30; 4 and 10 replicates to assess microbe and detritivore performance respectively, per treatment and day).