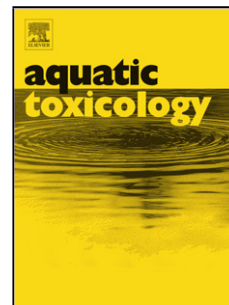


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Does wastewater treatment plant upgrading with activated carbon result in an improvement of fish health?

Short title: Wastewater effects in fish

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Highlights:

- Incomplete removal of micropollutants by conventional wastewater treatment
- Efficiency of an additional powdered activated carbon filter unit was investigated
- Biomarker responses in fish were correlated with results of chemical analyses
- After WWTP upgrade micropollutant levels and adverse effects in fish were reduced

Abstract

In the present study, the efficiency of a wastewater treatment plant (WWTP) upgraded with a powdered activated carbon unit for the reduction of micropollutants and the related advantages for fish health have been analyzed by means of different biomarkers, i.e. histopathological investigations, analyses of glycogen content and stress proteins, as well as by chemical analyses in different matrices. Comparative analyses were conducted prior and subsequent to the installation of the additional purification unit.

Chemical analyses revealed a significant reduction of several pharmaceuticals, including diclofenac, carbamazepine and metoprolol, in samples of effluent and surface water downstream of the WWTP after its upgrade. In addition, diminished concentrations of diclofenac and PFOS were detected in tissues of analyzed fish.

Histopathological investigations of fish liver, gills, and kidney revealed improved tissue integrity in fish after improved wastewater treatment. In parallel, biochemical measurements of

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