

On-line biosurveillance of wastewater discharges by analysing the behaviour of three invertebrate species: feedback in an urban context and on its relevance in different major industrial sectors

Authors: Alexandre Decamps¹, Olivier Geffard², Florian Moulin¹, Maxime Dauphin¹, Hervé Quéau², Laura Garnero², Arnaud Chaumot² and Didier Neuzeret¹

¹ViewPoint Behavior Technology, 67 Copernic Street, 01390 Civrieux, 04 72 17 91 92

²INRAE Lyon, Laboratoire d'écotoxicologie, 5 rue de la Doua, 69100 Villeurbanne, 04 72 20 87 87 87

Submission for a poster

Context

Water resources, bio-diversity and human health are major societal concerns. One of the main prerogatives for preserving them is to limit the entry of chemical contaminants into the environment, but very few tools are available to assess these inputs online. To meet this need, a collaboration between the INRAE-Lyon ecotoxicology laboratory and ViewPoint has made it possible to develop a station that measures the toxic quality of treated water on site, in real time and with a 30-day autonomy.

Methodology used

Some of the effluent to be analyzed is diverted and enters a conditioning module to control its temperature and oxygen content. A constant flow (650 ml.min⁻¹) comes into contact with the biological probes and their individual locomotor behaviour is measured in real time by video-tracking methods. The species used (*Gammarus fossarum*, *Radix auricularia*, *Erpobdella testacea*) for this online toxicity assessment method belong to different large phylogenetic groups and are representative of the receiving environments. Finally, the station's on-board computer measures the toxicity index from the individual distances travelled and is sent every two minutes to the water manager.

Feedback on urban and industrial step

The project with Saur industrial group consists in evaluating the purifying performance of a new chemical micropollutant treatment at the Saint-Fons urban wastewater treatment plant (1 million inhabitants equivalent). The site is equipped with online bio-monitoring tools upstream and downstream of this process. A year of continuous monitoring showed 1- different episodes of chemical contamination of the effluent, and 2- improvement of toxic quality through this organic chemical contaminant removal process.

A project financed by the RMC water agency consists in demonstrating the relevance of the tool to the industrial context. Four sites with different types of waste, classified by sector of activity, were equipped (chemistry, surface treatment, dyeing and agro-alimentary). The first follow-ups show the need to adapt the station (filtration, dilution) or the acclimatization of biological probes according to the sectors of activity. the first months of follow-up show that this technology would be relevant to the industrial sector. The sensitivity of the tool has made

it possible to provide useful knowledge on the variability of their effluent and thus to provide them with a real decision-making tool.