

# Physiological fish reactions biomarker for water quality

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A research project developed by the National Institute for Agricultural and Food Research and Technology (INIA) and the School of Forestry at the Technical University of Madrid has studied how to use fish farms to detect water quality in our rivers. There is a slight contamination that does not affect product quality and can trigger physiological reactions on fish. The analysis of these changes can be a good biomarker for water quality.

The monitoring of [water quality](#) is a great challenge today, particularly when it comes to accomplishing the corresponding requirements of the Water Framework Directive of the European Union. To carry out chemical analysis continuously is complex and expensive, and also provides limited data about the chemical compounds which ignores the influence of those excluded in the analysis. Another problem is the effect of all the compounds present in the concentrations that cannot be detected by the traditional analytical methods.

Biomarkers are being increasingly used to solve the just mentioned problems. Biomarkers are also witnesses of water conditions and are indeed being used in this research.

During the project, the researchers monitored two fish farms for three years and used three different approaches in order to show evidence of the trace levels of contaminants. Firstly, they analyzed fish in fish farms regularly and analyzed the induction of detoxification processes which are activated by the presence of contaminants.

Secondly, the fish were moved to the [fish farm](#) of the School of Forestry which has good water quality. It was observed that after a week these processes of detoxification had disappeared in the fish. This suggests that the fish were exposed to chemical elements in the first fish farm that was researched.

Thirdly, they analyzed chemicals in the fish farms

sediments. They only found high abnormal levels of in a few chemicals in some samples. These results do not explain the processes that had been seen induced on the fish. Therefore, there may be possibly substances in undetectable concentrations than can cause the observed effects.

**More information:** QUESADA-GARCÍA, A.; VALDEHITA, A.; TORRENT, F.; VILLARROEL, M.; HERNANDO, M.D.; NAVAS, J.M. "Use of fish farms to assess river contamination: Combining biomarker responses, active biomonitoring, and chemical analysis". *Aquatic Toxicology* 140: 439-448. DOI: [10.1016/j.aquatox.2013.07.007](https://doi.org/10.1016/j.aquatox.2013.07.007). SEP 2013.

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