

## Novel monitoring tools tackle chemical surface waters pollution

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With the socio-economic developments of the last decades, new emerging compounds have been produced, released and discharged through different point and diffuse sources in European rivers, lakes, and marine-coastal and transitional waters. Treated municipal wastewaters contain a multitude of organic chemicals including pharmaceuticals, hormones, and personal care products, which are continuously introduced into aquatic ecosystems. Their possible effects on the environment and human health is often unknown. The exposure of organisms, communities and humans to mixtures of chemical compounds must be considered to be the most common exposure scenario, but for technical and economical reasons, it is not possible to detect and quantify all chemical substances that are present in the aquatic environment.

To tackle the challenge of current and future chemical pollution, new monitoring and diagnostic tools are needed that can integrate and support the chemical monitoring programmes of surface waters. The Water Framework Directive (WFD) is the main legislation for the protection of water resources and sets the goal of achieving a "good status" for all Europe's surface waters and groundwaters by 2015 with the aim to protect environment and <a href="https://doi.org/10.1001/journal.org/">https://doi.org/10.1001/journal.org/</a> and pollution is based on the compliance with legally binding Environmental Quality Standards for selected chemical pollutants (priority substances) of EU-wide concern and for the specific pollutants selected at national or river-basin level.



In the context of the expert group CMEP (chemical monitoring and emerging pollutants) of the CIS (Common Implementation Strategy) of the WFD, a European technical report on aquatic effect-based monitoring tools has been published with the specific aim of supporting the monitoring programmes (surveillance, operational and investigative) of the WFD. The activity was chaired by Sweden and Italy and progressively involved several Member States and stakeholders in an EU-wide drafting group of 47 experts that includes also the JRC (Joint Research Centre) of the European Commission. The Technical Report has been approved by the Strategic Coordination Group of the WFD and endorsed by the European Water Directors in December 2013.

The present paper "The European technical report on aquatic effect-based monitoring tools under the water framework directive" published in Springer's journal *Environmental Sciences Europe*, summarizes the major technical contents and findings of the report with the aim to strengthen the link between science and regulation.

The tools described in the report include bioassays in vitro that can assess for example estrogenicity caused by pharmaceuticals, in vivo assays able to detect for example neurotoxicity and embryotoxicity effects, biomarkers for the detection of mutagenic effects, ecological indicators such as Spear, and innovative methods as the use of OMICs. Furthermore, methodologies such as EDA (effect directed analysis), which are useful to identify unknown pollutants, are also suggested.

In the context of the EU legislation, these tools can be used for example as screening tools, to establish early warning systems for human health protection, to detect the effects of chemical mixtures or chemicals that are not routinely analysed, to support investigative monitoring where causes of a decline of specific species are unknown, and to provide additional support in sediment quality assessment. Several case studies are included in the annex of the report as well as specific fact-sheets for



several single specific bioassays and biomarkers. The monitoring tools included in the report should support and complement the <u>surface waters</u> chemical <u>monitoring</u> programmes foreseen by the recent Directive 2013/39/EU on the priority substances. They should be spread in the Member States through training courses and field pilot studies with the final aim of improving the protection of environment and human health.

**More information:** Wernersson, A.-S., Carere, M. et al. The European technical report on aquatic effect-based monitoring tools under the water framework directive. *Environmental Sciences Europe* (2015, 27:7) DOI: 10.1186/s12302-015-0039-4

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