

Feedback on the revision of the Urban Waste Water Treatment Directive (UWWTD)

Submission date: 8 July 2021

1. Introduction, background and focus

The Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB) is Germany's largest research centre for freshwaters. Our research findings help to tackle global environmental changes and to develop strategies for sustainable water management – true to our guiding principle “Research for the future of our freshwaters”. Based on our research and expertise, we comment on the planned revision of the Urban Waste Water Treatment Directive (UWWTD). In addition to answering to the official questionnaire of the online public consultation, the IGB scientists provide additional information on the aspects of micropollutants, storm water overflows, urban runoff, and leaky sewers. The researchers underline that anthropogenic water pollution from settlements is a major threat to groundwater and freshwater ecosystems and their functioning, aquatic biodiversity, and the ecosystem services provided to humans. Therefore, current and upcoming challenges in wastewater management and treatment need careful attention, the development of new approaches, and a faster uptake of innovations in the water sector.

2. Micropollutants: indicators for treatment performance, the challenge of PMT substances, and bioassays for monitoring

- To ensure the efficiency of wastewater treatment, reliable performance indicators are needed that are linked to clearly defined treatment goals. However, the set of indicators as well as the criteria to assess treatment success should not be regarded as static elements in the long term. For example, (new) problematic substances can enter wastewater treatment plants, and toxic by-products may form unintentionally during (advanced) wastewater treatment. Such substances may be overlooked if the treatment performance is solely evaluated based on predetermined fixed criteria, and need to be supplemented by additional risk factor analysis. Thus, strategies for the periodic re-evaluation of indicators and treatment goals are needed.
- Persistent, mobile, and potentially toxic (PMT) substances should receive special attention in the monitoring of both raw and treated wastewater as they are neither removed through biodegradation nor sorption and consequently are a particular challenge for wastewater treatment. With the recent development of new analytical techniques, an increasing number of highly mobile

substances have been identified in water, some of which may pose a threat to freshwater and drinking water quality. Knowledge gaps on the occurrence, sources, formation, and fate of known and yet to be identified PMT substances in wastewater, stormwater, and drinking water need to be filled. The lack of monitoring and management strategies of PMT substances in wastewater treatment demands a political response.

- To assess water quality beyond single substance analyses, in particular if test routines for emerging substances are not in place, bioassays can be a complementary approach to chemical analyses. Bioassays can detect the cumulative toxicity of chemical mixtures in a water sample including unknown chemicals and transformation products. A battery of different bioassays allows to screen for specific modes of action (e.g., estrogenic effects or oxidative stress). Enhancing the development and implementation of bioassays as routine effect-based monitoring tools is recommended to improve the evaluation of treatment efficacy and wastewater-related risks.

3. Stormwater overflow and urban runoff: data and knowledge gaps, EU-wide monitoring, and enhancement of nature-based solutions

- The water quality of stormwater overflow and urban runoff is highly variable over time and also strongly dependent on location and land use. Also, the frequency, intensity, and duration of rain events and other factors play an influential role. While a lot of research has been done on micropollutants in wastewater and wastewater treatment plant effluents, much less is known about micropollutant composition and the associated toxicity in stormwater overflow and urban runoff. Knowledge gaps exist regarding the dynamics of micropollutant concentration and discharge in stormwater overflow and runoff, and their impact on receiving streams during rain events. In order to assess the contribution of stormwater overflows and urban runoff to the total load of micropollutants in surface waters, more data is needed. An optimised EU-wide monitoring is recommended to generate new research-based knowledge on micropollutants (and other pollutants of concern such as microplastics) in overflows and runoff. On this basis, the management and treatment of stormwater overflows and runoff could be optimised.
- Green infrastructure elements, also often referred to as nature-based solutions, have numerous benefits such as protection against urban flooding, reduced stormwater overflows, and urban greening. However, when it comes to treatment of urban stormwater runoff and especially the removal of mobile trace contaminants (including certain metals and micropollutants), nature-based solutions are often not very effective. Future developments involving e.g., the application of stormwater treatment materials are required to improve the treatment potential of nature-based solutions. To assess the treatment performance of decentralized stormwater purification measures, regular maintenance and monitoring strategies are needed (e.g., including indicator substances and the use of bioassays).

4. Leaky sewer systems: an often neglected source of pollution

Exfiltration of untreated wastewater from leaky sewers to the groundwater is an important urban source of pollution and should be tackled more consequentially by EU policymaking and practitioners alike. Damaged and leaking sewer systems are difficult to detect as sewers are not always

easy to access, exfiltration mostly occurs during high in-pipe water levels, and cracks are often self-sealed within days after high flow conditions.

Even if the pipeline networks are checked regularly by the operators, leaks often remain undetected and even if detected, repair works are time and cost intensive. Several observations indicate the presence of leaky sewers both in separate and combined sewer networks. For instance wastewater indicator compounds such as caffeine or the pharmaceutical metformin are often detected in storm drains, which are supposed to only transport urban stormwater. Wastewater indicators such as the sweetener acesulfame or the pharmaceutical carbamazepine were also found in otherwise unimpaired groundwater demonstrating the need to carefully address potential risks to water quality arising from leaky sewer systems.

5. Conclusion

From a research-based perspective, the IGB scientists underline that improved EU policies such as a revision of the UWWTD are urgently required to increase the sustainability of wastewater management and enhance the respective infrastructure and technologies, especially with perspective to the environmental goals of the EU.

6. Recommended scientific literature

Meinikmann et. al (2013): Contamination of Lakes by Non-Point Sources in their Catchment Areas. DOI: <https://doi.org/10.3243/kwe2013.12.002>

K. Meinikmann; M. Hupfer; J. Lewandowski (2015): Phosphorus in groundwater discharge – A potential source for lake eutrophication. DOI: <https://doi.org/10.1016/J.JHYDROL.2015.02.031>

H. H. Nguyen; A. Peche; M. Venohr (2021): Modelling of sewer exfiltration to groundwater in urban wastewater systems: A critical review. DOI: <https://doi.org/10.1016/j.jhydrol.2021.126130>

H. H. Nguyen; M. Venohr (2021): Harmonized assessment of nutrient pollution from urban systems including losses from sewer exfiltration: a case study in Germany. DOI: <https://doi.org/10.1007/s11356-021-12440-9>

Spahr et. al (2020): Hydrophilic trace organic contaminants in urban stormwater: occurrence, toxicological relevance, and the need to enhance green stormwater infrastructure. DOI: <https://doi.org/10.1039/c9ew00674e>

Umweltbundesamt (Federal German Environment Agency) (2021): PMT and vPvM substances under REACH. Online: <https://www.umweltbundesamt.de/en/PMT-substances> [08.07.21]

7. Contact

The IGB researchers are ready and motivated to support sustainable EU policymaking with their independent science-based advice. You will be brought into direct contact with our experts.

Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB)

Müggelseedamm 310, 12587 Berlin / Germany

Phone: +49 (0)30 641 81 500

E-Mail: info@igb-berlin.de

Website: www.igb-berlin.de