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Stockholm University Department of Environmental Science's and Baltic Sea Centre's response to the European Commission proposal for a recast Urban Waste Water Treatment Directive

Summary

- Overall, Stockholm university Department of Environmental Science and Baltic Sea Centre is supportive of the European Commission proposal for a recast Urban Waste Water Treatment Directive (UWWTD) (26.10.2022, COM(2022) 541 final 2022/0345 (COD).
- We support demanding tertiary treatment. From a Baltic Sea perspective, the suggested adaptation time is however unnecessary long since such requirement was decided by Helcom already in 2007.
- The definition of “sensitive area” should be expanded to include micropollutants, for instance in relation to limit values for priority substances.
- We welcome the inclusion of the Quaternary treatment step into the Directive. Urban wastewater treatment plants are important collection points for many chemical contaminants which are widespread in the aquatic environment.
- The list of indicator substances needs to include indicator PFAS. By not doing that the directive seriously risks steering towards techniques that will miss many problematic micropollutants.
- We welcome the inclusion of an extended producer responsibility for cosmetics and pharmaceuticals to the Directive. We believe that there is reason to include also the textile industry as many substances in textiles are released during washing and ends up in waste water treatment plants.
- Regarding monitoring we welcome the updated requirements for monitoring of priority substances and micro plastics. We welcome that monitoring data will be made available to the Commission and the EEA, but would like to stress that results from monitoring should also be made public.

The importance of reducing external load of nutrients to water

In recent decades, the nutrient loads to the Baltic Sea have decreased sharply. Eventually, this is expected to lead to improvements in the sea, but because large amounts of nutrients are stored in the water and on land, it will take time to see the effects. In order to comply with the commitments in the Baltic Sea Action Plan (BSAP), and simultaneously improve the environment in lakes and watercourses, the countries around the Baltic Sea need to continue to take measures to further reduce nutrient loads from land. Expanded urban waste water treatment is key. A recent conservative estimate from HELCOM (2022)¹ indicates that phosphorus inputs to the Baltic Sea could readily be reduced by 5-10% if WWTPs complied with treatment levels similar as suggested in proposal.

The importance of including micro pollutants treatment to waste water treatment plants

Micropollutants have many different sources and transport pathways to lakes and sea, one of the most important ones being urban wastewater treatment plants (UWWTPs). These function as collection points for many of the micropollutants that are diffusely emitted in urban environments^{2, 3, 4}. Although primarily designed to reduce levels of nutrients and organic matter, conventional treatment plants also lower the concentration of several but not all micropollutants⁵. Unfortunately, conventional treatment is ineffective in particular for mobile and persistent substances, i.e. highly water-soluble compounds that do not attach to particles and are resistant to biodegradation^{6, 7}. Short-chain perfluoroalkyl acids (PFASs) are examples of such substances. Other substances that do not easily degrade in conventional treatment

¹ Helcom (2022) Effectiveness of measures to reduce nutrient inputs, Baltic Sea Environment Proceedings 184, HELCOM, Helsinki, 39pp.

² Loos, R. et al. EU-wide monitoring survey on emerging polar organic contaminants in wastewater treatment plant effluents. *Water Res.* 47, 6475–6487 (2013).

³ Luo, Y. et al. A review on the occurrence of micropollutants in the aquatic environment and their fate and removal during wastewater treatment. *Sci. Total Environ.* 473, 619–641 (2014). Policy Brief February, (2021)

⁴ Rogowska, J., Cieszynska-Semenowicz, M., Ratajczyk, W. & Wolska, L. Micropollutants in treated wastewater. *Ambio* 49, 487–503 (2020).

⁵ Margot, J., Rossi, L., Barry, D. A. & Holliger, C. A review of the fate of micropollutants in wastewater treatment plants. *Wiley Interdiscip. Rev. Water* 2, 457–487 (2015).

⁶ Reemtsma, T. et al. Polar pollutants entry into the water cycle by municipal wastewater: a European perspective. *Environ. Sci. Technol.* 40, 5451–5458 (2006).

⁷ Reemtsma, T. et al. Mind the Gap: Persistent and Mobile Organic Compounds Water Contaminants That Slip Through. (2016).

plants and are found in liquid effluents or sludge, are pharmaceutical substances.⁸ Removal efficiencies however vary for different pharmaceutical substances due to different chemical and physical characteristics and to operational conditions of the treatment plants.

There is increasing evidence that chemical pressure on European water by the small fraction of micropollutants that are currently being monitored are likely having negative effects on aquatic organisms^{7,9,10}. Hence, including treatment of micropollutants into urban wastewater treatment plants, as suggested in the proposal for updated UWWTD, is of uttermost importance.

Detailed comments on the suggested articles

Article in UWWTD	Comments from Stockholm University researchers
Definition of micropollutants Art 2 (16)	<p>We believe that this definition is important and hence must include as many problematic substances as possible. We believe that the current definition fulfils this requirement as it refers to the CLP-regulation and Part 3 and 4 of Annex I, which include those substances that are hazardous to health and/or the environment. We would also like to emphasize the importance of using “CAN be considered hazardous.”</p> <p>We would, however, like to point to the fact that many substances that are not hazardous on their own at environmental concentrations, may become toxic in mixtures. This effect is not included in the definition.</p> <p>For an even more precautionary approach, micropollutants could be defined as any substances found in the recipient at levels above what can be expected in an unaffected environment.</p>

⁸ Verlicchi, Paola & Zambello, Elena & Al Aukidy, Mustafa. Removal of Pharmaceuticals by Conventional Wastewater Treatment Plants. *Comprehensive Analytical Chemistry*. 62. 231-286 (2013)

⁹ Posthuma, L. et al. Chemical pollution imposes limitations to the ecological status of European surface waters. *Sci. Rep.* 10, 1–12 (2020).

¹⁰ Malaj, E. et al. Organic chemicals jeopardize the health of freshwater ecosystems on the continental scale. *Proc. Natl. Acad. Sci.* 111, 9549–9554 (2014).



Collecting systems Art 3	We support all the suggestion for agglomerations with a p.e. of 2000 and above.
Individual systems Art 4	<p>In general, the inclusion of individual systems in the UWWTD is very important and we support this article but would like to underline the following.</p> <p>When implementing the revised UWWTD it is important to consider that the environmental benefits of upgrading or replacing individual systems with connection to waste water treatment plants strongly depend on local hydrological conditions. Drainage pathways and potential retention, influenced e.g. by the surrounding topography, vegetation and soil characteristics, can entail vastly different levels of risk to receiving water bodies.</p> <p>In order to combat eutrophication, individual system in areas with low retention/high leakage risk, draining to lakes and coastal waters with limited water turnover and high nutrient sensitivity, should be given high priority.</p> <p>In individual systems, from a eutrophication perspective, focus should be on ensuring that toilet waste is properly treated. Less effort can be put on grey water (i.e. water from showers, dishing etc) because it does not contain much nutrients.</p>
Integrated Urban Wastewater management plans Art 5 Annex V	<p>We support the establishment of integrated urban waste water plans, but it should be done quicker.</p> <p>In Annex 5.C, measures increasing green infrastructures such as wetlands should be included and prioritized because they serve as treatment for both nutrients and micropollutants.</p>
Secondary treatment Art 6	<p>We support increasing secondary treatment.</p> <p>Regarding the monitoring/measurements of discharges (Table 1. in Annex 1); the proposal only suggests measuring BOD. We argue that nutrients (Tot-N and Tot-P) must be included in monitoring, at least for areas identified as sensitive in Annex II. HELCOM also uses the suggested BOD and requires a 70% reduction for P for all secondary treatment and 30% for N in N-sensitive areas.</p>
Tertiary treatment Art 7	<p>We strongly support demanding tertiary treatment. It is an important and effective technique that is already in practice. However, from a Baltic Sea perspective, the suggested adaptation time for Member States is far too long since the HELCOM contracting parties agreed</p>



	<p>in 2007 to upgrade WWTPs according to similar standards as proposed here.</p> <p>7.2 suggests establishing a list of areas sensitive to eutrophication. These do already exist as part of for instance the nitrates directive. Therefore, actions can be taken much faster than suggested. The definition of “sensitive area” should be expanded to include micropollutants, for instance in relation to limit values for priority substances. Expanding the scope of the meaning of sensitive areas and conditions for emitting wastewater in these areas under the UWWTD would enable directive contribute to reaching targets set under both the WFD and MSFD.</p> <p>Annex 2, Art 2 describes the procedure of selecting the target nutrient(s) for tertiary treatment. The selection procedure is vague and seems to apply only for WWTPs serving between 10 000 and 1000 000 p.e., leaving the procedure for selecting nutrients to remove for WWTPs serving > 100 000 p.e. unclear.</p>
<p>Quaternary treatment Art 8</p>	<p>We very much welcome the inclusion of the Quaternary treatment step into the Directive. Urban wastewater treatment plants are important collection points for many chemical contaminants which are widespread in the aquatic environment. The Water Framework Directive (WFD) and the Marine Strategy Framework Directive (MSFD) set requirements for defining and assessing the status of European fresh and marine waters, and UWWTD is specifically mentioned in these directives as a measure to achieve good ecological and environmental status.</p> <p>We hence welcome the linkage between requirement for treatment with environmental statutes of the recipient for plants between 10 and 100 000 p.e.</p>

<p>List of Indicator substances to be removed by at least 80% Annex 1, Table 3.</p>	<p>The list of indicator substances needs to include some indicator PFAS (e.g., perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), perfluorohexanoic acid (PFHxA), and perfluorobutane sulfonates (PFBS)), which are common legacy and replacement PFAS representing a range of perfluoroalkyl chain lengths (short and long chains) and thus partitioning behavior. By not including PFAS the directive seriously risks steering towards techniques that will miss many problematic micropollutants with special/unusual partitioning behavior. Many studies show that there is a need for a combination of techniques in order to treat both PFAS and pharmaceuticals in treatment plans.¹¹</p>
<p>Extended producer responsibility Art 9</p>	<p>We welcome the inclusion of an extended producer responsibility to the Directive. The Polluter Pay Principle should be a key principle underlying EU environment legislation and policies, as set out in Article 191(2) of the Consolidated Version of the Treaty on the Functioning of the European Union (europa.eu). We also understand the rationale behind choosing the cosmetics and pharmaceutical sectors, as all their products and substances will end up in sewage treatment plants. We would however like to argue that there is a case to include also the textile industry as many of the substances used and added to textiles are released during washing and ends up in waste water treatment plants. Notable substances include PFAS, permethrin (insecticide), azo dyes, and phthalates.</p>
<p>Energy neutrality of urban waste water treatment plants Art 11</p>	<p>We support this article, suggesting the establishment on energy audit are carried out.</p>
<p>Local climate conditions Art 13</p>	<p>Art. 13 requires UWWTPs to be designed to handle wastewater loads under normal local climatic conditions, but we suggest that climate change, in particular its implications for hydrological extremes, also be considered.</p>
<p>Discharges of non-domestic wastewater Art 14</p>	<p>We welcome that authorities are encouraged to take measures to identify, prevent and reduce as far as possible the sources of pollution in non-domestic wastewater. We also welcome the connection between identified problematic substances through the monitoring system in Art 21, with the</p>

¹¹ Svenskt Vatten, rapport 2022-7. PFAS – hur kan svenska avloppsreningsverk möta utmaningen. (2022) With English summary

	<p>possibility for authorities to stop industries wanting to connect to the sewage system. We believe that this upstream approach gives industries incentives to reduce pollutants at the source.</p>
<p>Sludge Art 20</p>	<p>We think that the present sludge directive has little relevance for environmental protection and circular economy and should therefore be revised. A new directive must focus not only on preventing harmful effects on soil, vegetation, animals and people, but also must focus on preventing harmful effects on drinking water, freshwater and the marine environment, by leakage of nutrient, pollutants, pharmaceuticals or microplastics from application of sludge.</p> <p>A new directive should not consider the spread of sludge as the only solution, but should also be open to new techniques that can extract nitrogen and phosphorus and limit the spread of hazardous substances (e.g. heavy metals and persistent organic pollutants), pharmaceuticals and microplastics.</p> <p>Untreated sludge should never be allowed to be spread on agricultural land, not even if it is injected or incorporated into the soil.</p>
<p>Monitoring of substances Art 21</p>	<p>Monitoring of the influx of N and P loads must be included in Table 1 in Annex 1.</p> <p>We welcome the updated requirements for monitoring of priority substances and micro plastics and the established connection to the WFD Daughter Directives.</p> <p>There is a risk of solely relying on lists of priority compounds for monitoring as it will miss the large majority of chemicals in commerce as well as potential mixture effects on aquatic life. Use of chemical screenings that take account of a wide range of pollutants is therefore an important complement, as is effect screening and mixture toxicity assessments based on a wide range of analysed chemicals.</p>
<p>Reporting of monitoring results Art 22</p>	<p>We welcome that datasets with results from monitoring will be made available to the Commission and the EEA, but would like to stress, not the least in the interest of research, that results from monitoring should also be made public.</p>



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