

Microplastics capture: microplastic sampling in wastewater and their capture at wastewater treatment plant level

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Introduction of two projects microplastics in wastewater

- These two Swedish projects were aimed to create an overview and increased understanding of the flow of microplastics in the wastewater management cycle.
- The fractions included in the projects were: influent and effluent wastewater, sewage sludge and for one of the projects also soil fertilized with sludge for 35 years.
- For the soil, sludge and digestate fractions, method development was included measuring microplastics in mg/l water and mg/kg dry matter sludge (mass not number of particles)



Project 1: Malmö, Sjölunda WWTP, 350 000 pe

Treated waste water

- More than 99% of the microplastics (10-500 $\mu m)$ were removed from the incoming wastewater.

- Removal levels may be lower in other member states depending on the treatment process (80-95% removal).

- Total discharge of microplastics **to water** was calculated to: **0,15 g/(PE year).**

Waste water sludge

 - 40% of the microplastics in the incoming wastewater were found in the anaerobically digested sludge

- Microplastic to sludge:
- **0,42 g/kg DM** (5 times less than Fertilising Products Regulation for plastic/impurities)







Arable land at Petersborg after 35 years of sludge use



Project 2: Göteborg, Rya WWTP and Stockholm WWTP

- Domestic wastewater in Stockholm and in Göteborg, contains 3-10 g/(PE year)
- ~ Microplastics in the **influent** wastewater to Rya WWTP:
 - ~ **30 %** originates from **domestic wastewater**
 - ~ **70 %** originates from **stormwater** and other sources
- ~ The load to WWTPs of tyre particles is **1.2 g /(PE year)**

This study also shows that:

- Microplastics are efficiently removed at Rya WWTP, by approximately **99 %**
- The microplastic load direct from stormwater to water recipients are 100 times greater than of WWTP effluents
- The large number of pathways to the environment requires control-at-source measures.



Conclusions

Waste water

- The WWTPs are highly effective in retaining microplastics with 80-99% removal
- Microplastic pathways to water recipients from stormwater is 100 times greater than from effluent wastewater

Sludge

- **Only 40-60%** of the microplastics in the incoming wastewater were found in the anaerobically **digested sludge**. The rest of the microplastics have been removed or disintegrated/degraded during the treatment in an ordinary WWTP
- The concentration of microplastics in sludge from Rya WWTP, Käppala WWTP and Sjölunda WWTP, corresponds to 5, 8 and 8 g/(PE year) respectively
- Sludge (normal dose) used as fertilizer for 35 years **seems not to cause an elevated microplastic** concentration in the soil
- Data indicate that the microplastics might be disintegrated/degraded in the soil

Source control and EPR

 Additional removal requirements at WWTP are not sustainable, but more source control is needed e.g. microplastics in storm water were polluters-pays and extended producers responsibility (EPR) should be applied

Project 1: Malmö

Mikroplaster i kretsloppet

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Project 2: Göteborg and Stockholm

Read more about microplastic and the waste water sector:



Project 1: Malmö, Sjölunda WWTP

http://vav.griffel.net/filer/svu-rapport-2018-13.pdf

(Summary in English)

Project 2: Göteborg (Rya WWTP) and Stockholm WWTP https://www.svensktvatten.se/contentassets/22657293353d44ecaca 7721d0b1c907c/svu-rt228.pdf

(Summary in English)

EurEau briefing note on wastewater and microplastics

http://www.eureau.org/resources/briefing-notes/3940-briefingnote-on-microplastics-and-the-water-sector/file

Thank you for your attention

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