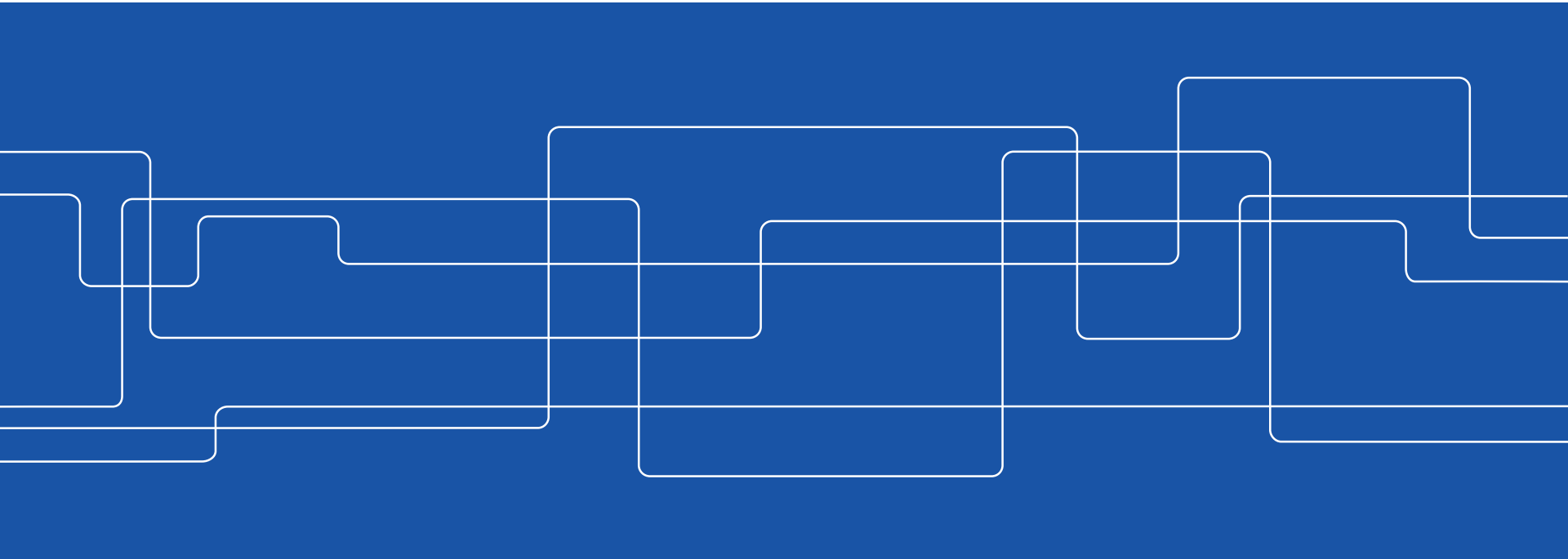




Screening of different types of on-site sewage facilities- treatment function and the potential of removing micropollutants

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RedMic project

- ❑ The RedMic project is financed by FORMAS
- ❑ Aims at identifying critical organic micropollutants emitted from on-site sewage treatment facilities (OSSFs) and provides new science based reduction tools and reduction strategies.
- ❑ Cooperation between Umeå University, KTH Royal Institute of Technology, Stockholm University, Swedish University of Agricultural Science and Uppsala University
- ❑ KTH task in the project is to develop treatment units that are able to remove micropollutants



Introduction

- ❑ 10% of the population are not connected to municipal WWTP.
- ❑ The emission of organic micropollutants from OSSFs are largely unknown.
- ❑ OSSFs:
 - soil filtration system (SFS),
 - package treatment system (PTS)
 - Source separation system (SSS)

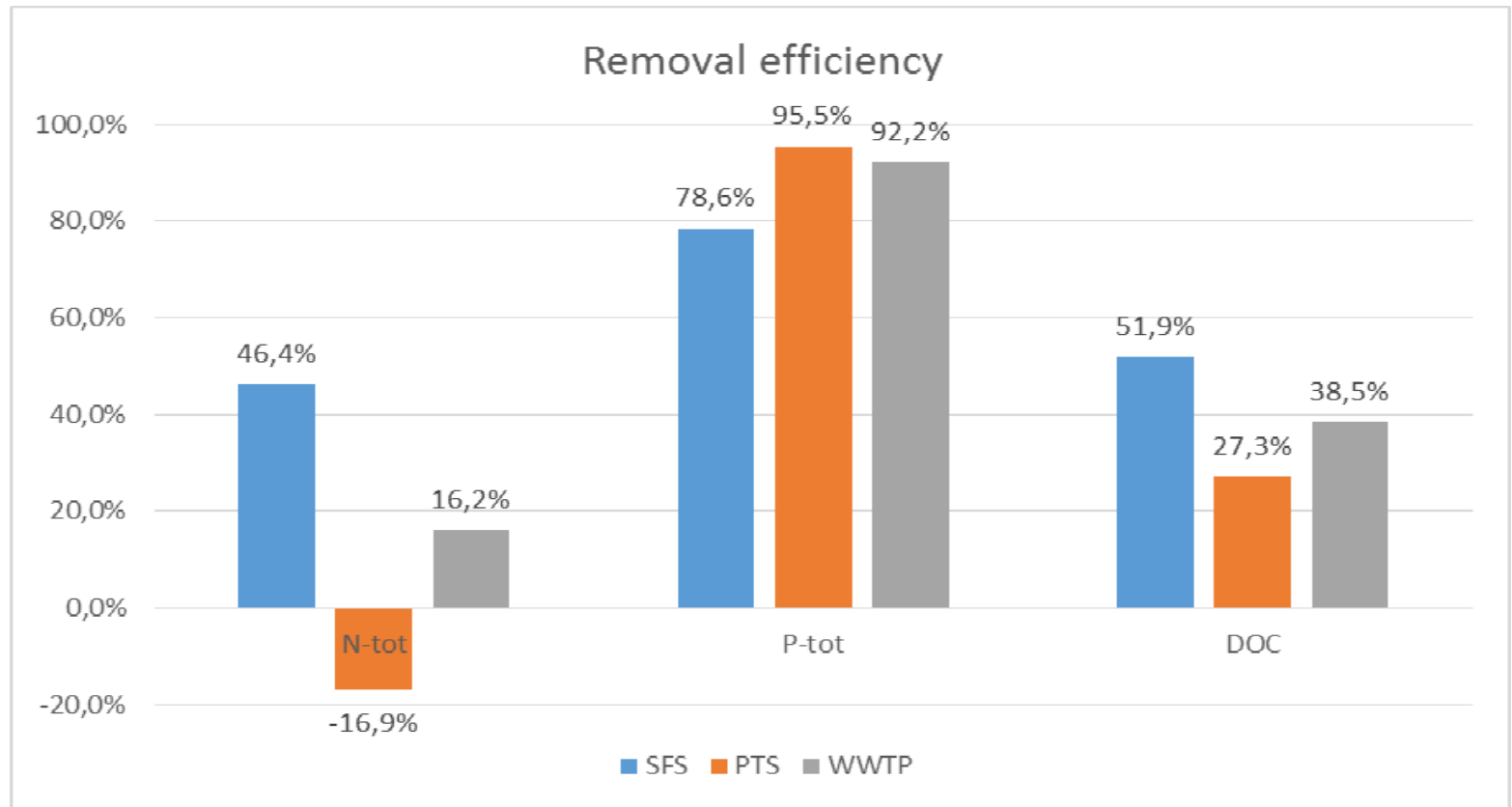


Material and method

- ☐ Sampling: Water samples were collected from influent and effluent at 16 OSSFs (SFS, PTS, SSS) and 2 medium sized WWTP
- ☐ Control parameters analysis to assess the function of OSSFs: phosphorus, nitrogen, pH, DOC, EC, turbidity, oxygen concentration
- ☐ No target MP analysis was carried out by laboratories at Umeå University and the Swedish University of Agricultural Sciences. (pooled samples)

Results and disussion – SFS, PTS

- ❑ Removal of total nitrogen, total phosphorus and DOC



Results and discussion – SSS

Blackwater and greywater analysis

- High levels of pollutants in BW
- Greywater is suitable for direct discharge, however the treatment of greywater greatly improved the turbidity

Location	Ntot mg/L	Ptot mg/L	DOC mg/L	pH	EC μS/cm	Oxygen mg/L	Temp °C	Turbidity NTU
BW	900.91	185.14	275.93		4135	0.22	-	765
GW (inf.)	11.14	1.83	13.35	7.34	656	1.7	-	116
GW (eff.)	13.64	1.41	7.5	8.15	645	10.23	4.8	8

Micropollutant analysis

- No-target analysis – Several thousands of compounds were detected, 45 and 79 of them were successfully identified by UU and SLU laboratories respectively.
- 30 compounds were selected as case chemicals for further study.

	SFS	PTS
Fragrances	68.60%	93.90%
UV stabilisers	55.90%	98.90%
Food additives	69.50%	59.90%
Detergents	46.50%	-6.80%
Plastic/rubber additives	70.70%	66.50%
Biocides	27.30%	14.60%
Pharmaceutical	52.90%	34.10%
Mean removal rate	52.40%	37.50%

* MPs analysis were done by Kristin Blum (UU) and Meri Gros (SLU)



Conclusion

- ☐ Not all OSSFs in Sweden are in good condition.
- ☐ SFS provided acceptable treatment results for all control parameters and was also better at MP removal.
- ☐ PTS had a few extreme values
 - MPs
 - Nitrogen, DOC

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