

Retention Soil Filters as a polishing step for the removal of micropollutants in waste water treatment

- First findings from a pilot scale plant in Rheinbach –



Ecotechnologies for treatment of variable wastewater and stormwater flows

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Concept / Idea

- **Erftverband: 28 RSFs**
 - **Capability of micropollutant removal**
 - **Most of the time in standby, waiting for rain events**
 - **Some RSFs located near to WWTP**
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- **Could these Filters work as an additional treatment step in order to remove micropollutants?**
- ⇒ **Pilot scale plant**

Pilot scale plant - Overview

- On WWTP Rheinbach
- 3 filters
- Fed with WWTP effluent



Photo: Google Maps



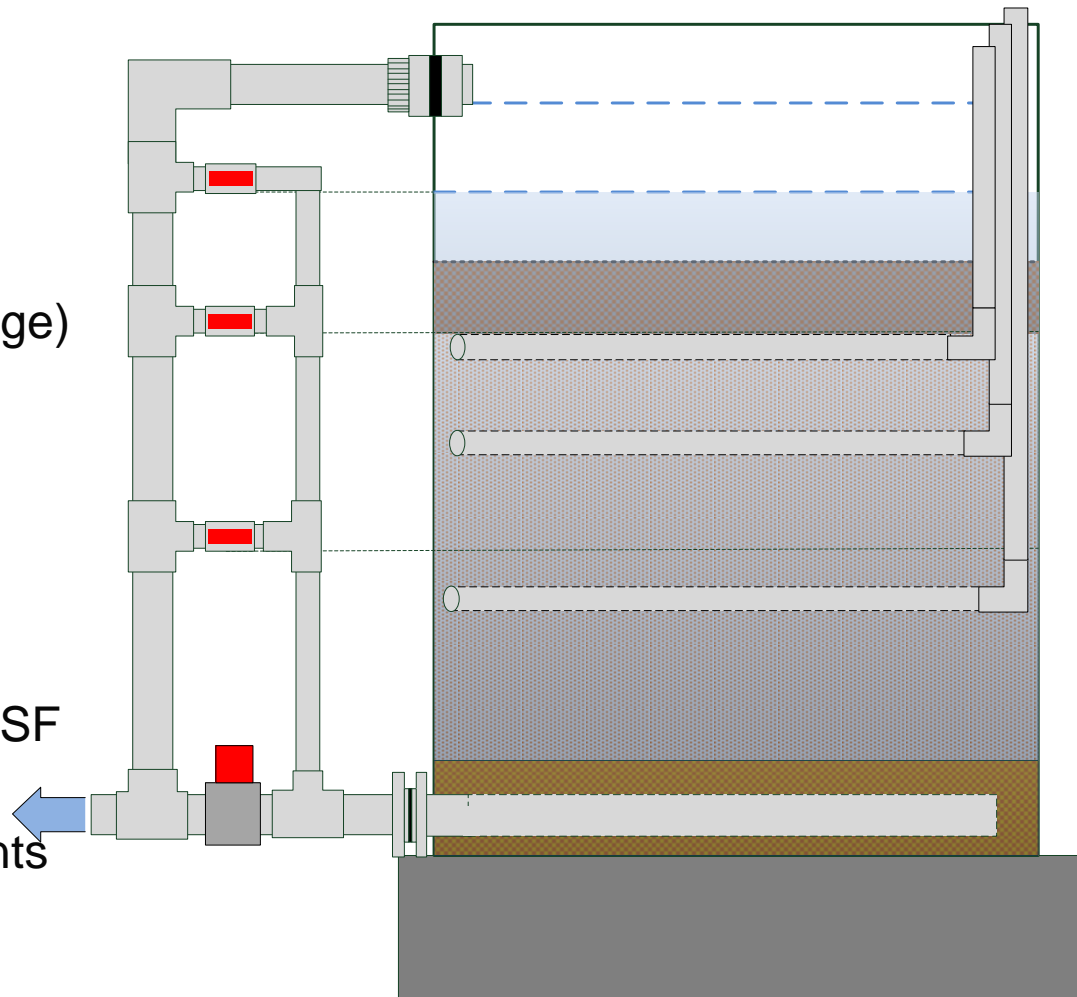
Filter

- 1,6 m height
- 1,4 m diameter
- ⇒ ~1,5 m² surface area

- 30 cm gravel (2/8 mm, drainage)
- 90 cm filter sand (0/2 mm)
- Sampling tubes in 3 layers:
0,1 m, 0,3 m 0,75 m

Filters 1&2

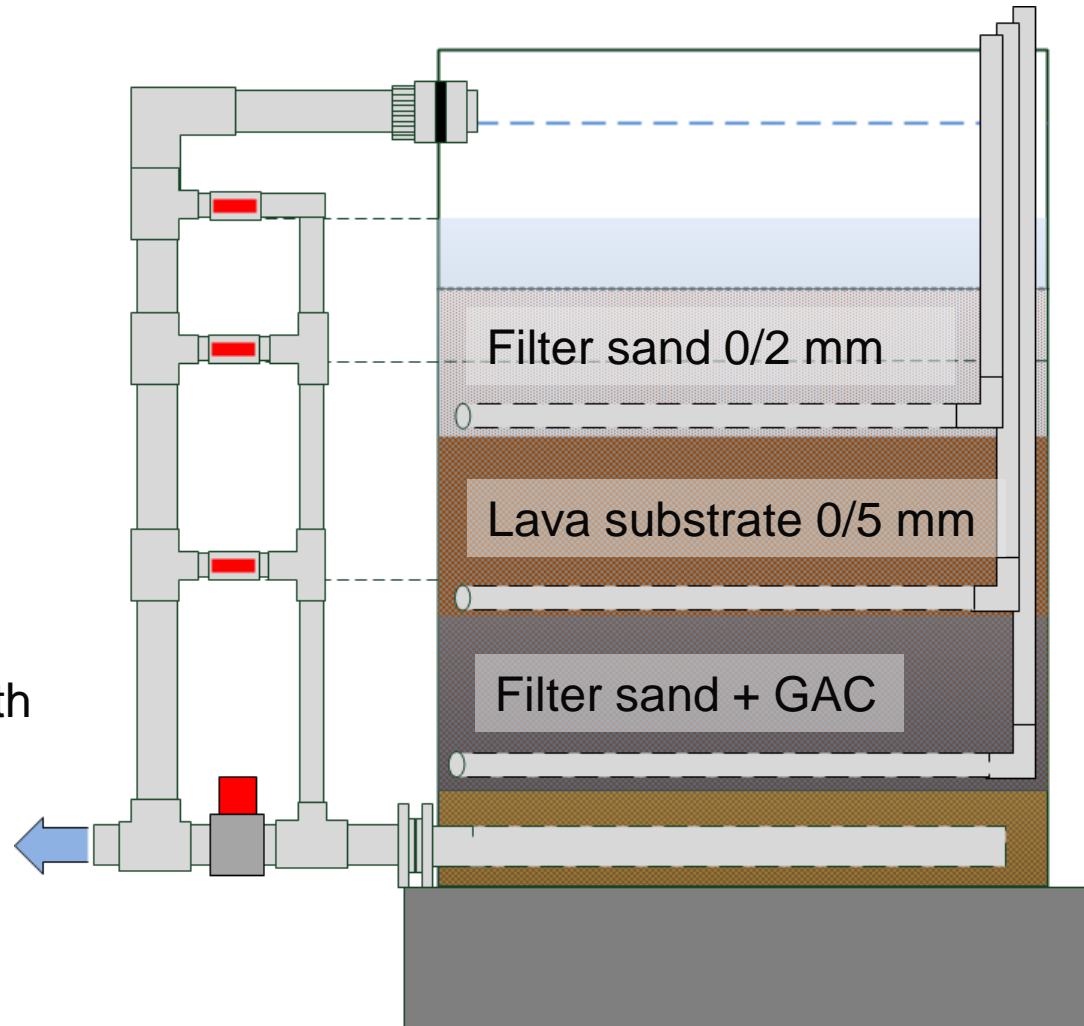
- Filter material from existing RSF plants
- Upper layer contains sediments (organic matter)
- Reed plants (phragmites australis)



Filter

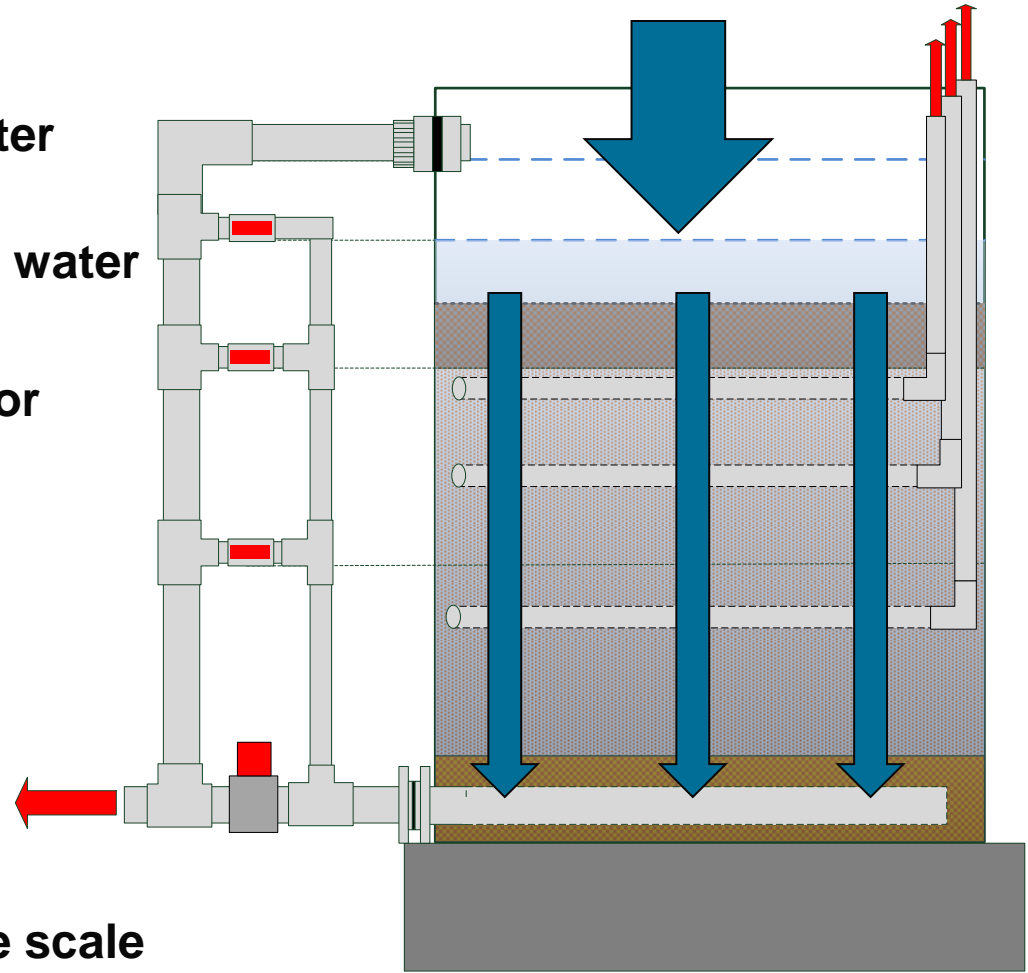
Filter 3:

- Fresh filter sand 0/2 mm
- Lava-substrate 0/5 mm
(pumice stone, Lava stone)
⇒ High porosity
- Granulated activated carbon
(GAC 0,6/2,5 mm) mixed with
fresh filter sand sand
- Reed plants



Operation

- Filled ~ 10 cm above filter surface
⇒ distribution of feed water
- Dry phases important for oxygen supply
- Cycles of
 - 28 hrs Feeding
 - 56 hrs dry= 3,5 days/cycle
- Feed according to large scale Filters (0,03 l/(s*m²))
⇒ Realistic operating conditions



First Findings

- **High oxygen concentration**
Influent: 7 - 9 mg/l
Effluent: same range

⇒ **Oxygen supply sufficient!**

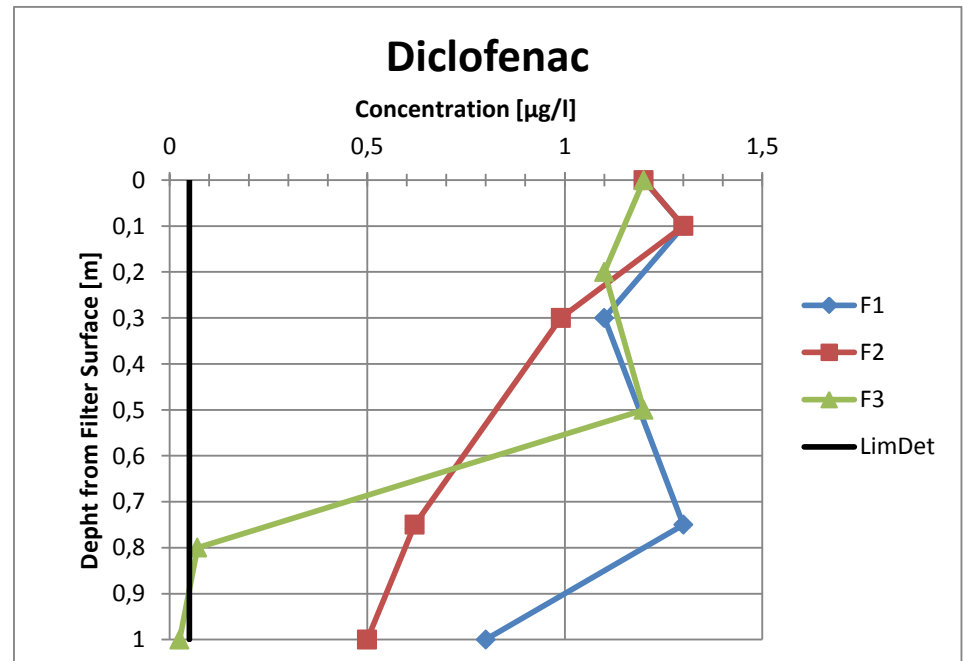
First Findings

- High oxygen concentration
Influent: 7 - 9 mg/l
Effluent: same range

⇒ Oxygen supply sufficient!

- Moderate removal in F1 & F2
- High removal in F3

⇒ Sampling from filter layers works!



Future activities

- **Further Sampling**
- **Long term performance**
- **Elimination mechanisms**
- **Optimization of design, materials**
- **Large scale plant in upcoming R&D project**
 - **4500 m² surface area**



Thanks!



TAPES

Transnational Action Program on Emerging Substances

