

An overview of urban runoff treatment using nature-based solutions

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Atmospheric deposition



Urban runoff pollution sources

Anthropogenic activities



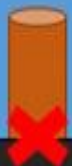
Drainage surfaces



Recreational
areas



Urban drainage system



Pipes and misconnections



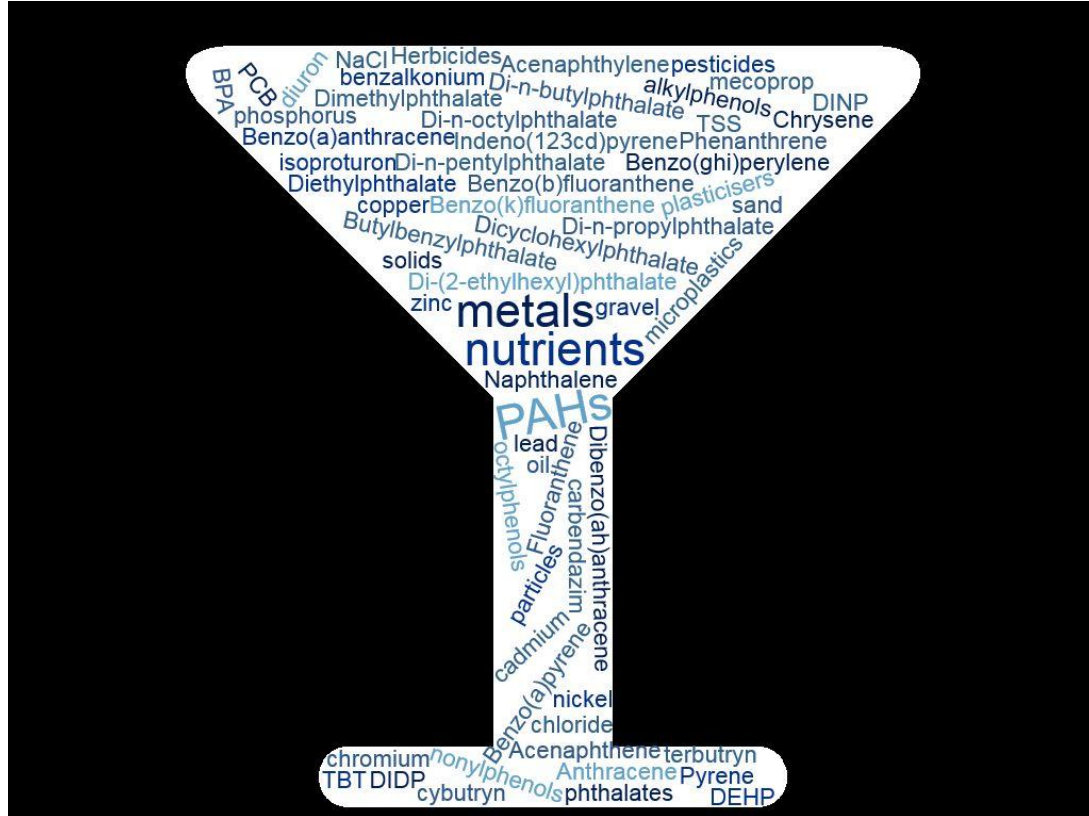
Stormwater control measures

Green infrastructure



Müller et al., 2020

Urban pollution cocktail



Traditional approach



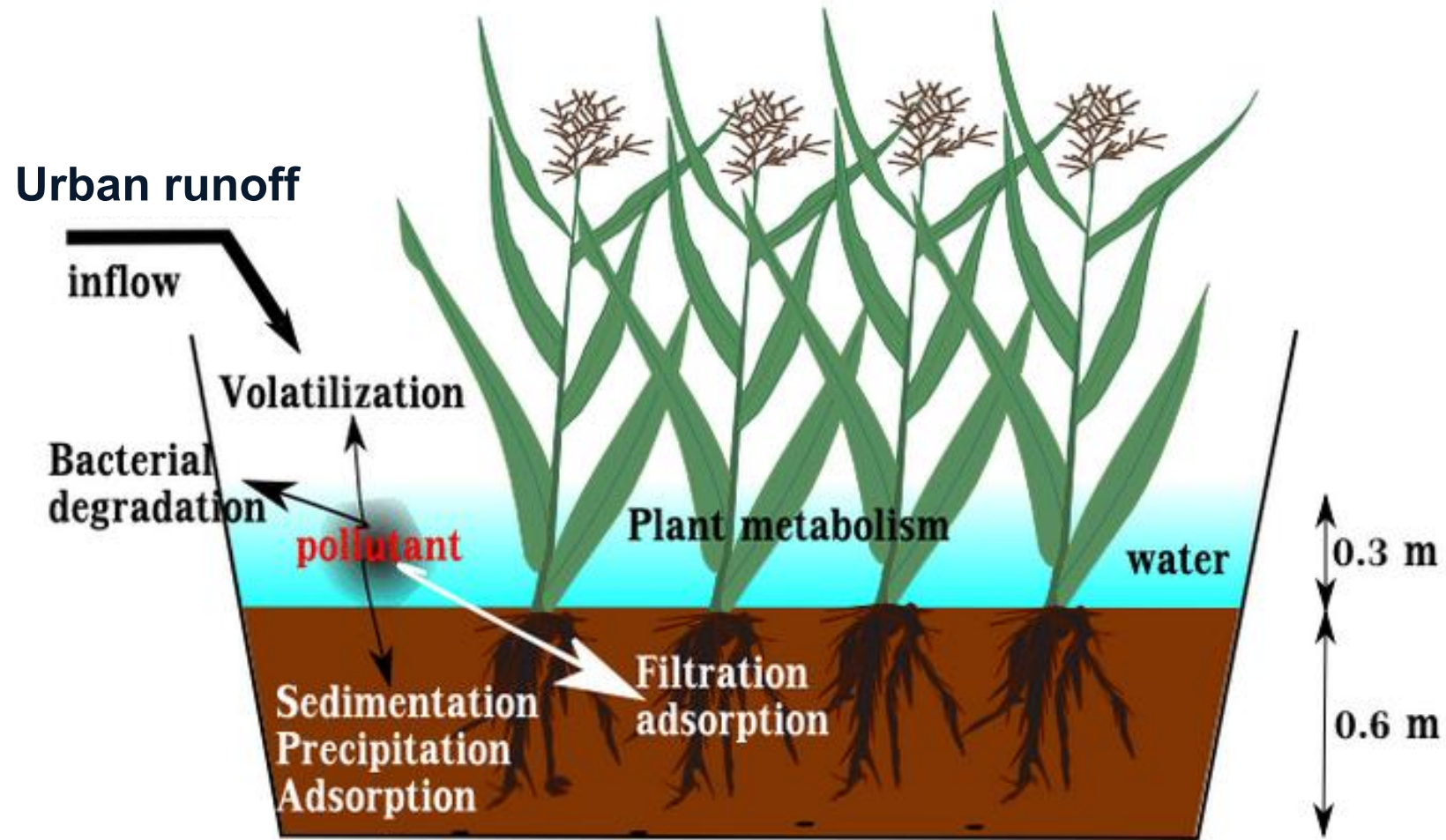
Müller et al., 2020

Is there a solution?



Photo credits: SuDSnet Abertay, Sylvia Kowar, Hanna Fors, Meristem Design, Stormwater Partners

How do they work?



Truijen and van der Heijden, 2013

How good are they?

Recent review of studies on the removal of organic micropollutants from stormwater by NBS (Zhang et al., 2025) reports:

- Biofiltration >80%
- Constructed wetlands >60%
- Stormwater ponds <30 – 78%
- Swales 9 - >50%



Photo credit: Sudsnet Abertay

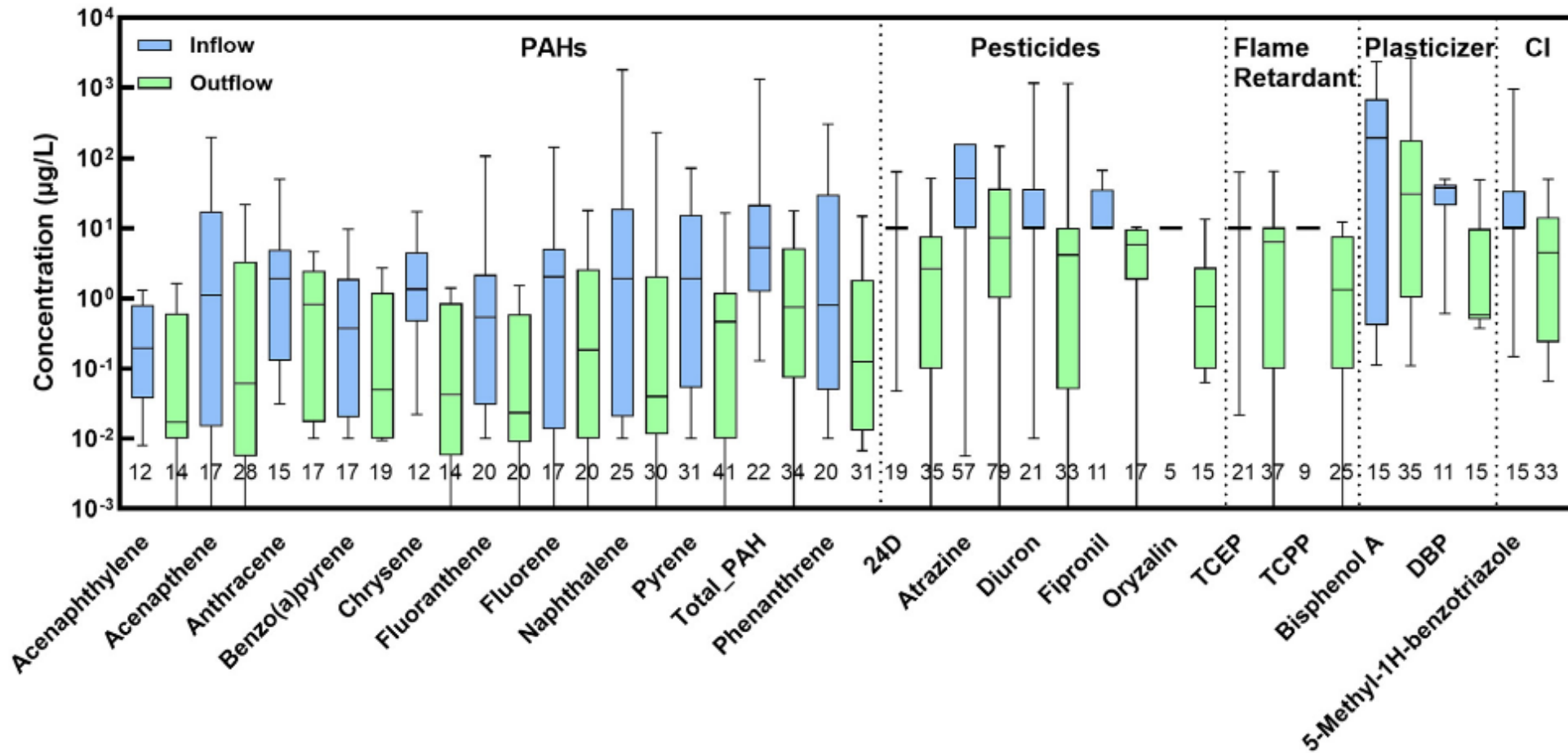


Fig. 2 The inflow and outflow concentration of 21 OMPs for biofiltration systems (CI – corrosion inhibitor; number stands for data points for each plot). The OMPs that have over five reported points are included.

NBS as providers of wider benefits

- Mitigate urban heat island effect
- Reduce surface runoff volumes
- Enhance surface water quality
- Enhance air quality
- Mitigate noise pollution
- Provide habitat
- Physical and mental health well-being



Policy recommendations

- Stormwater runoff is an unintentional mix of substances - integrate the use of chemical and toxicity methodologies
- Optimise NBS performance through routine deployment of sensors technologies - policy support to drive innovation
- Open-access urban water data platform
- Facilitate collaboration between urban stormwater stakeholders within and external to municipalities



Lundy et al., 2025

Thank you!

