Leaching characteristics of agglomerated mixed CDW

John Allen, University of Helsinki 16.06.2026

Interreg
Co-funded by the European Union
Central Baltic Programme
StoPWa

The challenges of CDW materials

Interreg
Co-funded by the European Union
Central Baltic Programme
StopWa

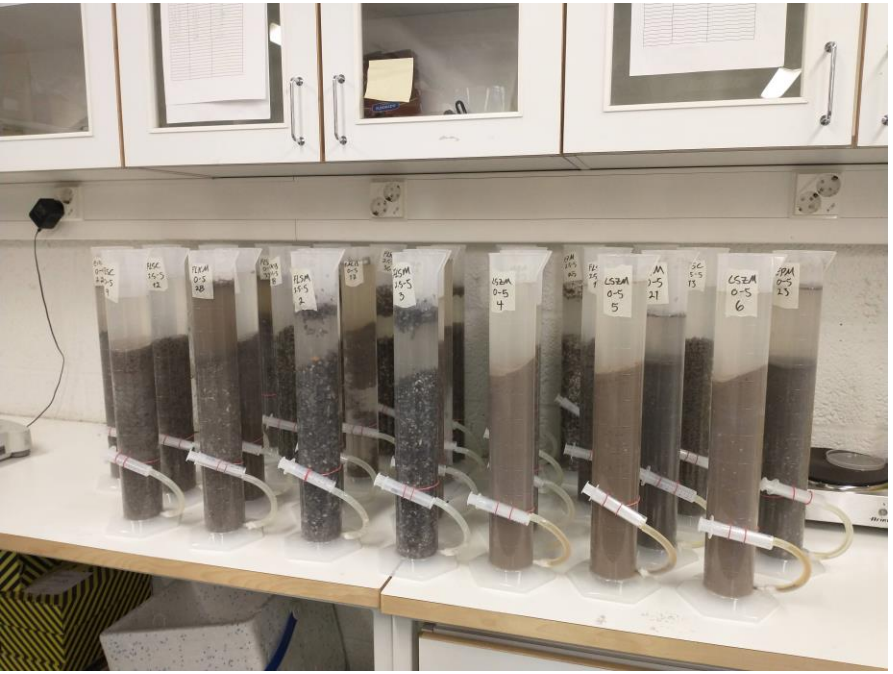
Construction and Demolition Waste (CDW) reflects a long-term negative impact of human activity, with large volumes generated annually for decades, and with significant environmental and economic impacts.

- **Significant Waste Stream Globally:** Over 30% of total waste generated in the EU.
- **The Leaching Paradox:** Whether CDW is recycled or landfilled, the risks of incorporated chemicals leaching into the environment are the same.
- **Highly Heterogeneous Material:** Includes any and all materials and substances used in current and previous building practices. Factors like particle size, pH, and the mixing of different materials influence how pollutants are released.
- **Disproportionate Impact of Hazardous Waste:** High impact due to toxicity and persistence of substances like asbestos, lead, and polychlorinated biphenyls (PCBs). Many are highly resistant to biodegradation and can biomagnify up the food chain.
- **Plastics/microplastics:** Important novel entities to be taken into account.

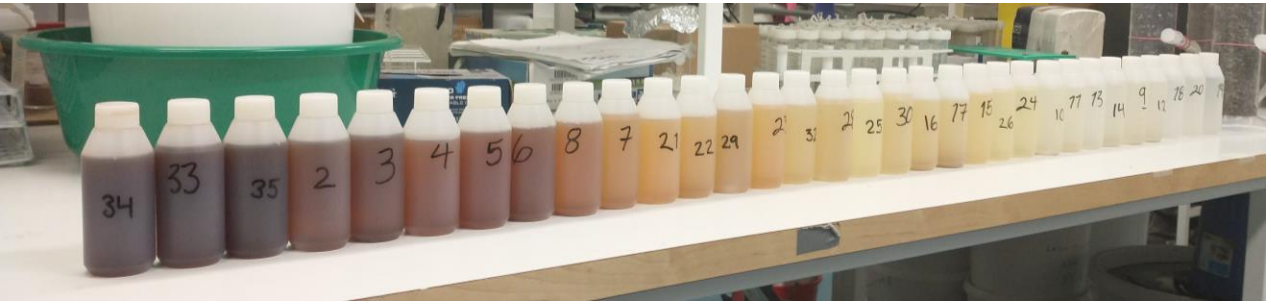
Lab-scale testing of CDW materials at UH

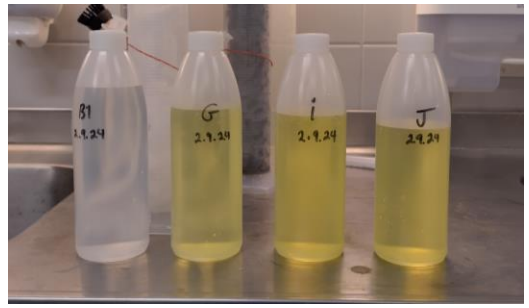
Interreg
Co-funded by the European Union
Central Baltic Programme

StopWa



Loose materials and plastic-agglomerated, mixed CDW





Cement bound agglomerates

SOILIA soil research station, Lahti, Finland

Interreg Co-funded by the European Union

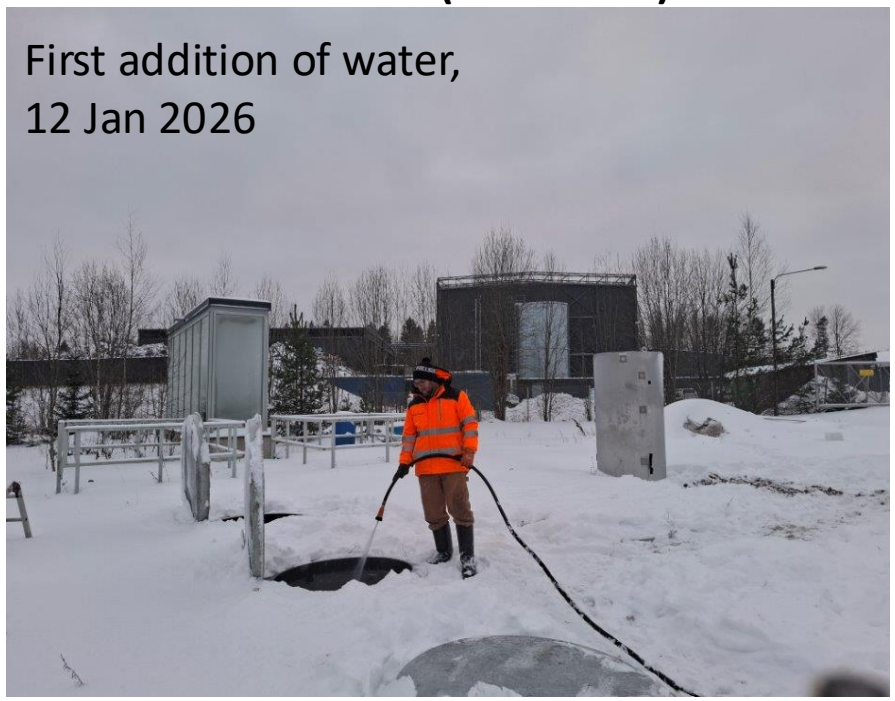
Central Baltic Programme

StopWa

Six lysimeters were filled with test materials:

- **Three with plastic-agglomerated mixed CDW (ACDW)**
- **Three with a commercially available stormwater filtration media (Filtralite™)**

Filling the lysimeters,
29 Oct 2025



First addition of water,
12 Jan 2026

Emptying the lysimeters,
07 April 2026

300 liters of tap water are added to each lysimeter and allowed to sit for six days. Leachate was then sampled, lysimeters allowed to drain for ~24 hr, then refilled with 300 liters of tap water to begin the next cycle.

Lysimeter scale leaching tests

Interreg
Co-funded by the European Union
Central Baltic Programme
StopWa

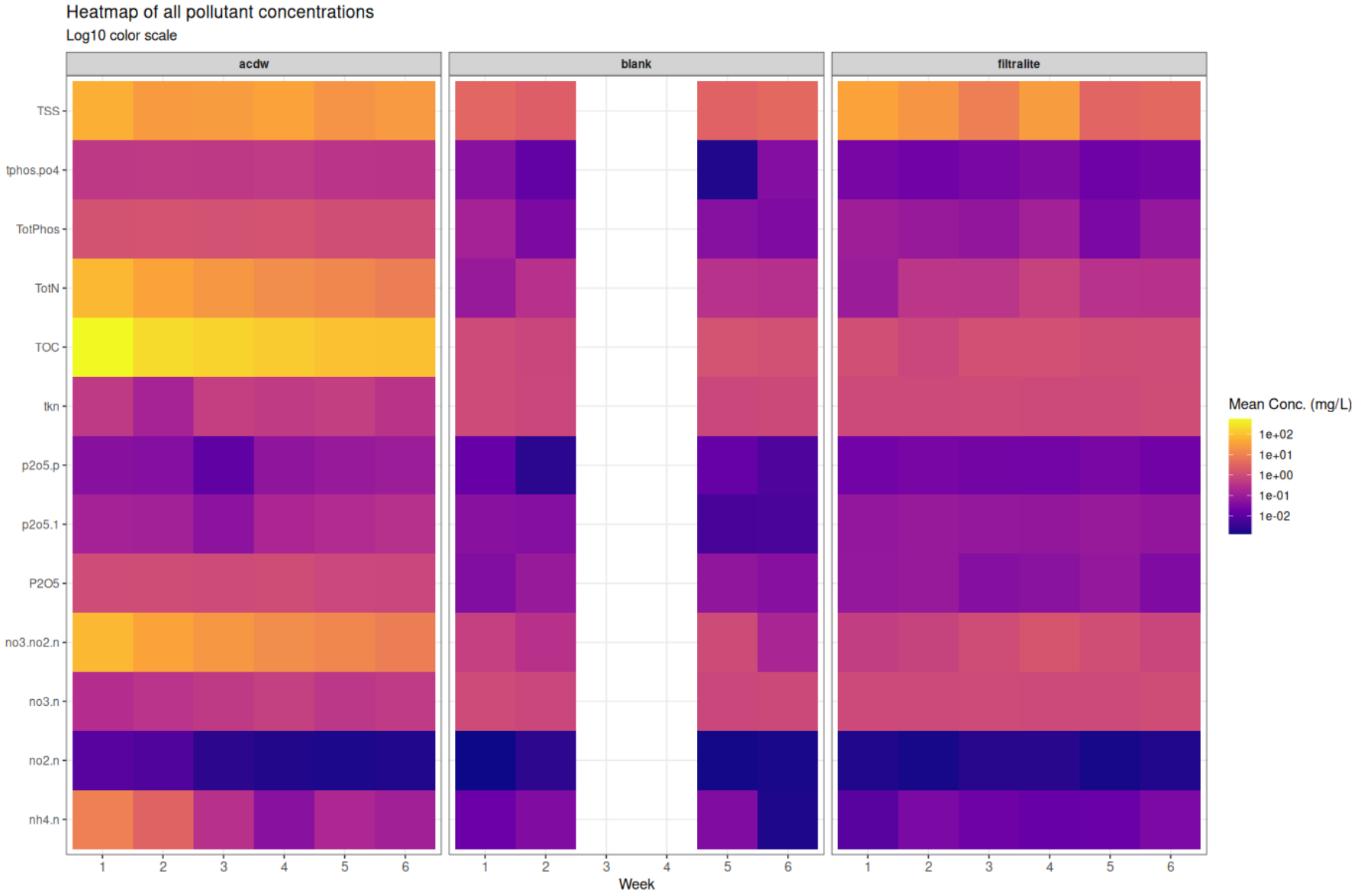
A total of six cycles of sampling were completed between 26.1 and 02.03.2026, with samples analyzed by ALS Finland Oy. Individual samples for nutrients, TSS and TOC were collected weekly; analysis of metals and organic pollutants were made from three, two-week composite samples.

ACDW leachate has distinctive menthol like smell and produces abundant foam. After siting in storage for several days, developed a very dark color.

Sampling ACDW leachate from the central drainage port of lysimeter 5

Results: Nutrients, TSS

Interreg
Co-funded by the European Union
Central Baltic Programme



Na

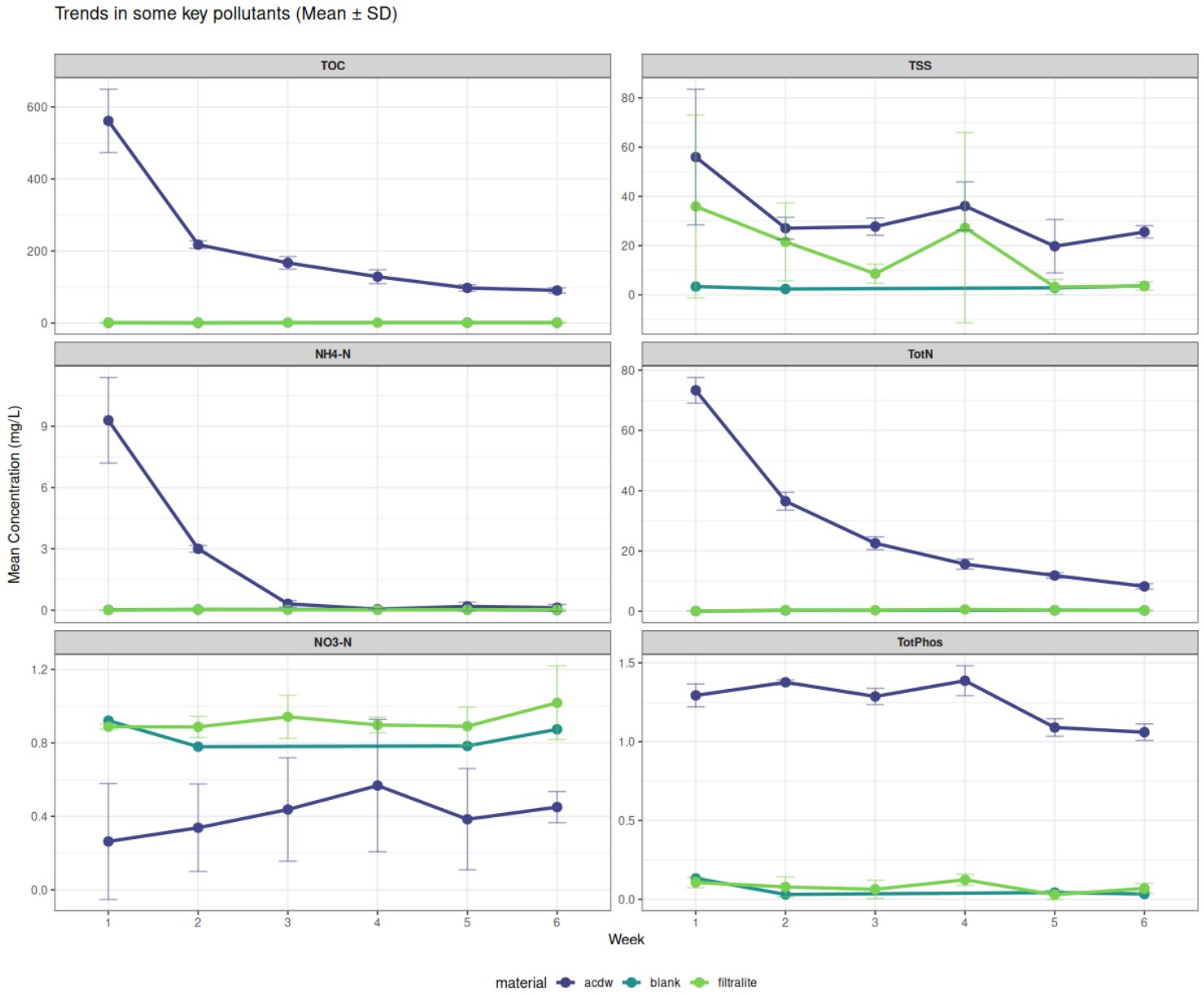
Observations:

- ACDW leaches nutrients, TSS and TOC in greater amounts than Filtralite™.

Results: Trends in Nutrients & TSS

Interreg
Co-funded by the European Union
Central Baltic Programme

StopWa



Observations:

- After six weeks ACDW leaches TotN, TotPhos TSS and TOC in greater amounts than Filtralite™, though most parameters are decreasing.
- ACDW leachate had distinctive menthol like smell and produced abundant foam throughout the experiment. After siting in storage for several days, developed a blackish color
- ACDW consumes nitrate

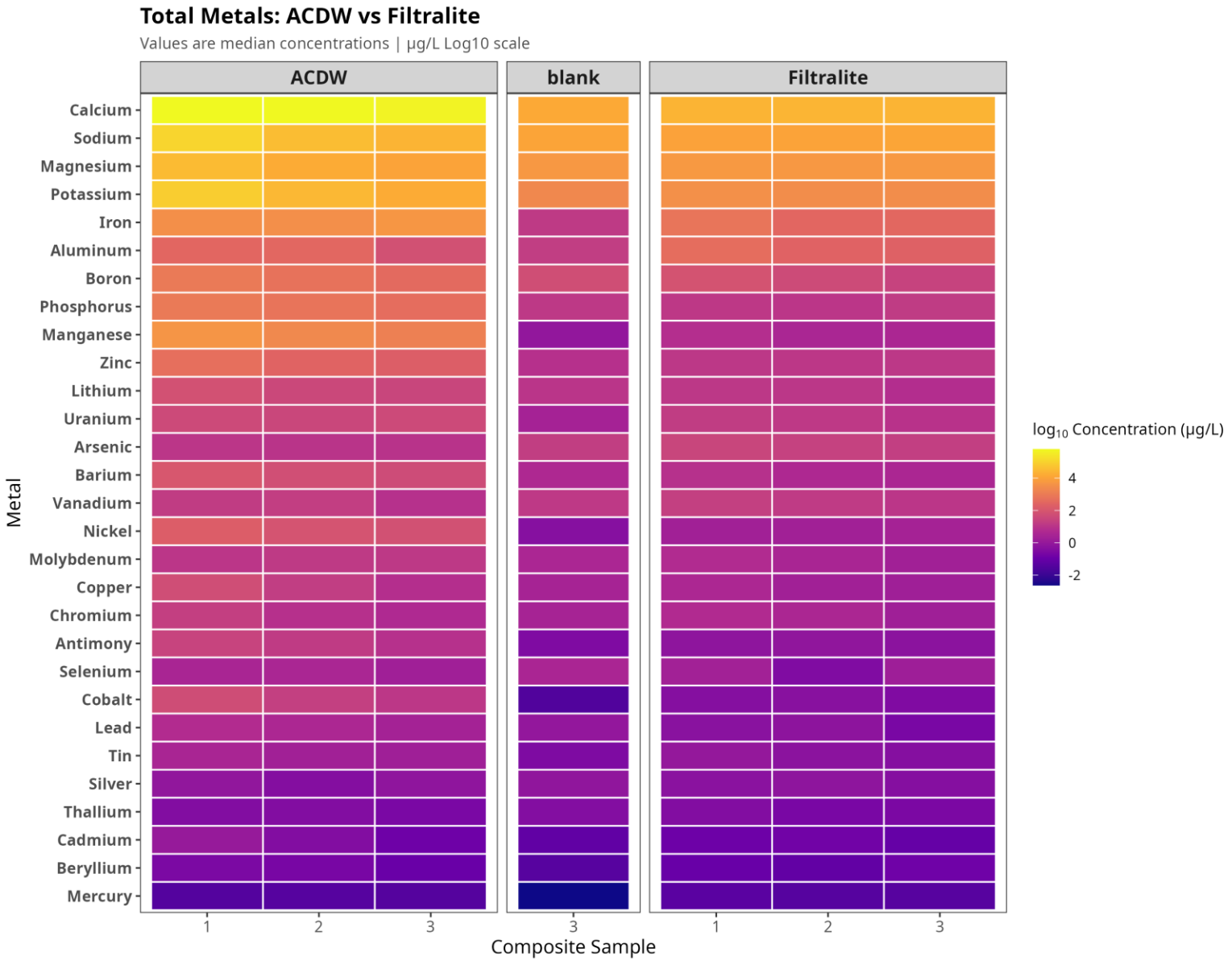
Results: Total Metals

Interreg

Co-funded by the European Union

Central Baltic Programme

StopWa



Observations:

- ACDW leaches dissolved metals in greater amounts in greater amounts than Filtralite™.

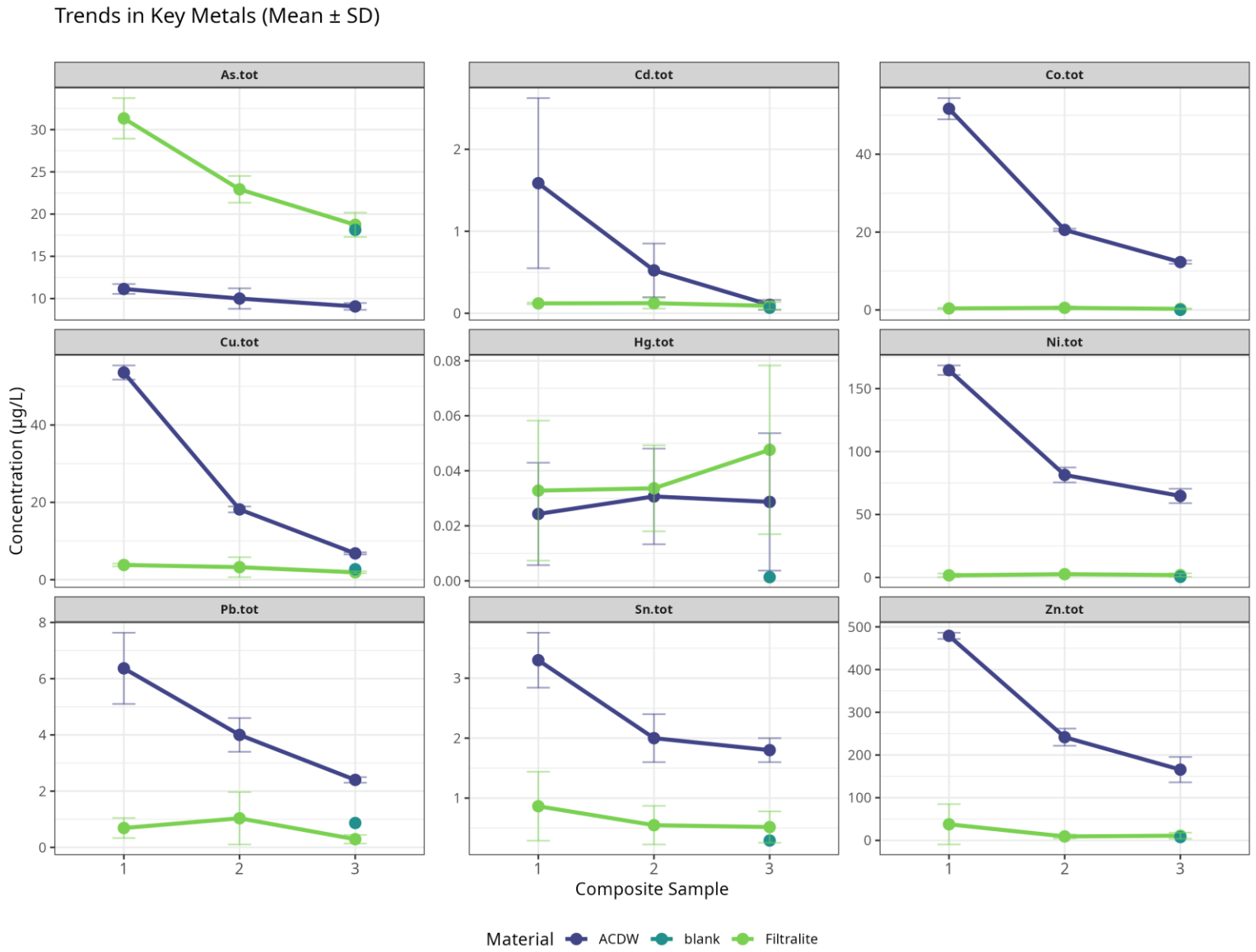
Results: Trends in heavy metals

Interreg

Co-funded by the European Union

Central Baltic Programme

StopWa



Observations:

- After six weeks ACDW leached metals in higher concentrations than Filtralite™, though most parameters were decreasing.

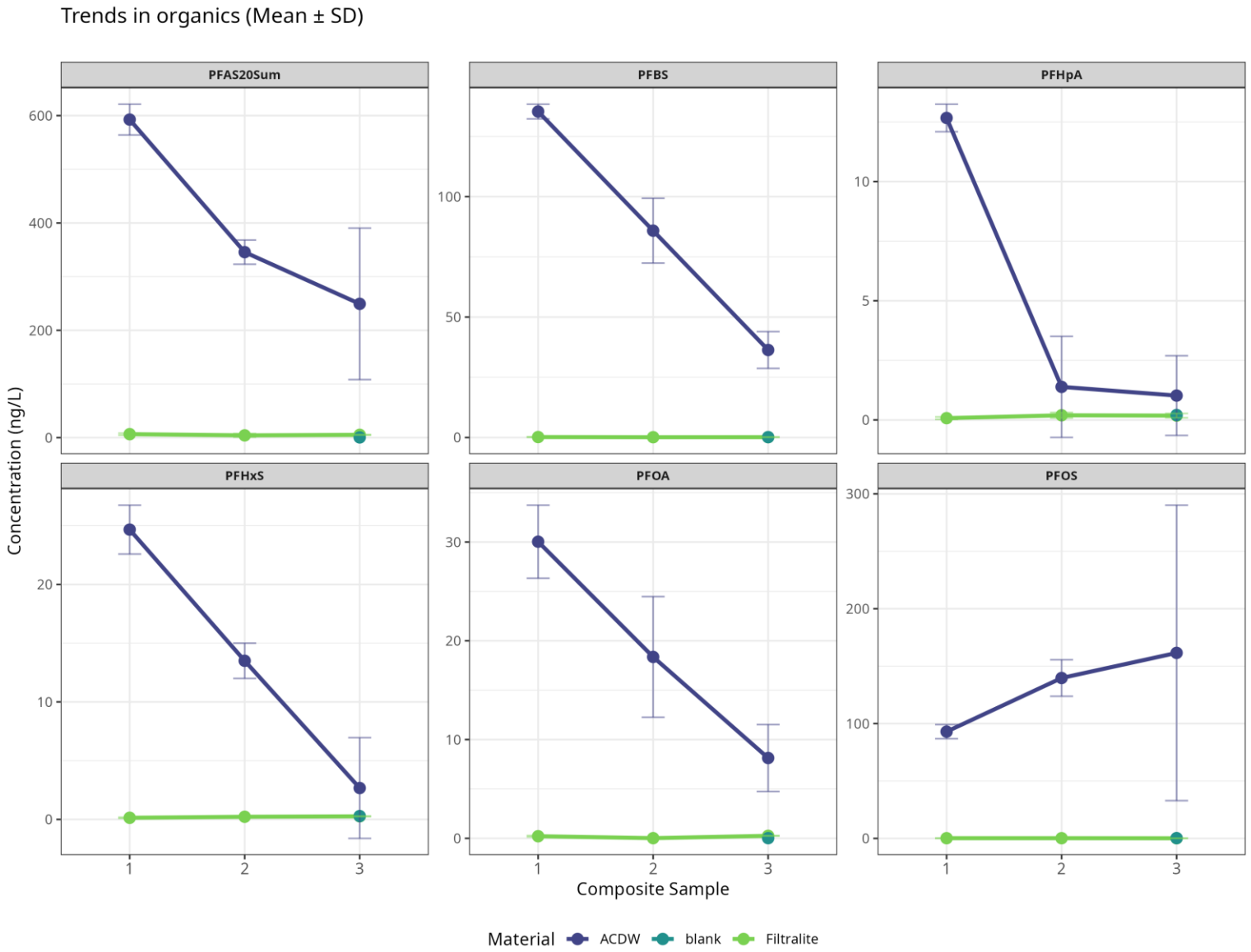
Results: Trends in organics

Interreg

Co-funded by the European Union

Central Baltic Programme

StopWa



Observations:

- After six weeks ACDW leached PFAs in higher concentrations than Filtralite™, though most parameters were decreasing.

Interaction with artificial stormwater

Interreg Co-funded by the European Union

Central Baltic Programme

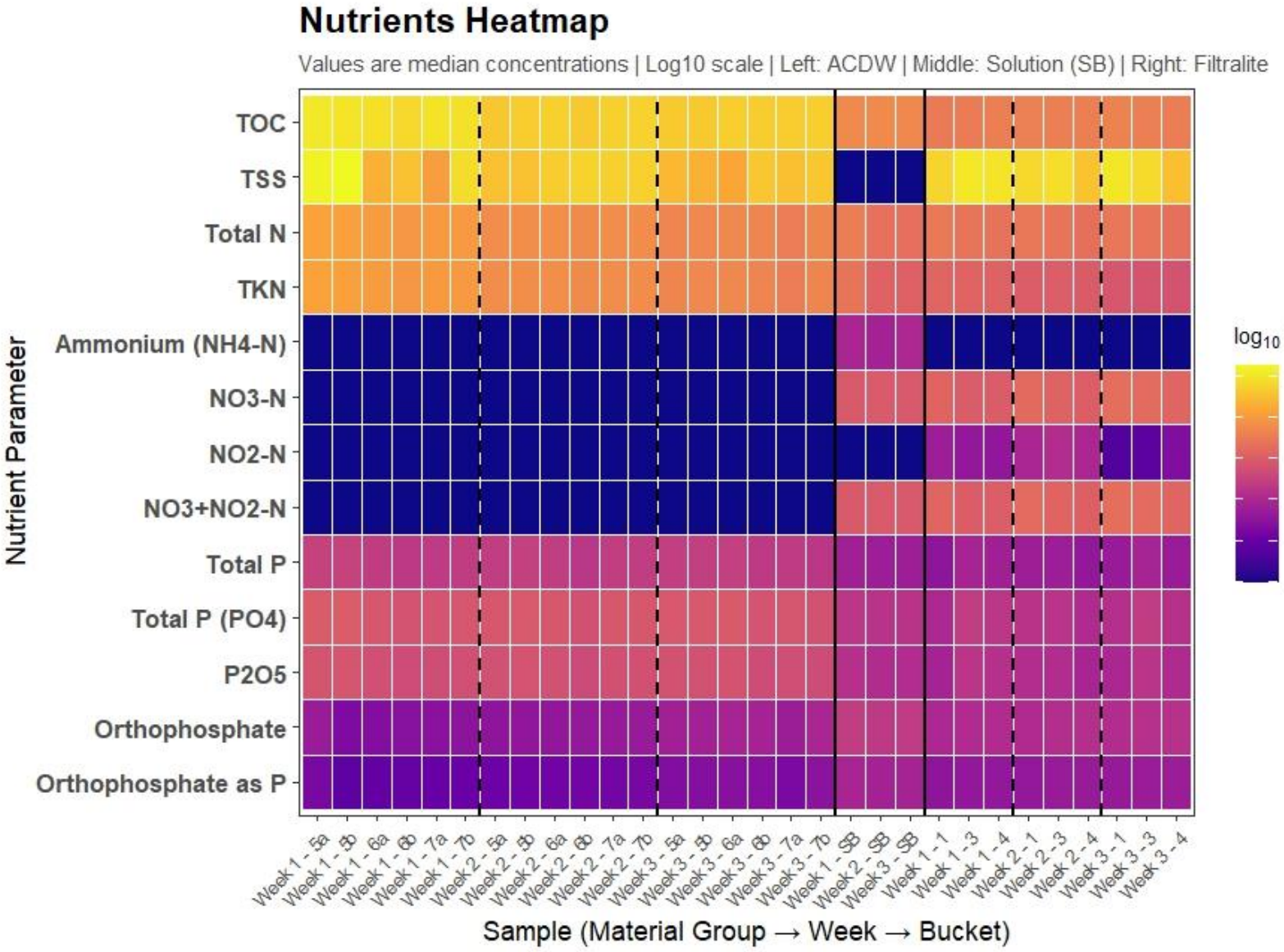
StopWa

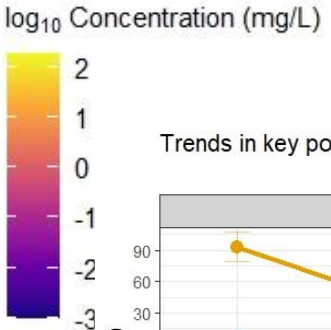
Small scale using artificial stormwater was conducted between 28 April and 15 May 2026.

Results: Nutrients, TSS

Interreg
Co-funded by the European Union
Central Baltic Programme

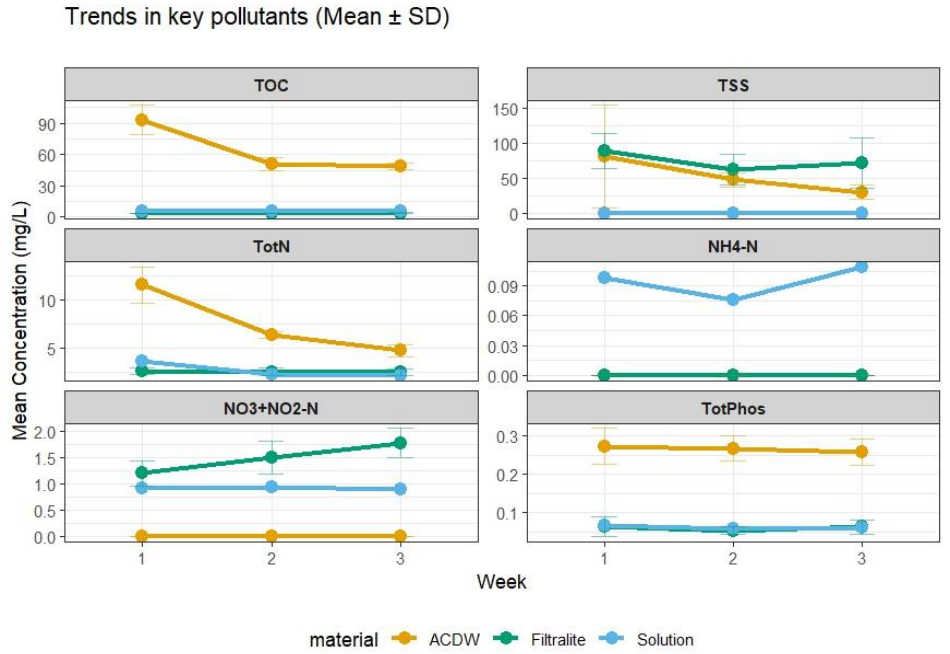
StopWa





Observations:

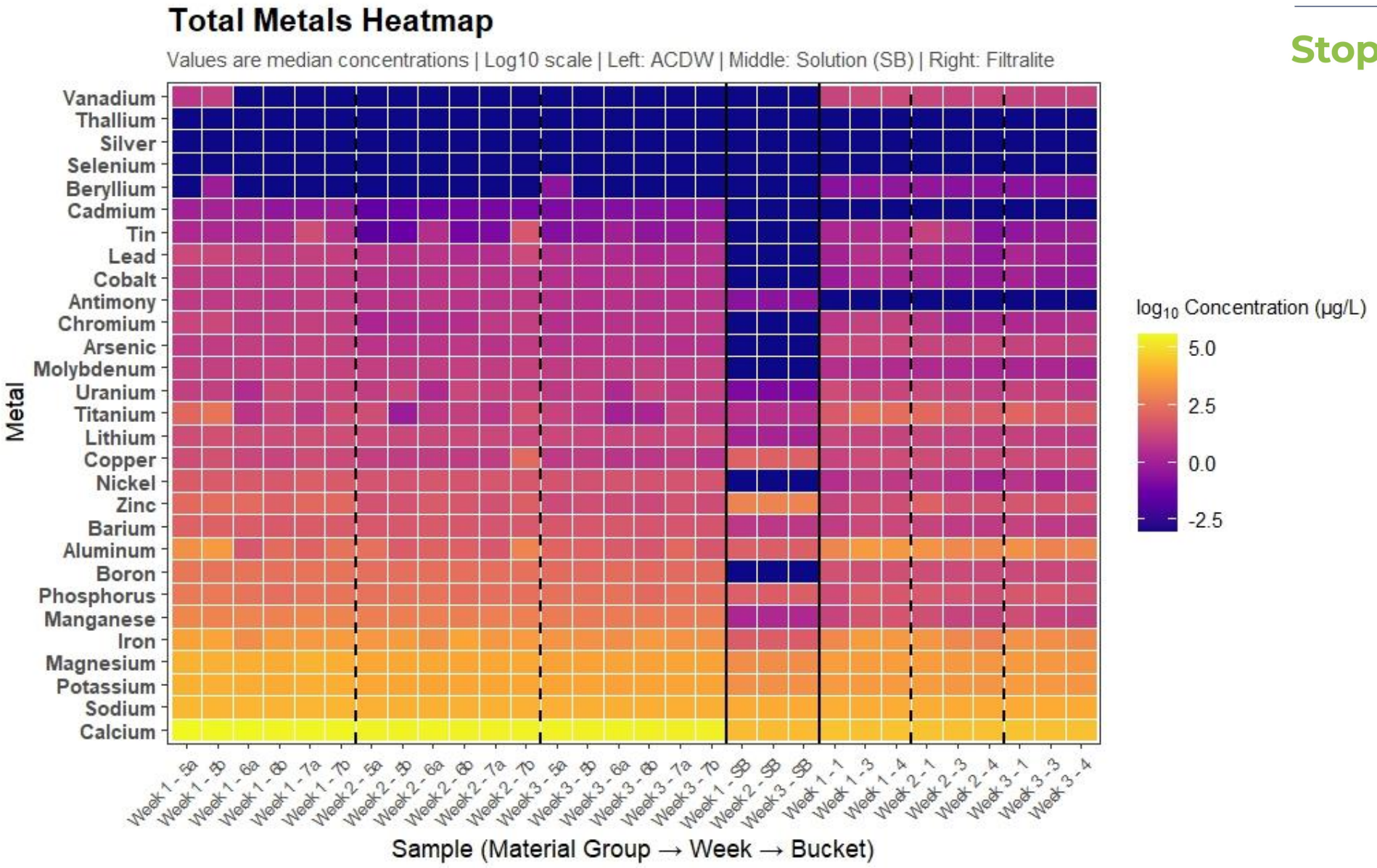
- ACDW contributed TOC, N, and P, but scavenged NH4, NO3, NO2



Results: Total Metals

Interreg
Co-funded by the European Union
Central Baltic Programme

StopWa



Observations:

- Both ACDW and Filtralite™ leached some metals, but retained others

Conclusions

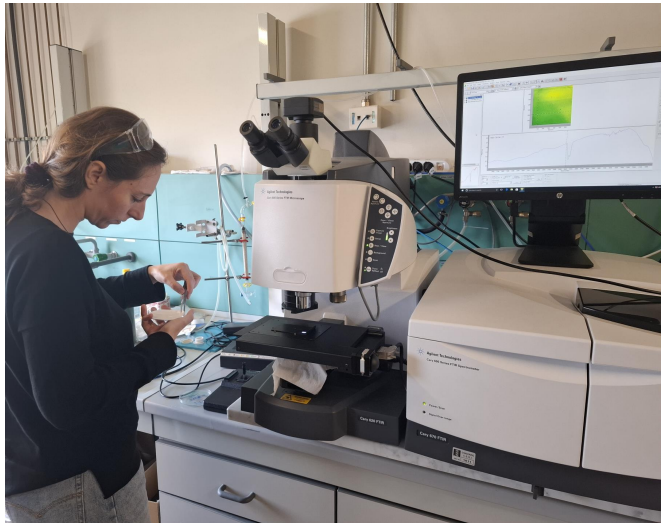
Interreg
Co-funded by the European Union
Central Baltic Programme

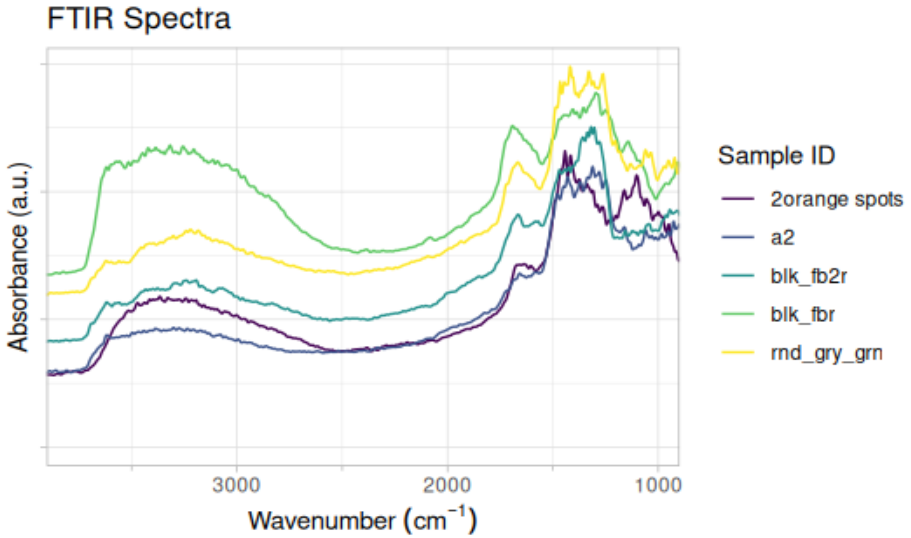
StopWa

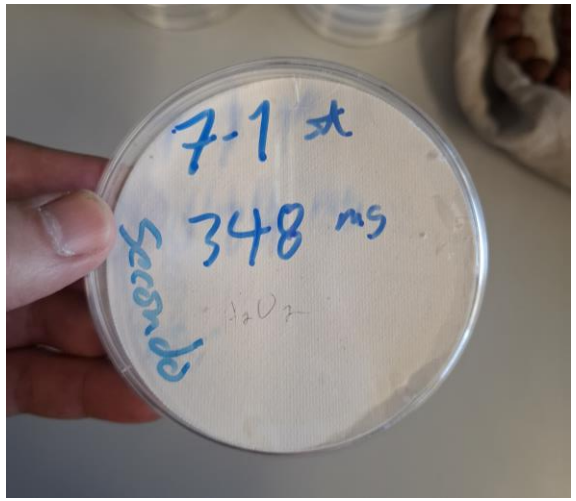
Plastic agglomerated mixed CDW is not suitable for use as stormwater filtration media due to leaching of pollutants

Pretreatment could improve the situation, but the presence of plastics, metals, and organic pollutants present additional challenges

Observed reductions in nitrate concentrations of ACDW leachates indicates biological activity.







Thank you

John A. Allen

University of Helsinki

john.allen@helsinki.fi

Interreg

Co-funded by the European Union

Central Baltic Programme

StopWa