

# Evolution of $\mu$ pollutants in a constructed wetland treating road runoff of Paris

## *Évolution des $\mu$ polluants dans un filtre planté pour le traitement de ruissellement de voirie à Paris*

J. Roux, M. Seidl, N. Bousserhine, P. Branchu, M.C. Gromaire, P. Neveu,



# Background



# History



## Water Pollution Research and Control Brighton

Proceedings of the Fourteenth Biennial Conference of the International Association on Water Pollution Research and Control, held in Brighton, U.K., 18–21 July, 1988  
1988, Pages 1665-1668



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Pr  
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## SEWAGE TREATMENT IN CONSTRUCTED REED BEDS — DANISH EXPERIENCES

Hans Brix, Hans-Henrik Schierup

# 35 years

## Reed bed filters for wastewater treatment in France: major design and history of development

- The type of wastewater treatment used in France is the fact that the country has a large number of small c
- CATHERINE BOUTIN and ALAIN LIÉNARD review the rise in poi  
reed bed filters.

*Lienart et al 1990*  
*Boutin et al 2004*

....

## EXPERIMENTAL REEDBED SYSTEMS FOR THE TREATMENT OF AIRPORT RUNOFF

D. M. Revitt\*, R. B. E. Shutes\*, N. R. Llewellyn\* and  
P. Worrall\*\*

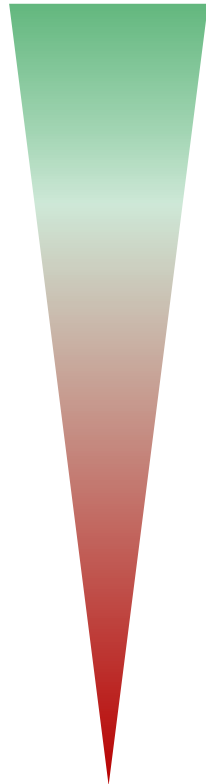
# 25 years



# Literature data

## planted filters for runoff treatment

•



- Water treatment efficiency (TSS, N, P, metals, PAH/THC) (Walaszek et al. 2018)
- - **Dissolved /particulate** pollutants (LeFevre et al. 2015,
- - Fate of **metallic** (Dechesne et al. 2004, .... )
- - Process and operation (Molle et al. 2013 ...)
- - Fate of **organic**  $\mu$ pollutants (PAH/THC...) (Leroy et al. 2015 ...)

- **Fate of trace elements and emerging organic  $\mu$ pol (AP, BPA, ...)**
- *Characterization of microbial communities and their roles*

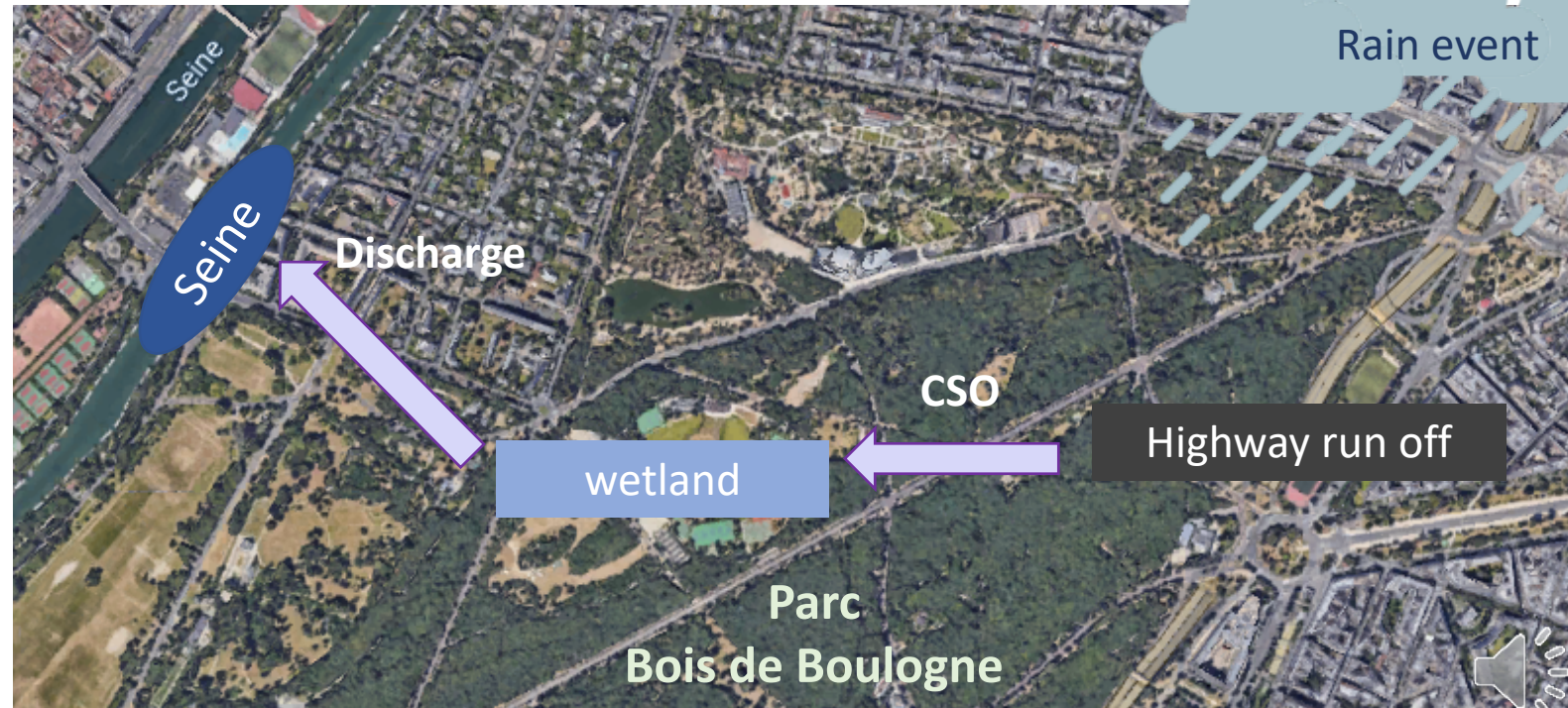
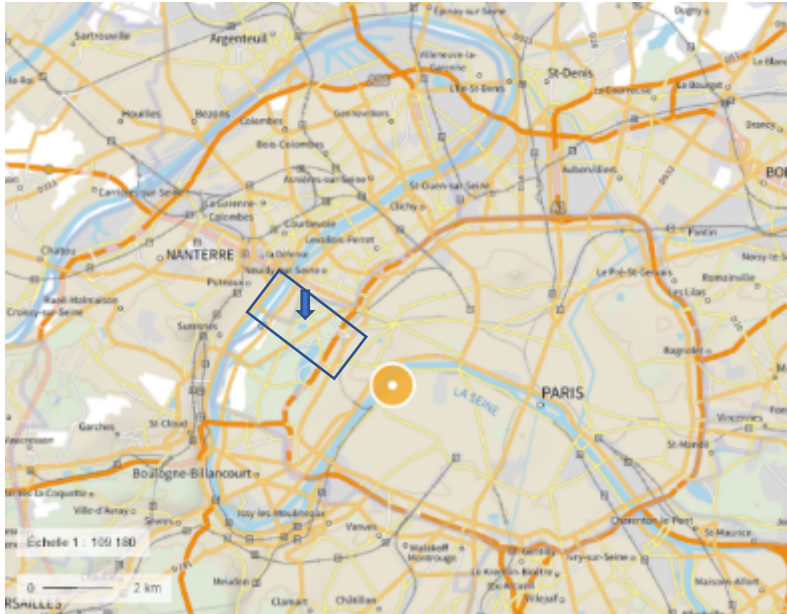




# Methodology



# Our wetland







December



February



April

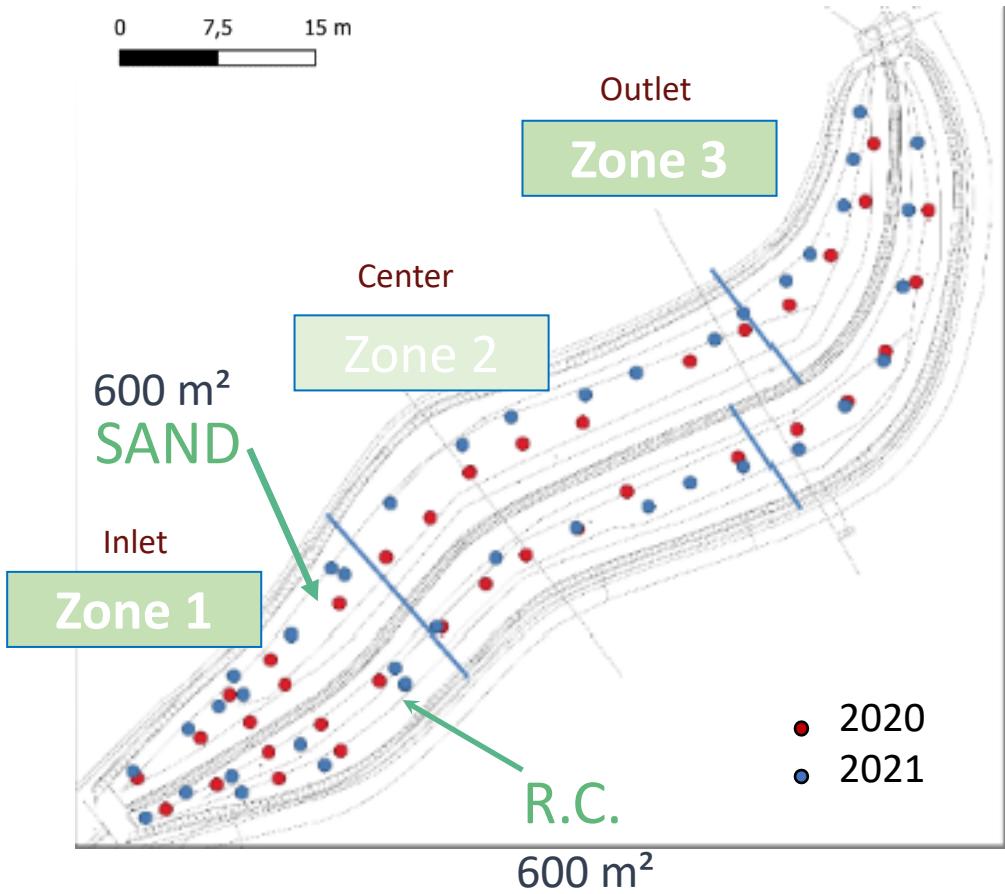


September





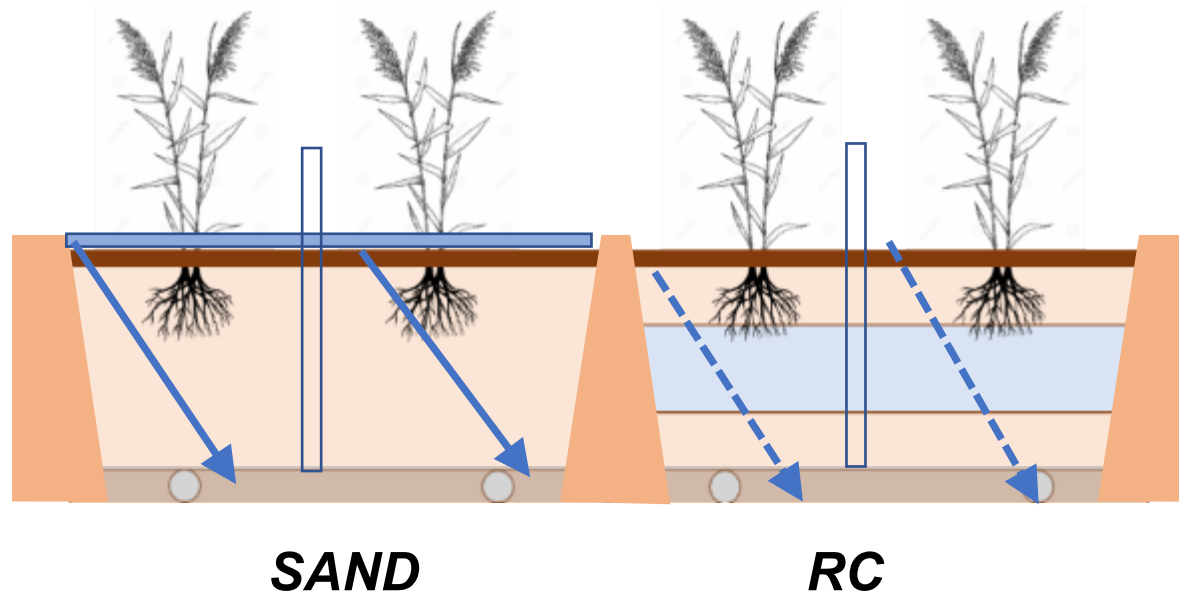
# Functioning & sampling





# Filter structure & sampling

Flow  $\leq$  20 L/s



*Common reed*

“sediment”  
10 cm sand  
20 cm Rainclean™  
10 cm sand



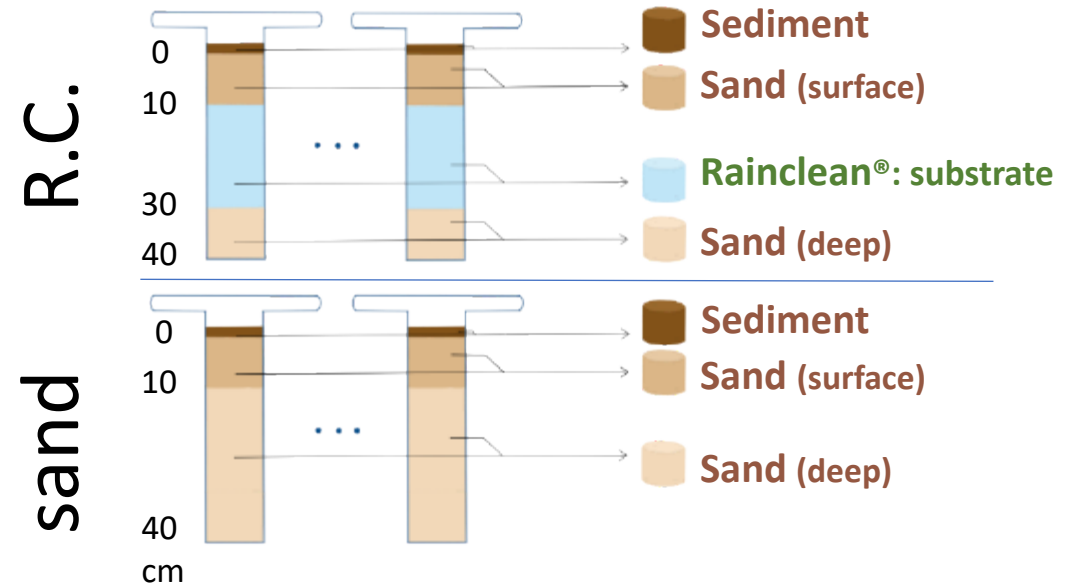
# Core sampling



Nouredine

Julia

6 to 8 cores/zone

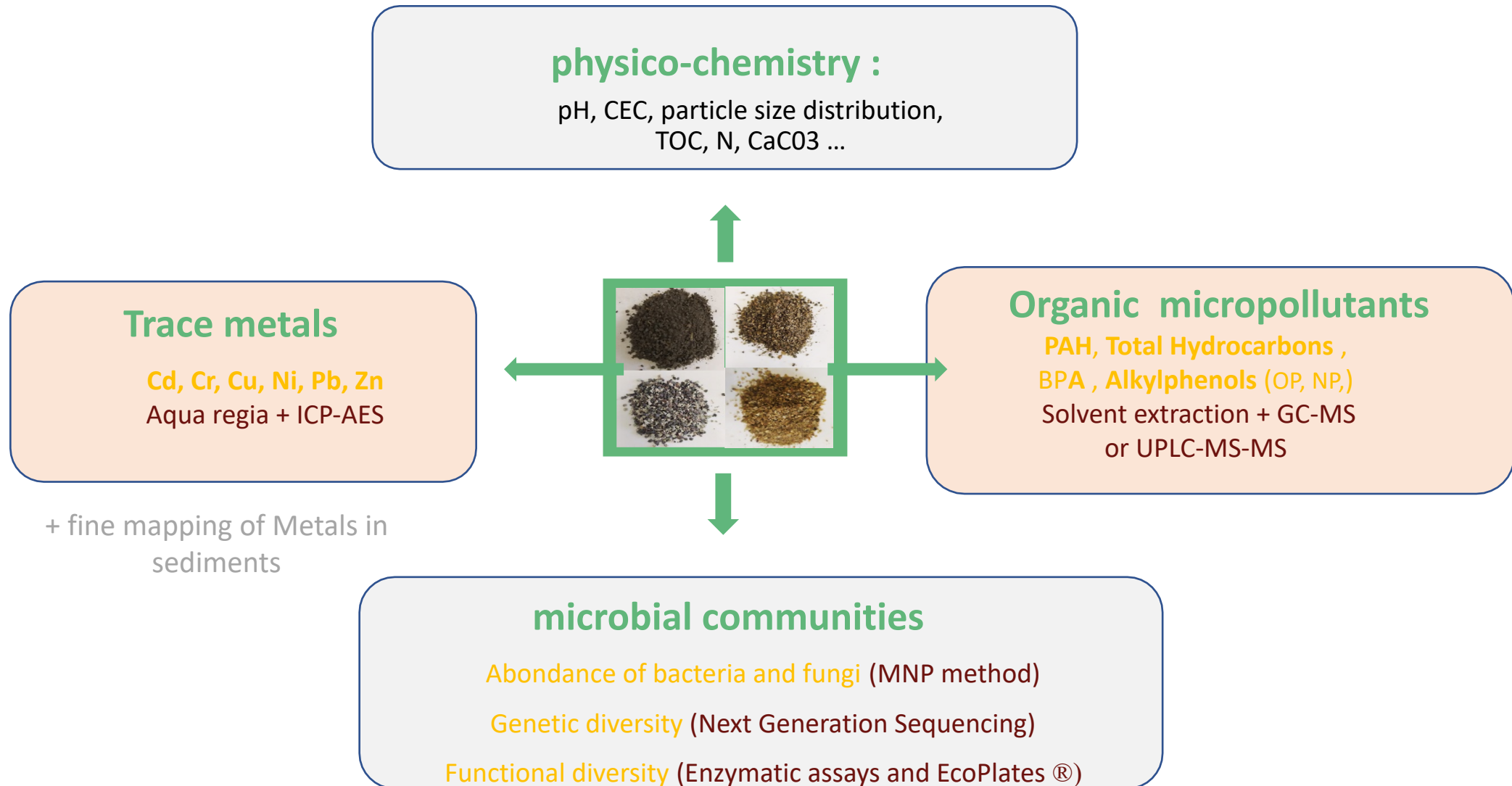


Composite samples for each:

- Campaign
- Filters
- Substrates/Depth
- Localisation



# Analysis



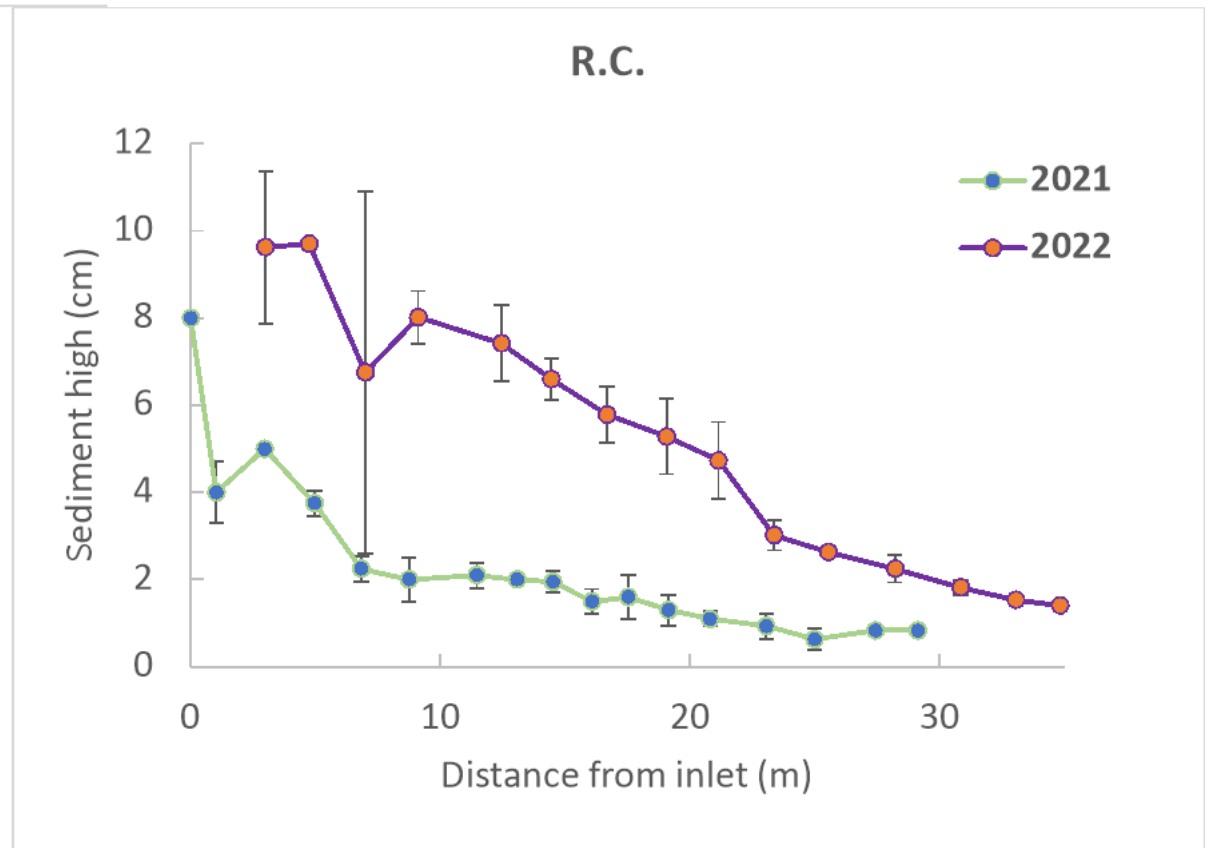
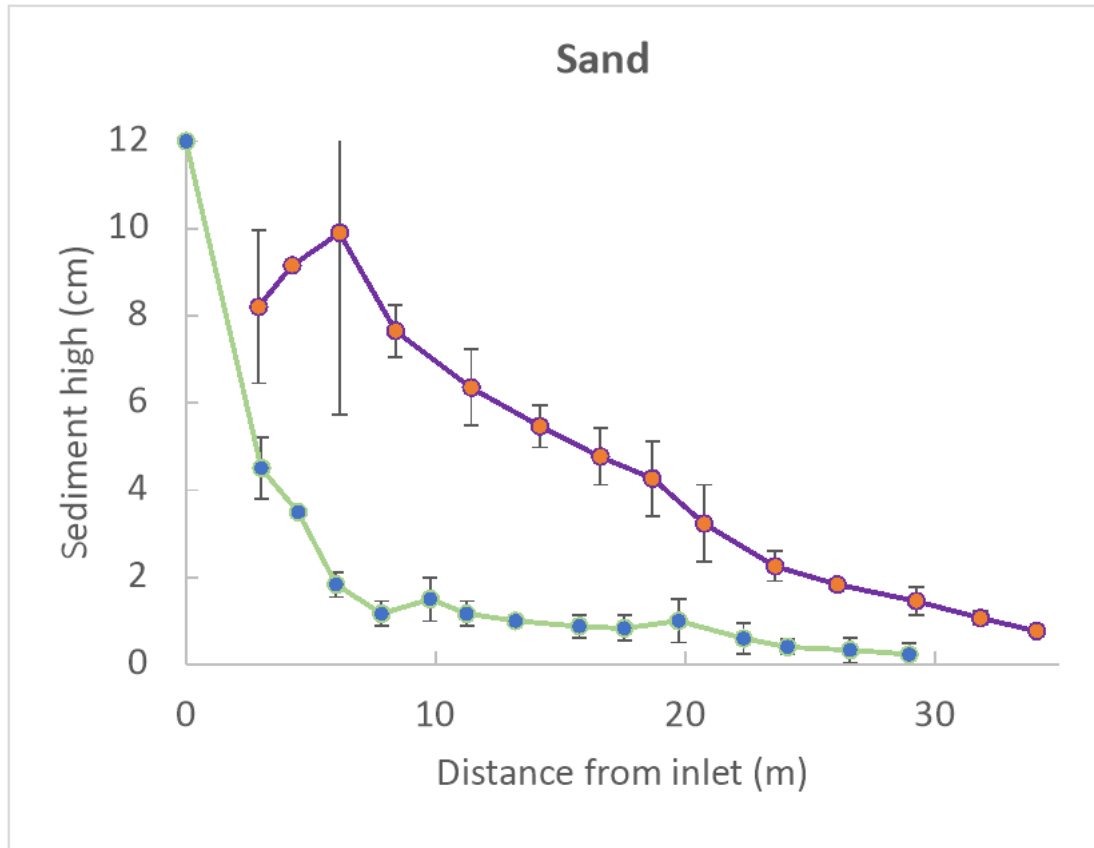




# Results & discussion

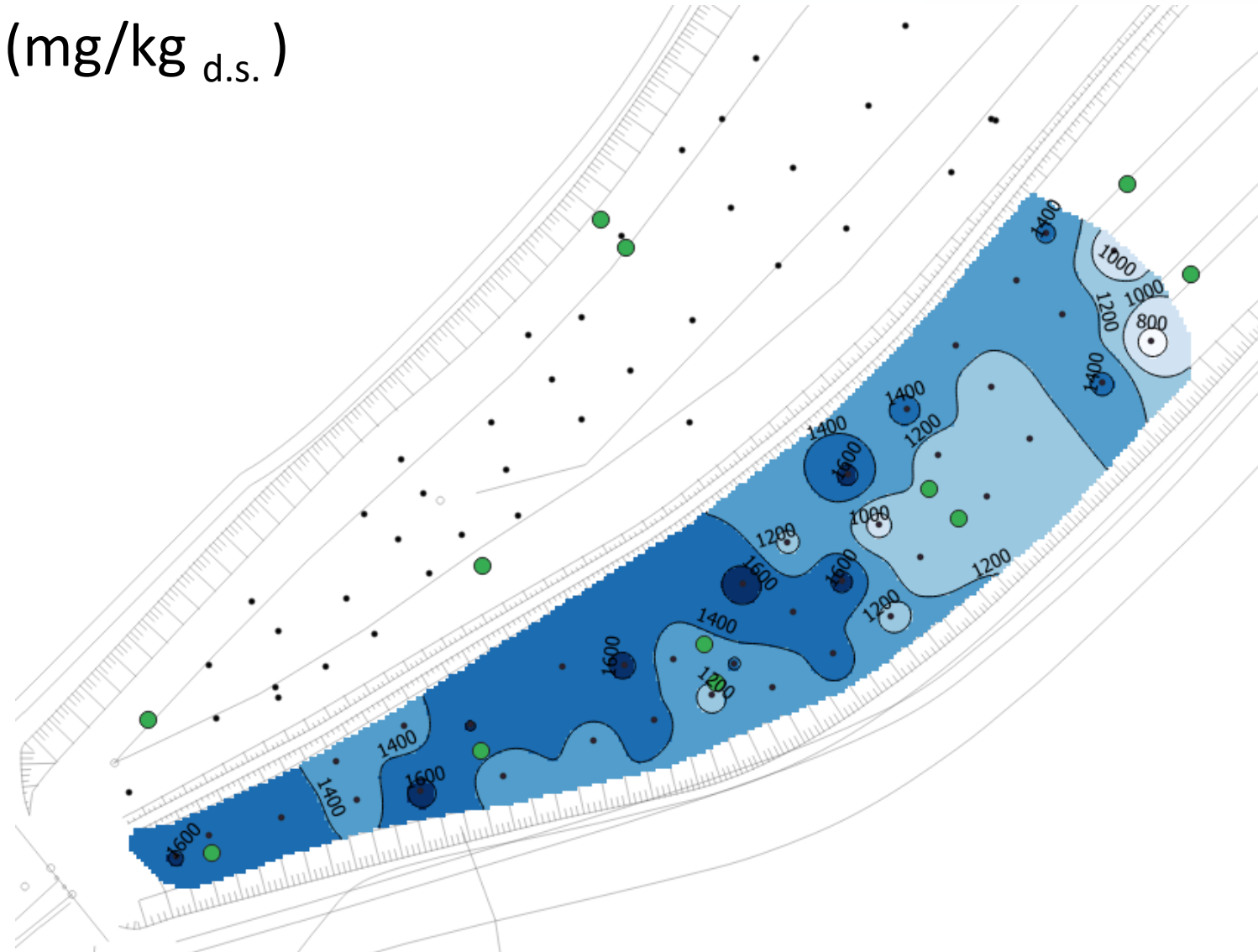


# S.S. retention



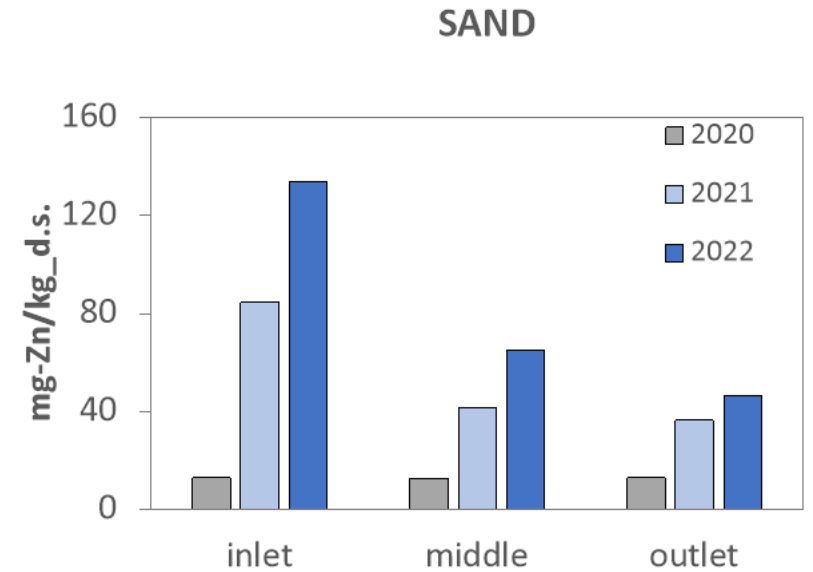
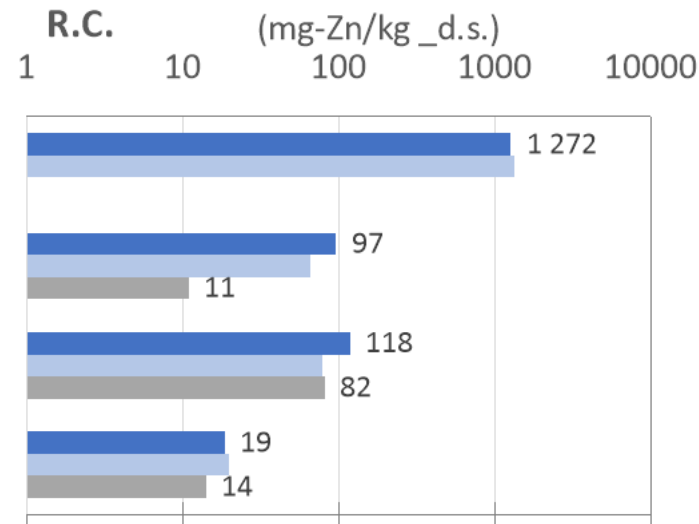
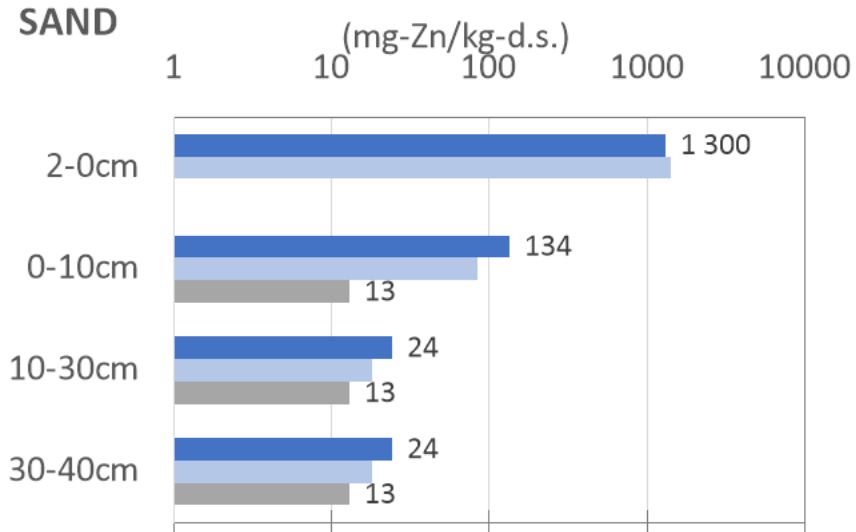
# Zinc

- Zn XRF map 2021 (mg/kg d.s.)

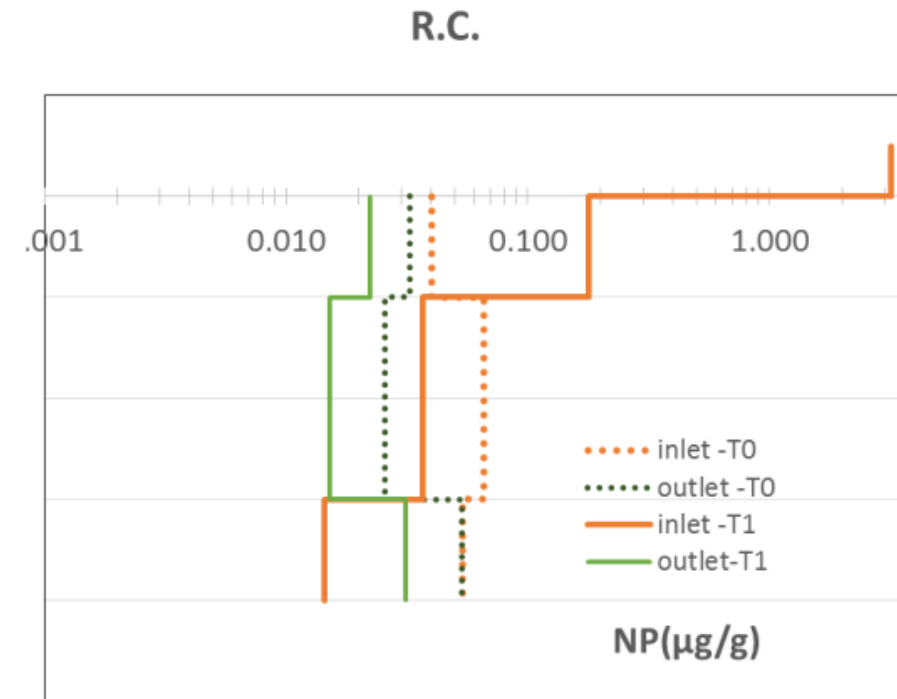
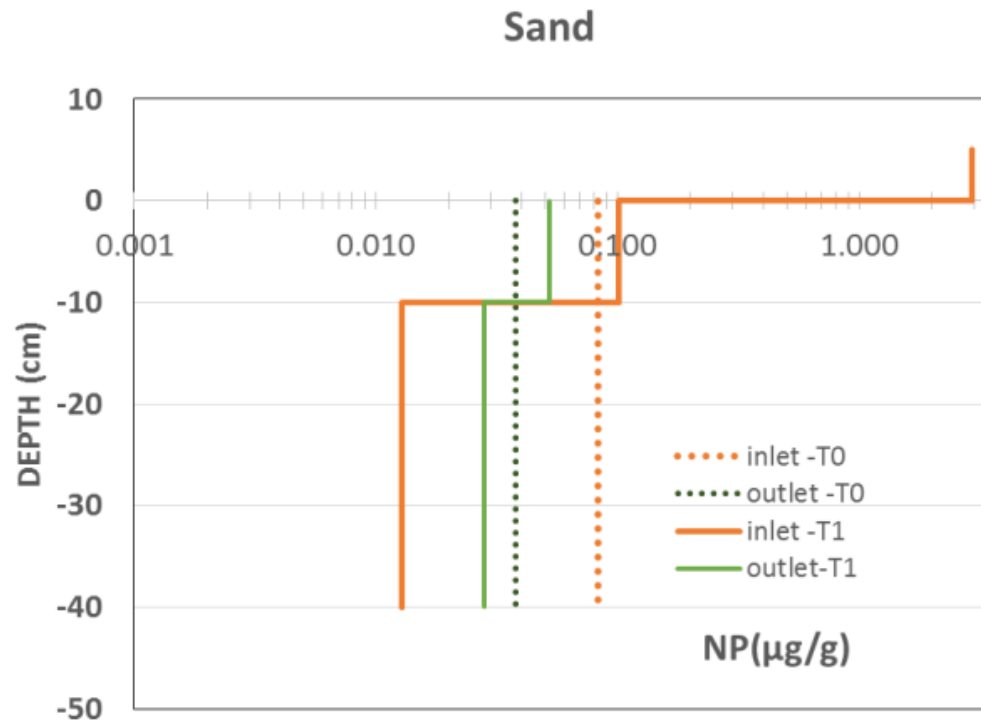




# Trace metals - zinc



# Organic $\mu$ pol - Nonylphenol



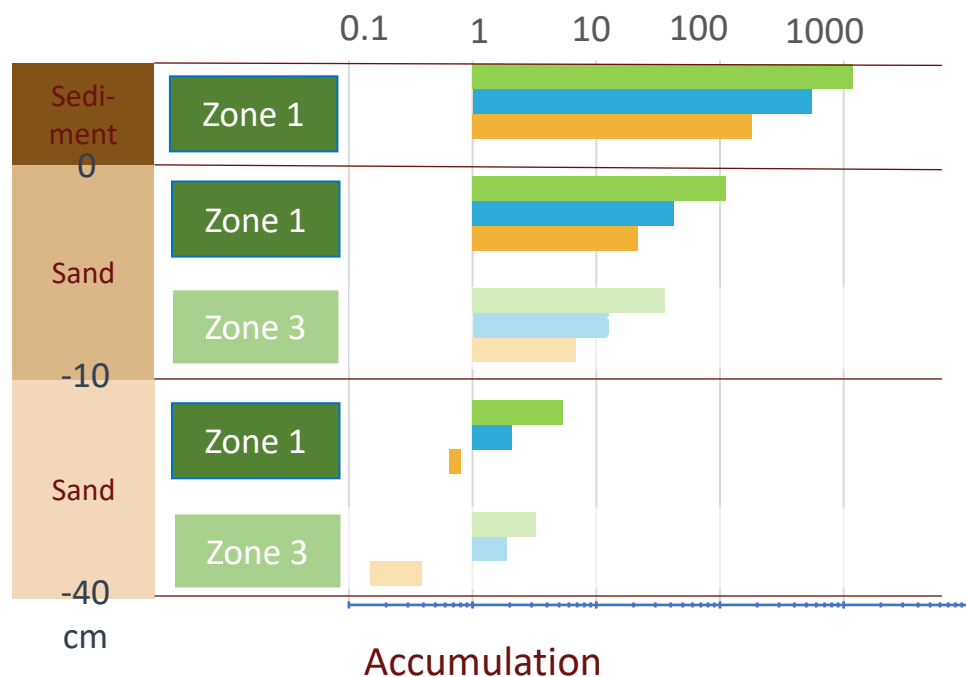
# Trace metal accumulation ( $\text{g}/\text{m}^3/\text{y}$ )

Zn

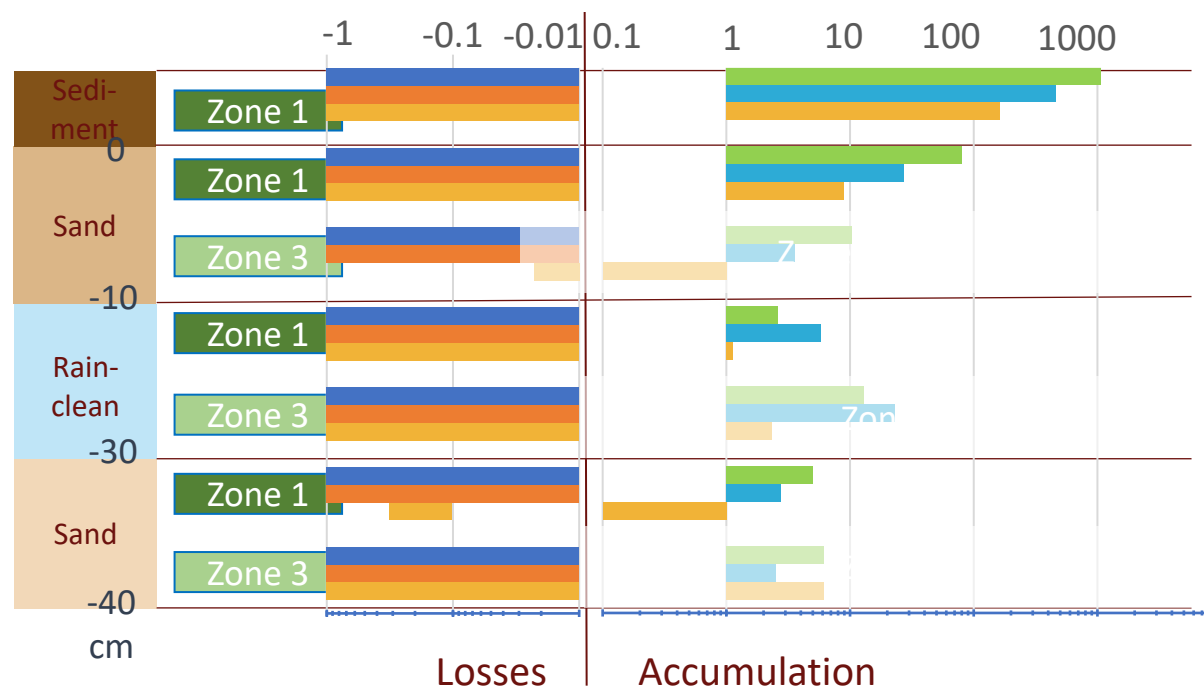
Cu

Pb

## Sand

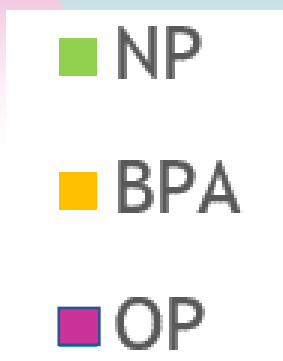


## R.C.

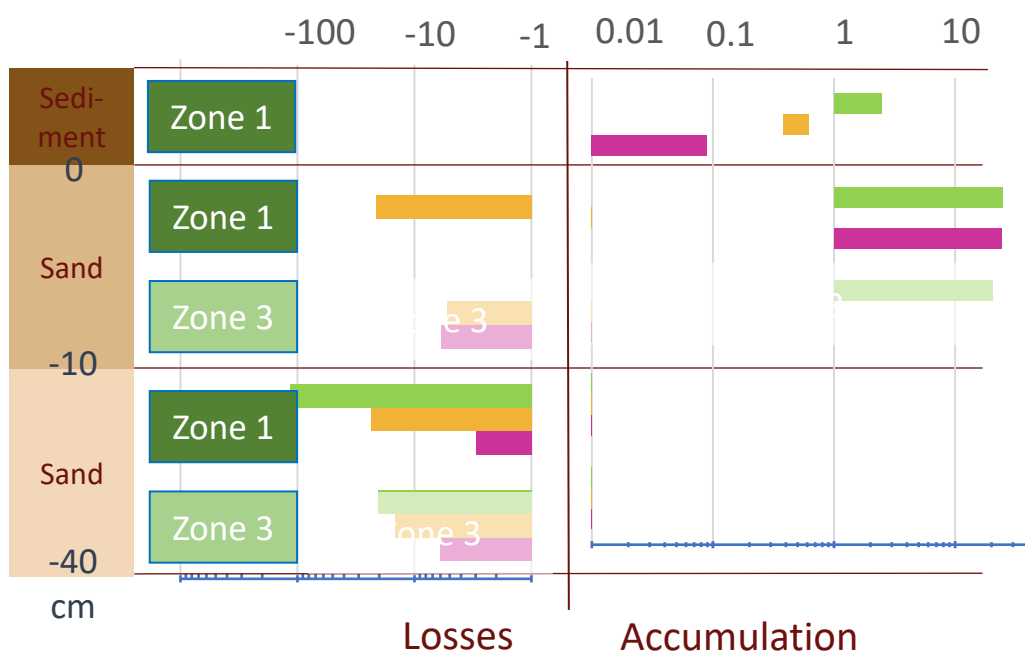




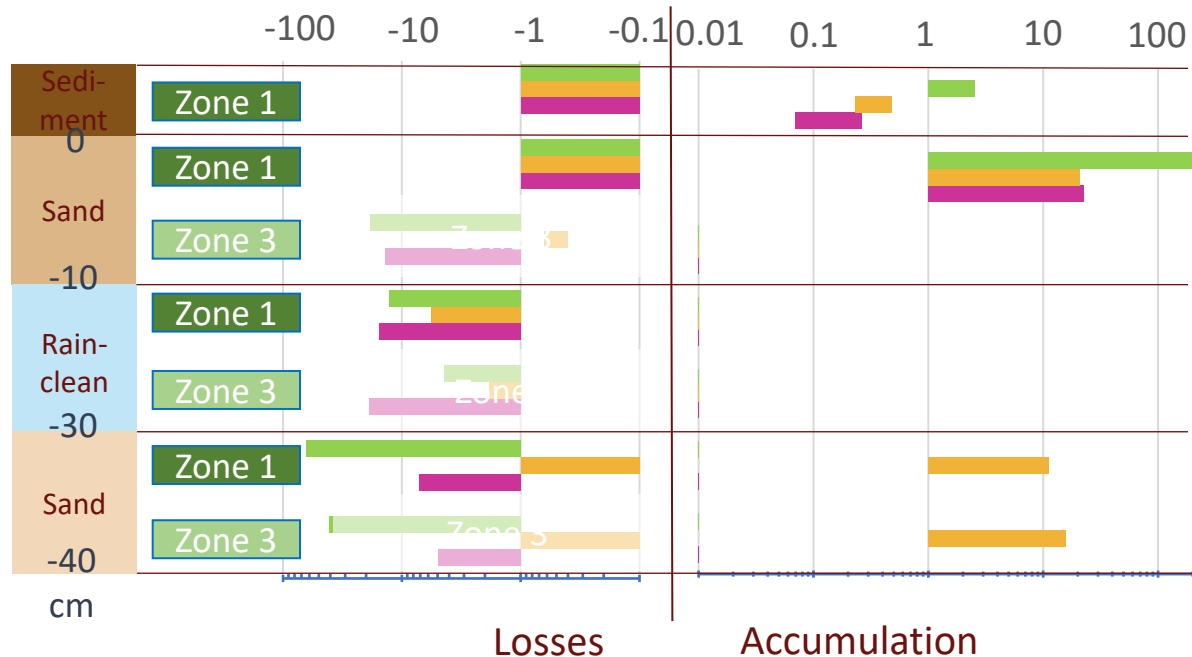
# Organic $\mu$ pol accumulation ( $\text{g}/\text{m}^3/\text{y}$ )



## Sand

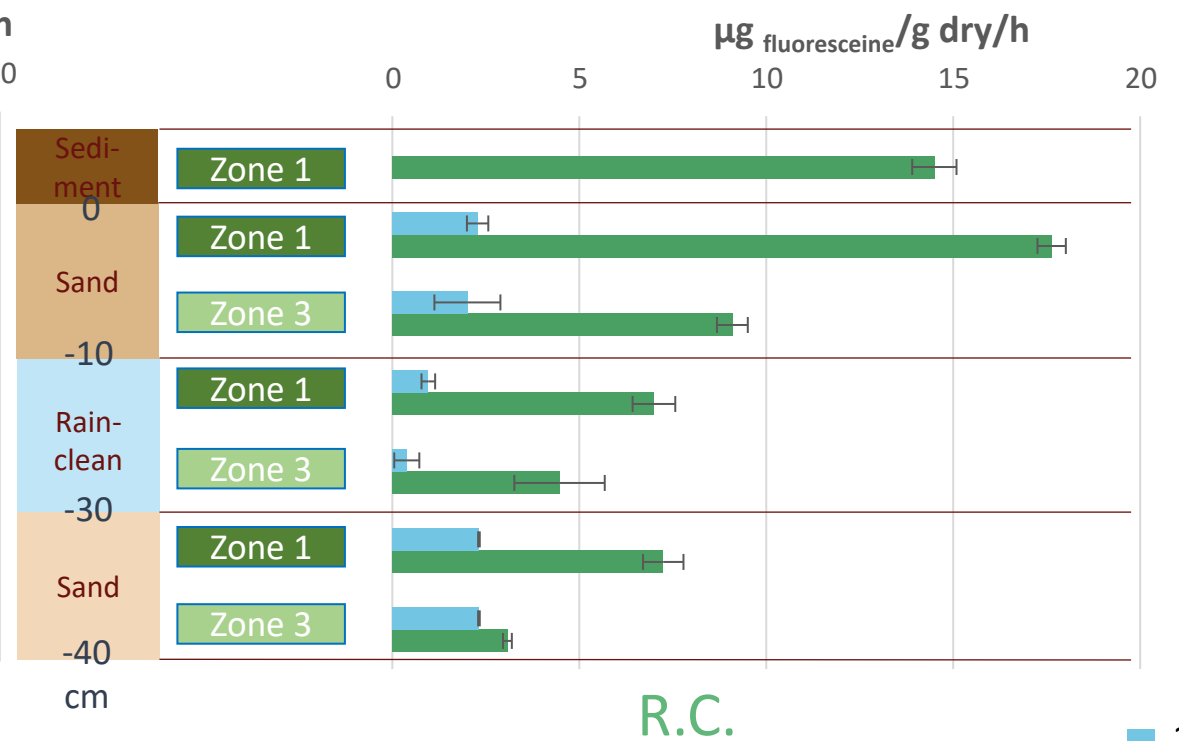
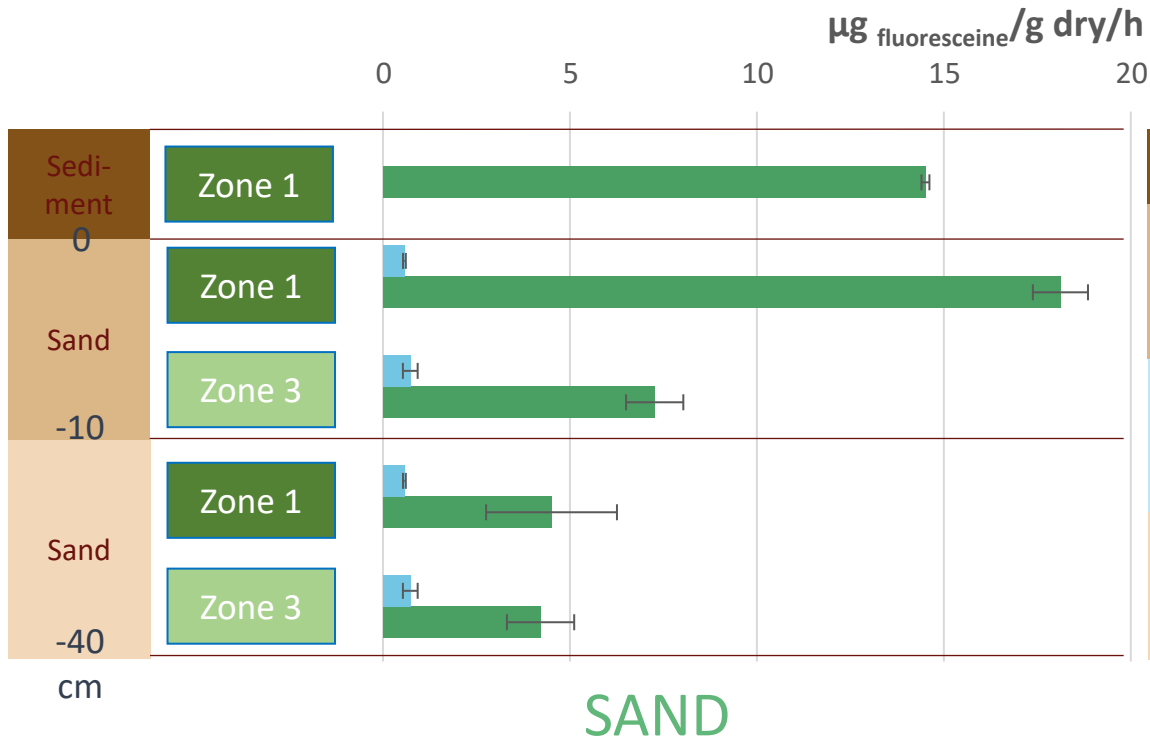


## R.C.



# Global microbial activity

(Organic  $\mu$ pol accumulation)



■ 2020  
■ 2021

	DT50 (d)
P-sand_NP	4.35
P-RC_NP	2.55
sand_NP	15.63
RC_NP	5.11



# Conclusions



# $\mu$ -pollutant fate

## Accumulation

**Metals**: accumulation and few losses = **Leaching ?**

**Organic MPs**: losses except in surface/zone 1 = **Biodegradation ?**

**Microbial communities** : progressive colonization → rôle ?

## Substrate

**Sediment**: 1% volume 35-45% contribution

**Rainclean**: retention capacities not (yet) demonstrated

## Mass balance

Sand > R.C. for Metals ; opposite for Organic  $\mu$ pol → Water data needed





Thank you  
for your attention