

**Micropollutants and pathogens in
soil-groundwater-river continuum:
modeling, monitoring and
mitigation**

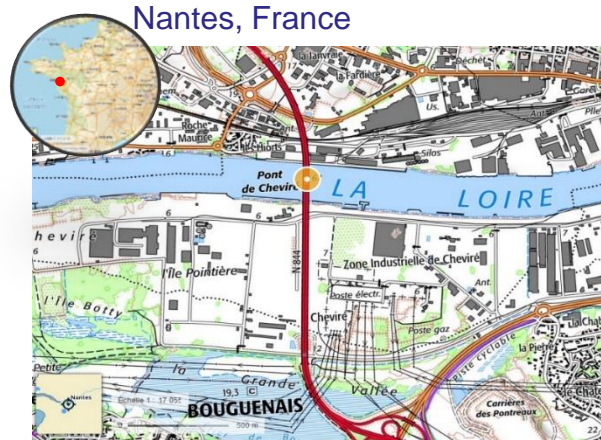
25th May (08:30-11:45)

Evaluation of ageing effect on trace element mobility in sediment of sustainable drainage systems by chemical extractions

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Study site

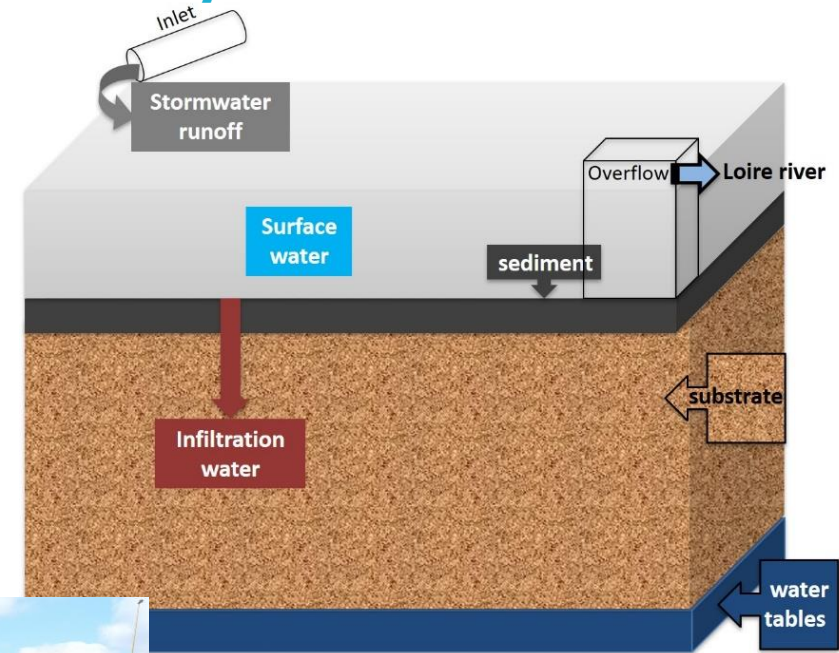
- ❖ **Runoff collection system for a highly trafficked roadway**
- ❖ **Retention and infiltration basin**



Location of the Cheviré bridge (geoportail)

South basin

- 1st total dredging after 30 years of operation



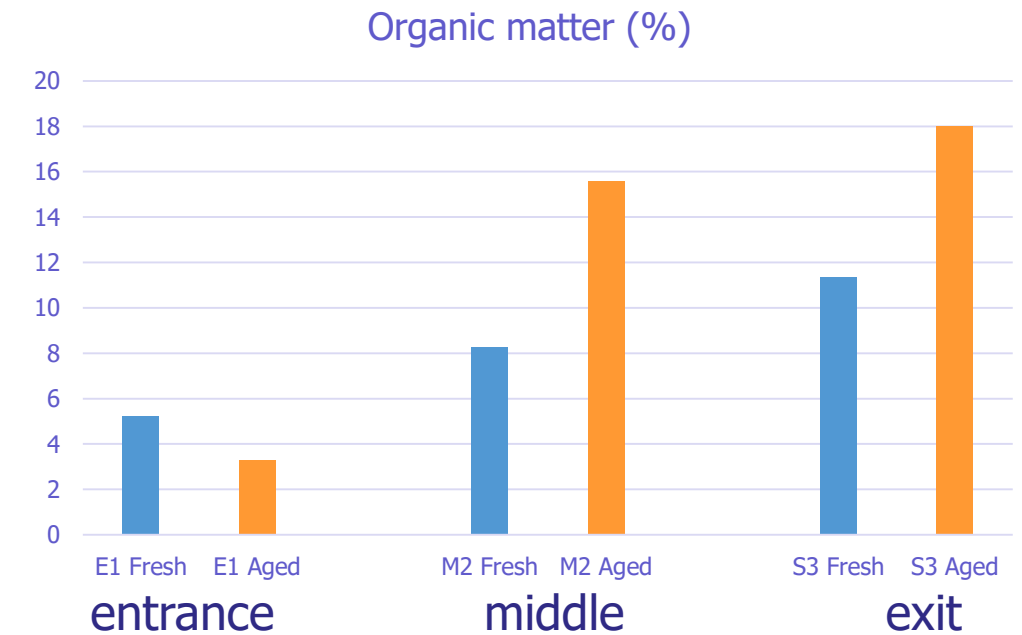
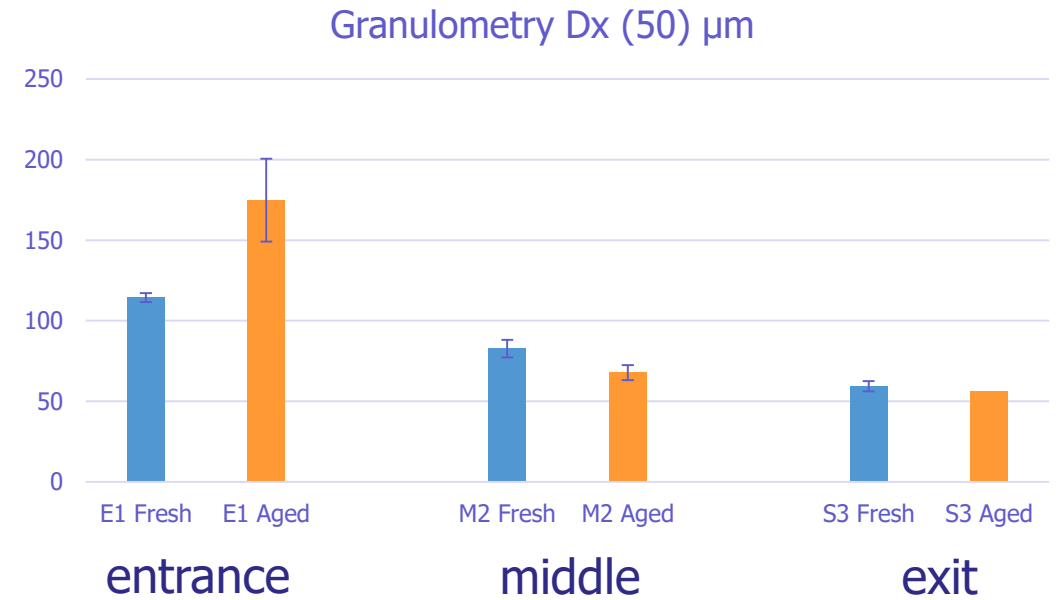
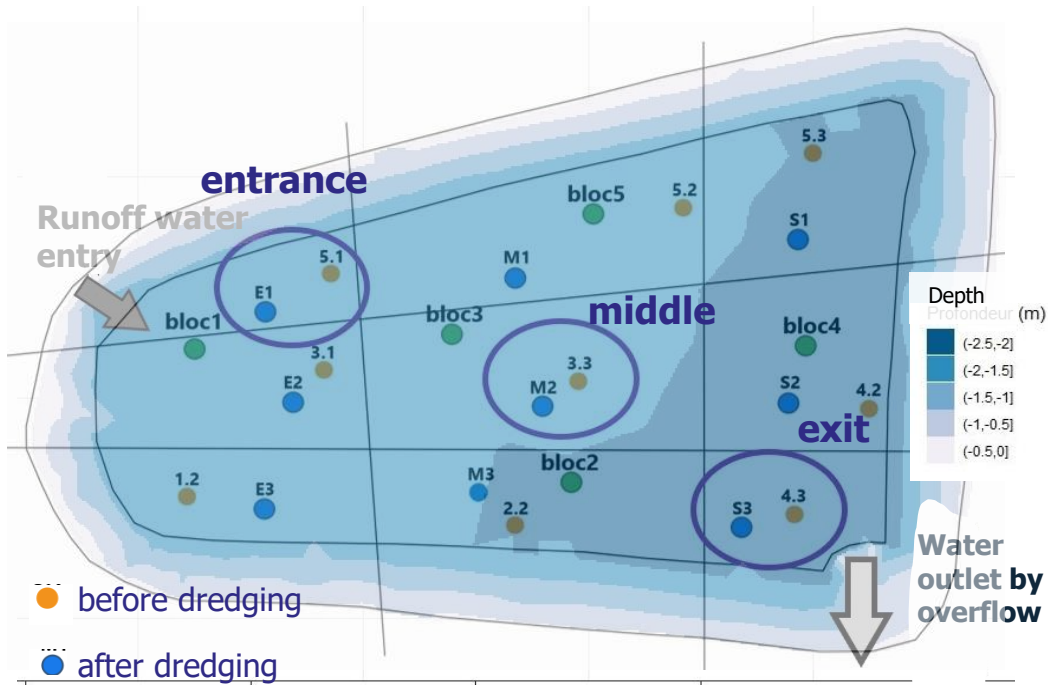
Basin **before** dredging
=> **Aged** sediments
Abundant vegetation



Basin **after** dredging
=> **Fresh** sediments

- Surface area: 925 m²
- Max depth: 2.4 m
- Max water level: 1.2 m

Sediment characteristics



Particle size of sediment

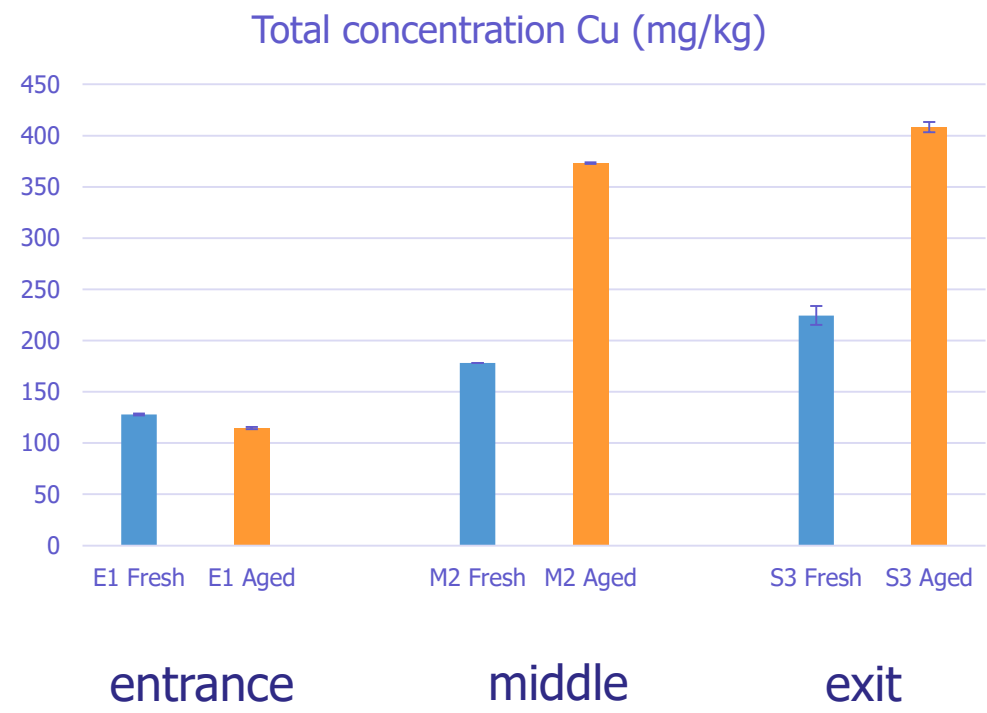
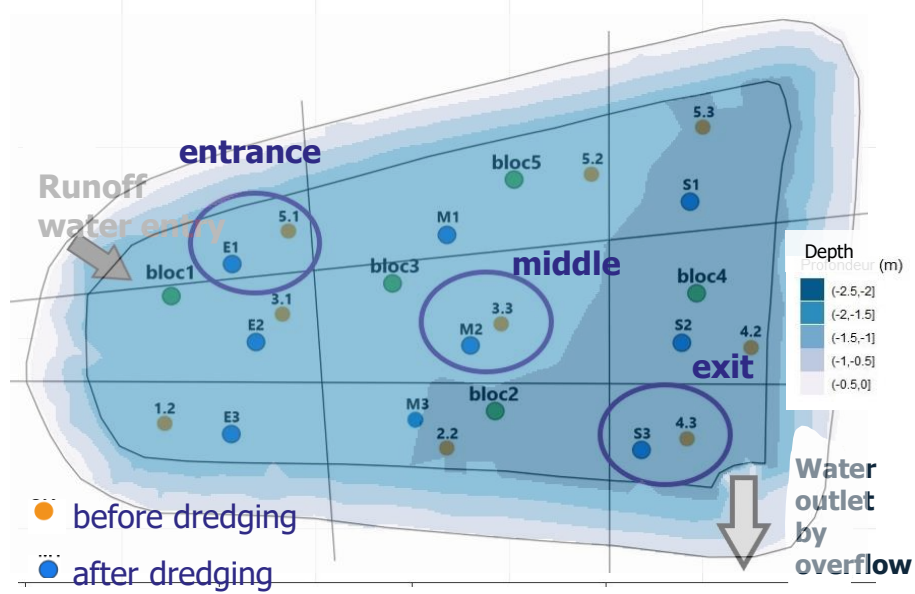
Aged ~ **Fresh**

Influence of hydraulics & basin morphology

Organic matter

Aged >> **Fresh**

Sediment characteristics



- Total concentration of Cu
- Aged >> Fresh

Cu mobility in aged and fresh sediments ?

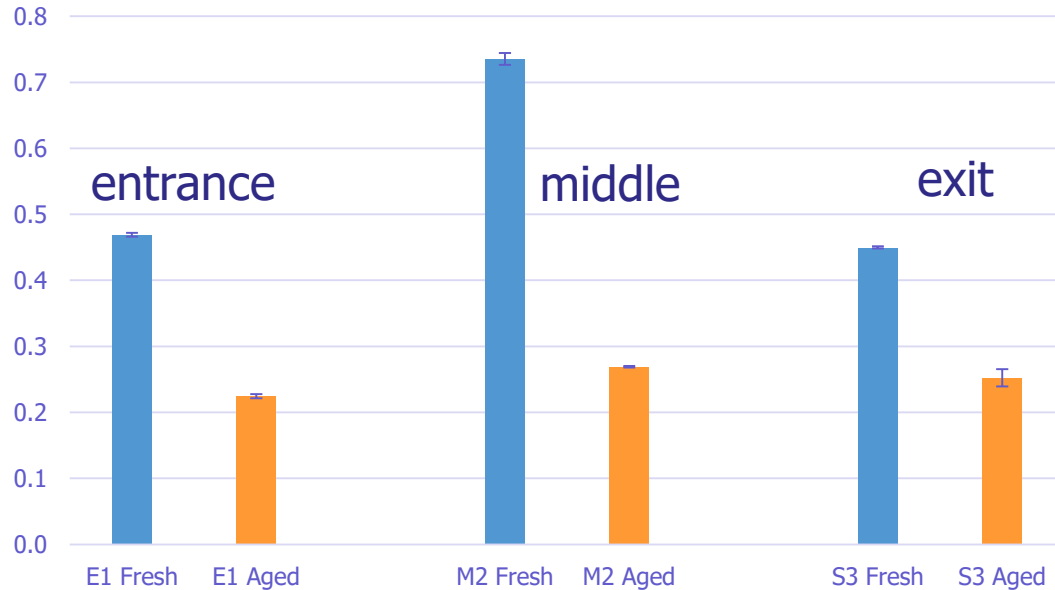
Chemical extractions

	Single extractions	Fractions
Sediments	< 63 µm	
Method	Rotation, 22 rpm	
Extracting agents	ammonium acetate AA (pH~5-6)	exchangeable + weak surface complexes
	CaCl ₂ (pH ~7)	exchangeable

	Sequential extraction (BCR three-stage)	fractions
Sediments	< 2 mm	
Method	Ultrasonic probe-assisted, 50 W	
Extracting agents	acetic acid (10 min) pH ~ 2	→ exchangeable + acid soluble
	hydroxylammonium chloride (10 min) pH ~ 2	→ reducible
	hydrogen peroxide (2 min) ammonium acetate (6 min) pH ~ 2	→ oxidisable
	aqua regia	→ residual

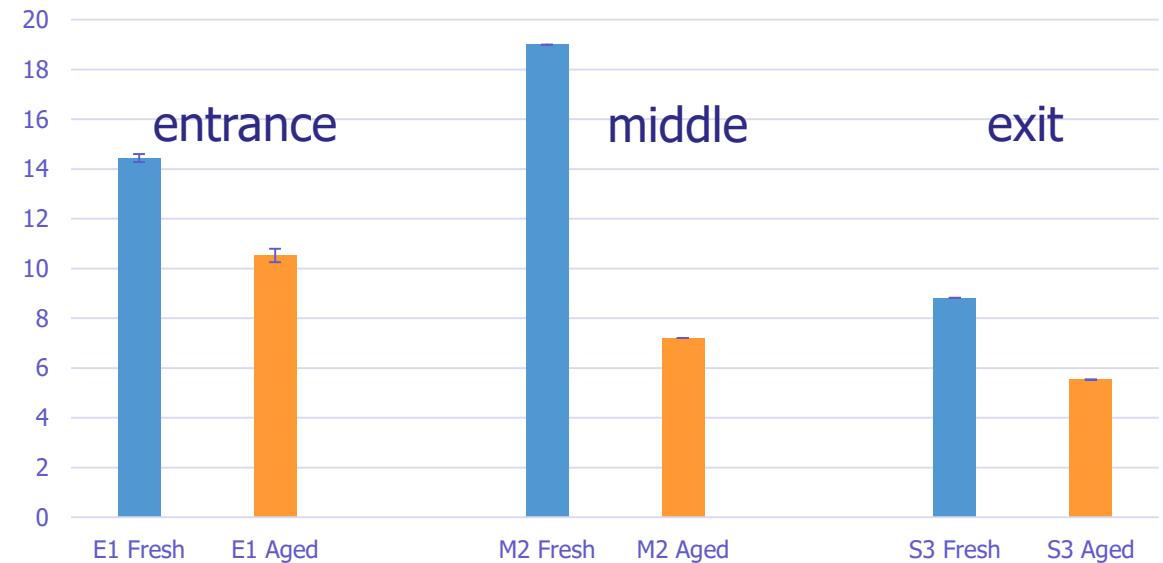
Mobility of Cu – Single extractions

% Cu exchangeable (CaCl₂, pH 7)



⇒ Exchangeable_{Fresh} > Exchangeable_{Aged}

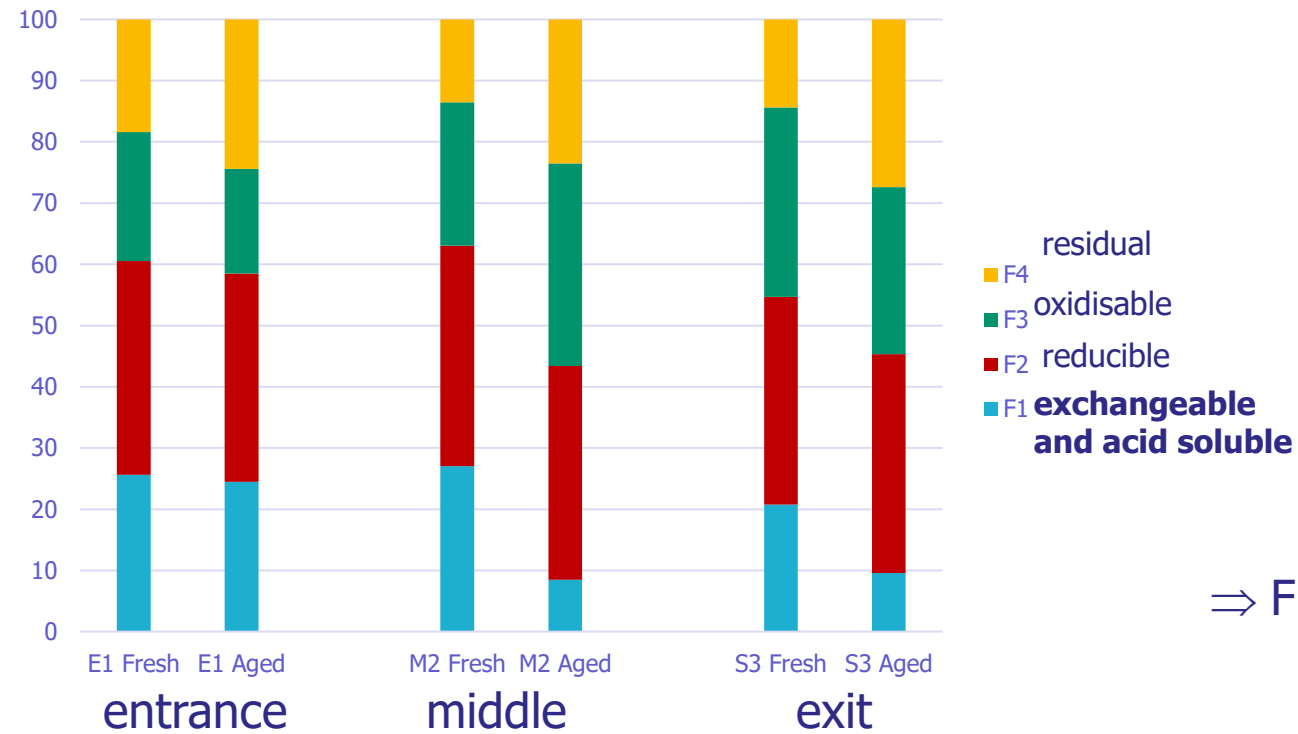
% Cu exchangeable and weak surface complexes (AA, pH 5-6)



⇒ Fresh > Aged

The mobility of Cu is enhanced in fresh sediment for the exchangeable fraction and weak surface complexes

Mobility of Cu - Sequential extraction



$\Rightarrow F1_{\text{Fresh}} > F1_{\text{Aged}}$

Confirmation of enhancement of Cu stability in aged sediment

CONCLUSION

What is the ageing effect on trace element mobility in sediment of sustainable drainage systems ?

Copper/ stormwater infiltration basin

Chemical extractions



Organic matter as ageing criteria

The **mobility of Cu** is enhanced in fresh sediments

Readily extractable fractions lower in aged sediments

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