LEESURIALES

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"Assessment of microplastics (MPs) in wastewater treatment plant (WWTP) – occurrence, removal and fate"

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SIAAP Service public de l'assainissement francilien

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LimnoPlast: Microplastics In Europe's Freshwater Ecosystems: from sources to solutions

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Introduction

Microplastics

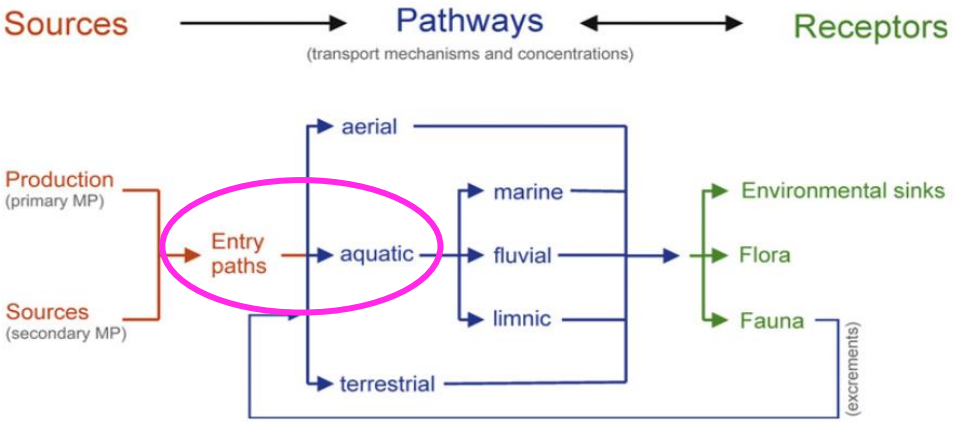
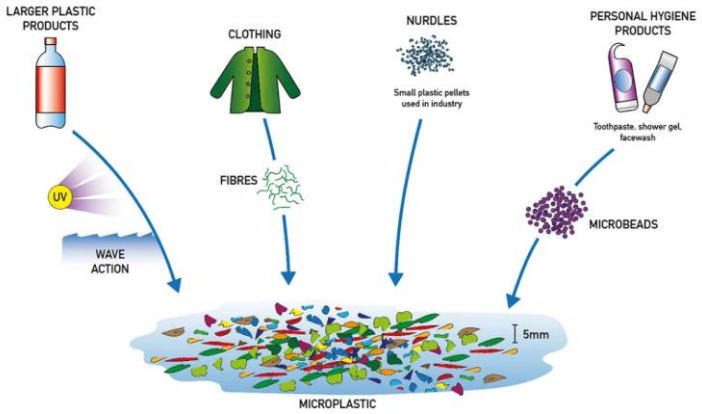


Figure 1: The Source-Pathway-Receptor model to the context of microplastics (Waldschläger et al. 2020)



Sewer systems = WWTP + networks

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Scientific objectives

Sector 1: Sewer networks

- MPs in the sewer deposit/sediment

Sector 2: Wastewater treatment plants

- MPs disposed to the environment along with treated wastewater & sludge (quantity + quality)
- Evolution of MPs throughout sludge-line
- Removal efficiency of different technologies for sludge

Sector 3: Combined sewer flows (CSOs)

- MPs discharged to the recipient through CSOs

Overall objective

Assessment of MPs fluxes at the scale of Paris megacity

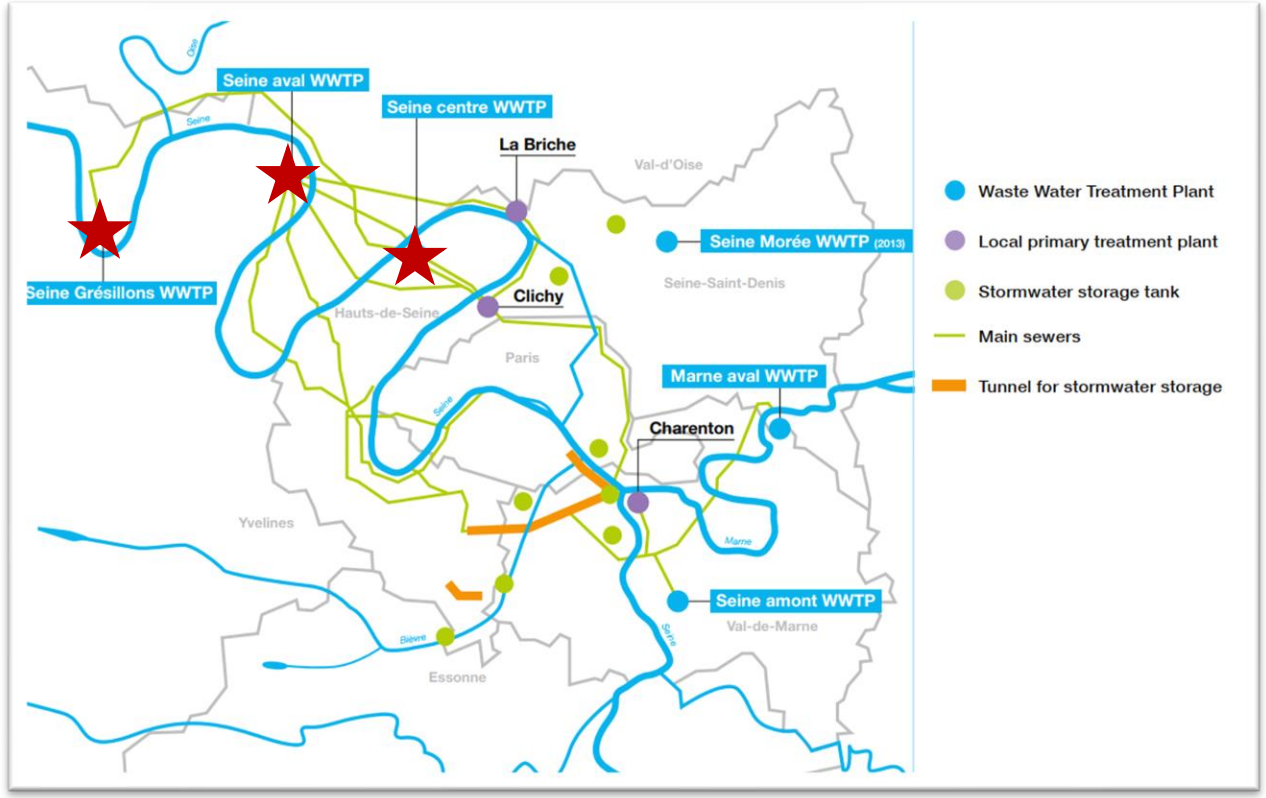

Figure 2: SIAAP sewage systems

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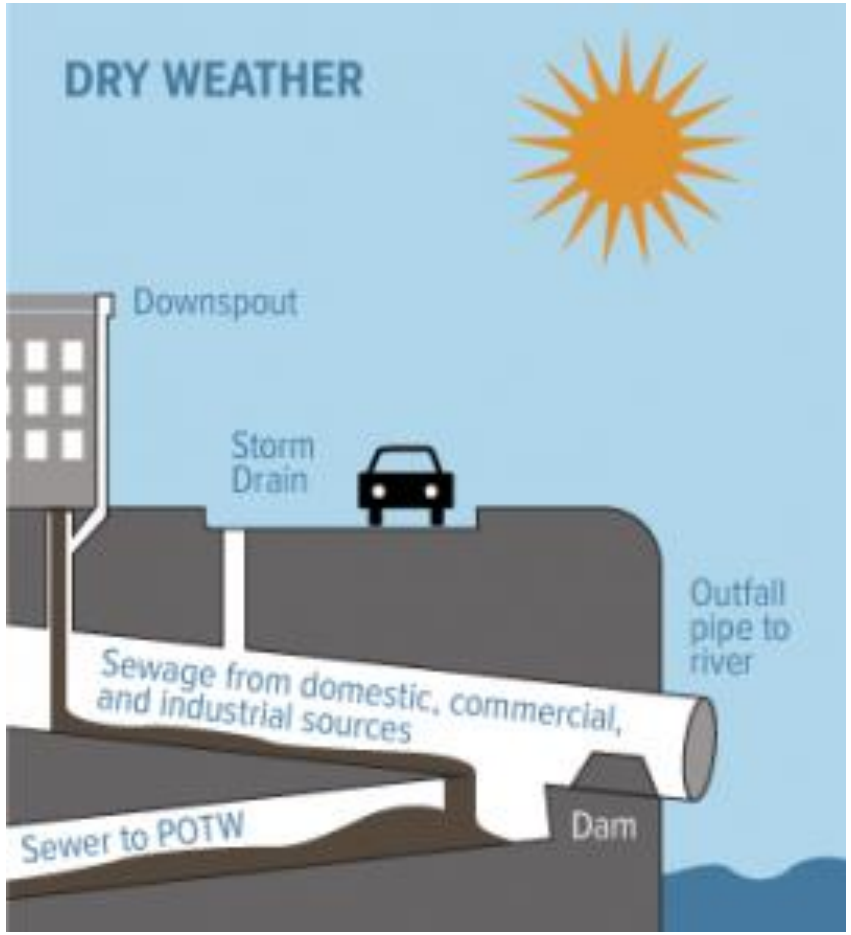
Sewer networks

Why does it matter? What have we found?



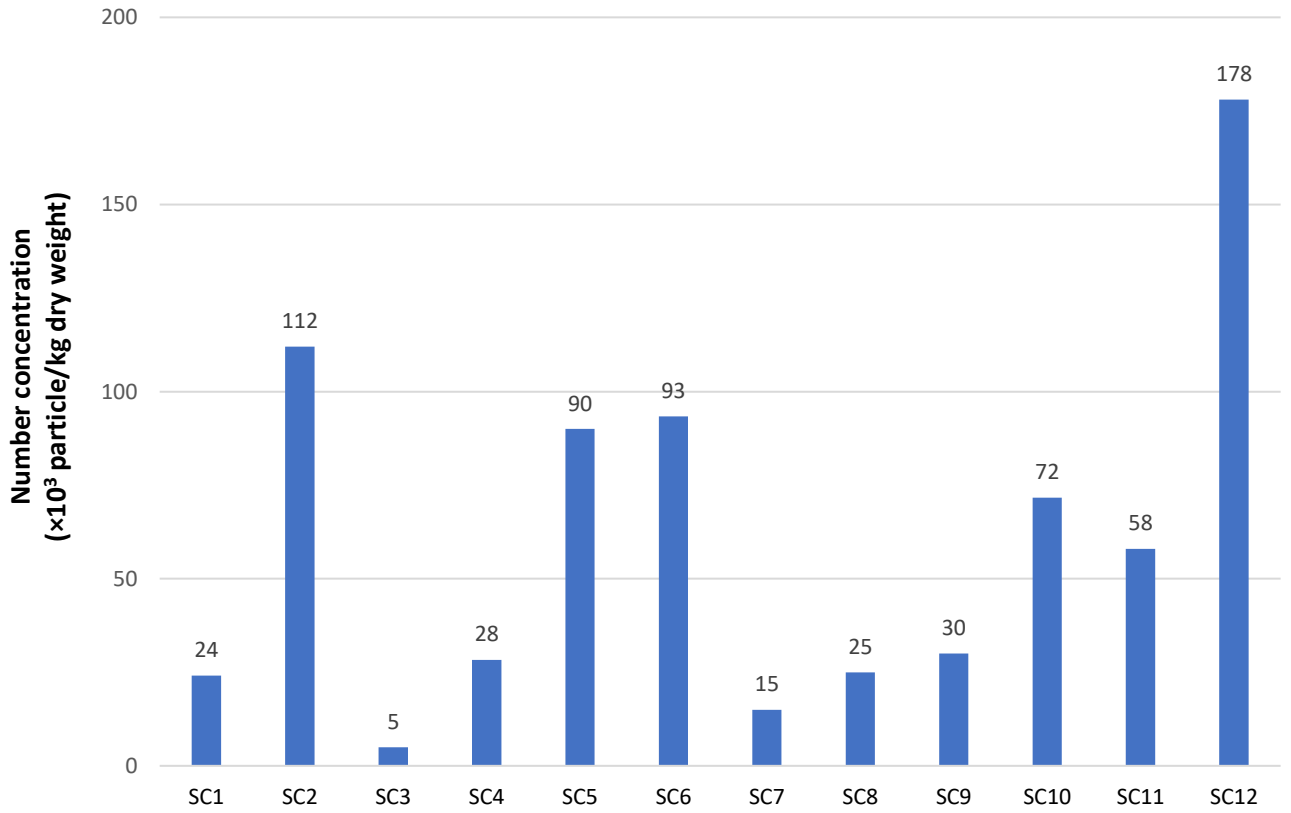


Figure 3: Microplastic concentration in sewer deposit

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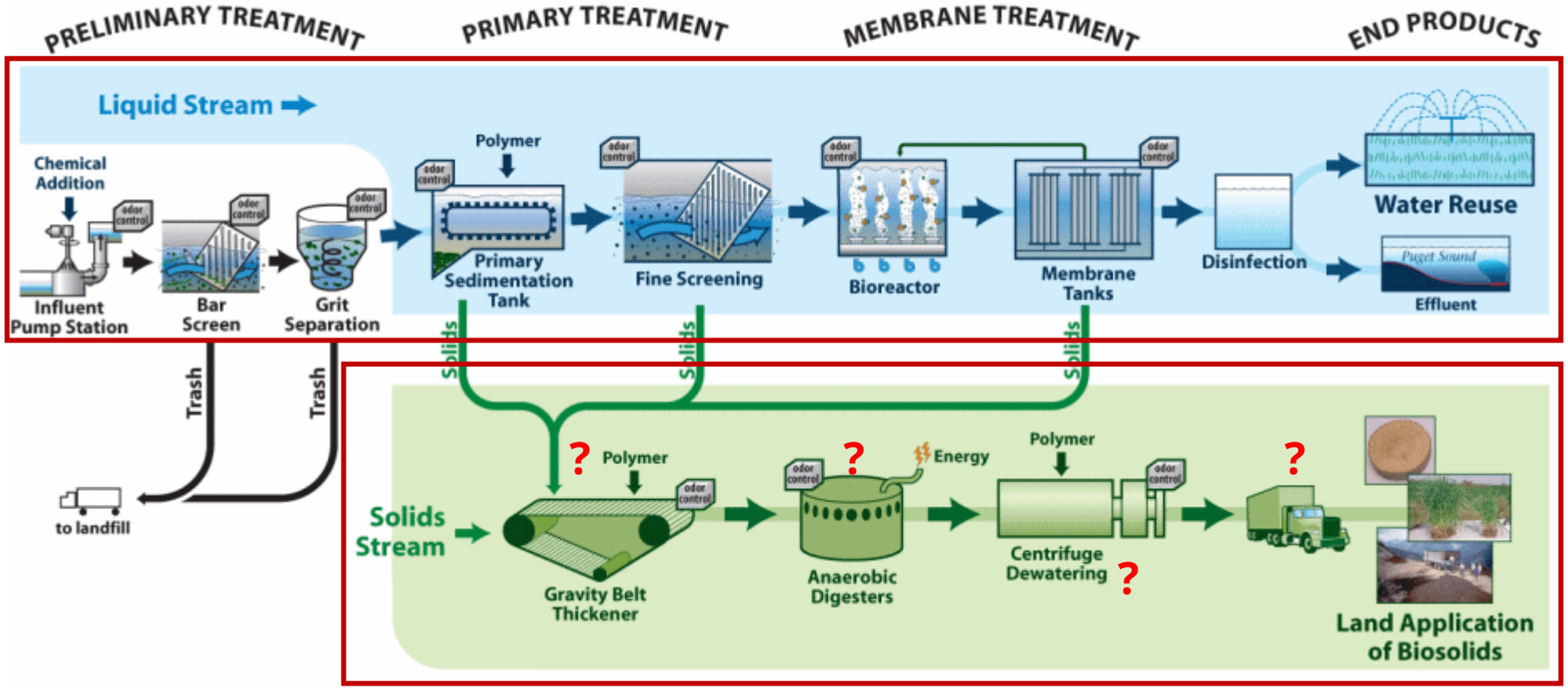
Wastewater treatment plants

What I focus on and why?



>90%

<10^3 particle/m^3

Figure 4: General scheme of a wastewater treatment plant

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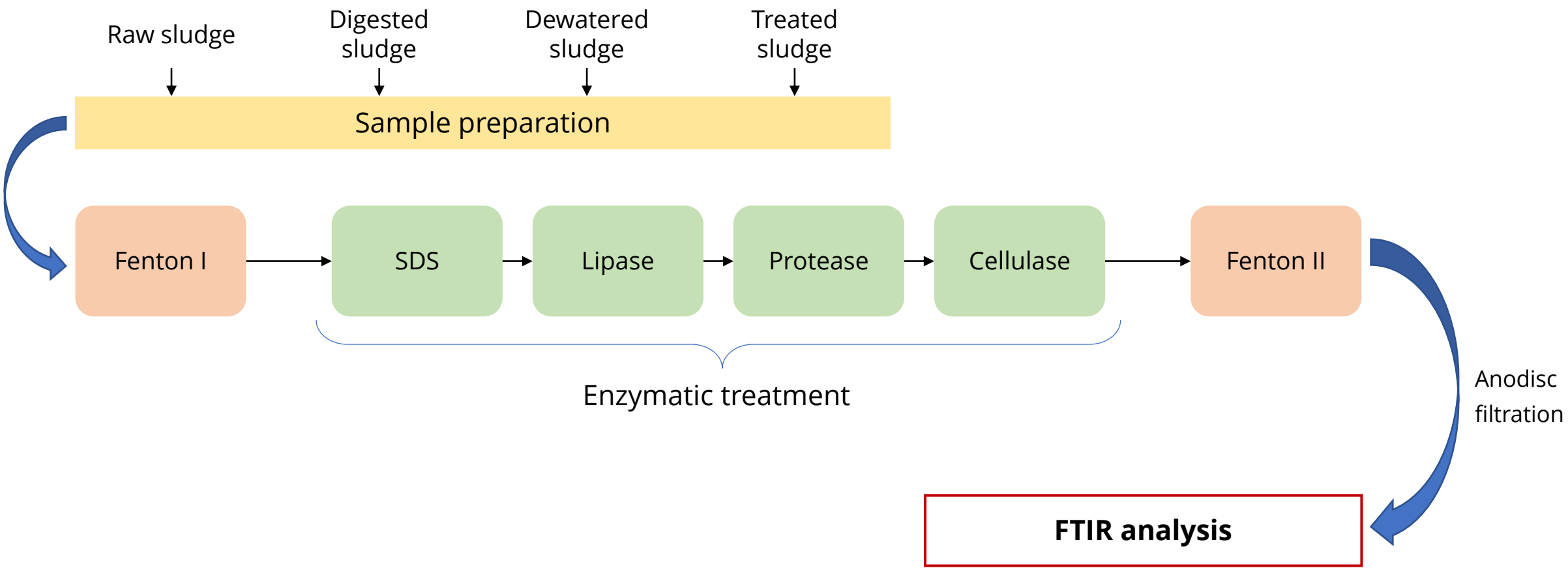
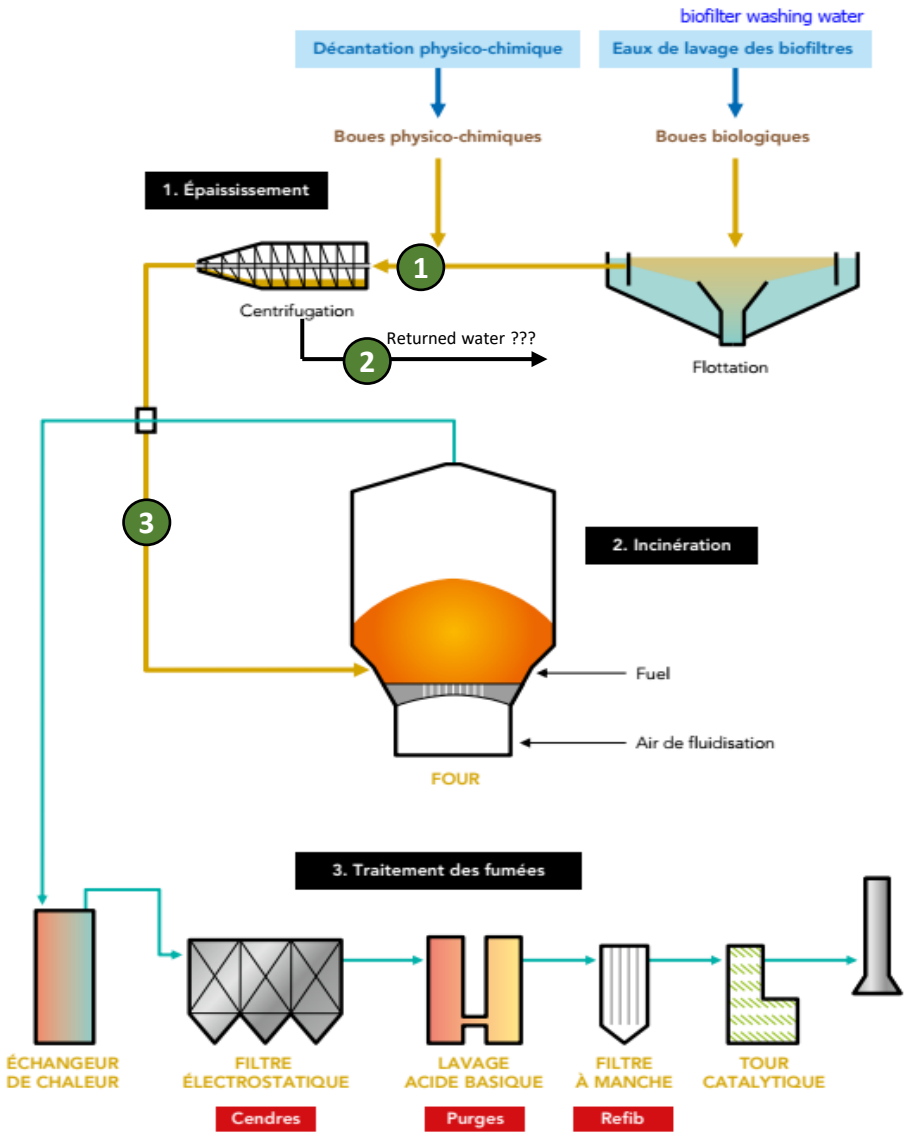
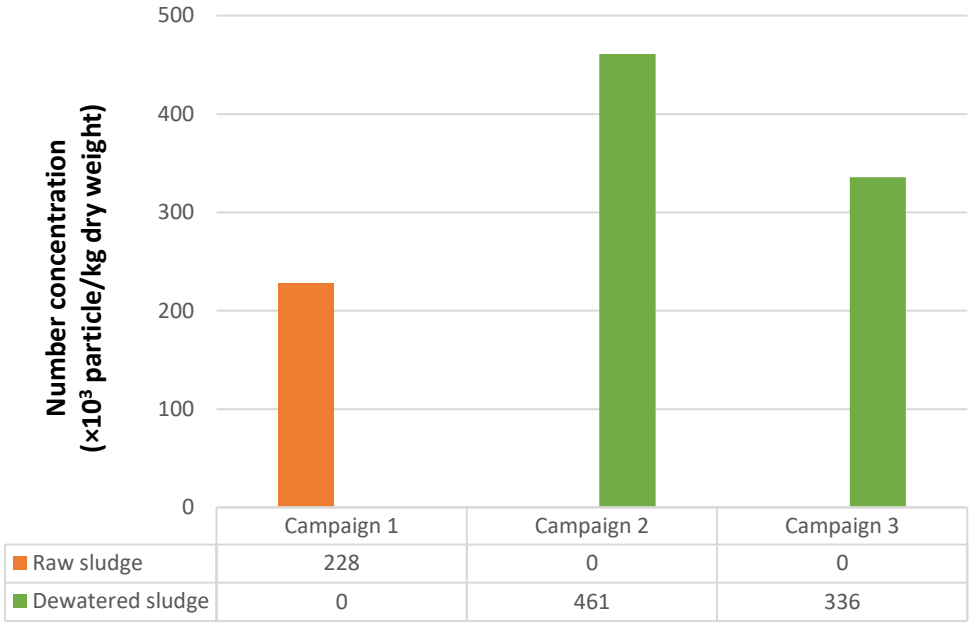
Methodology for sample treatment



Seine Centre

900 000 habitants
240 000 m³/day (dry weather)
400 000 m³/day (wet weather)





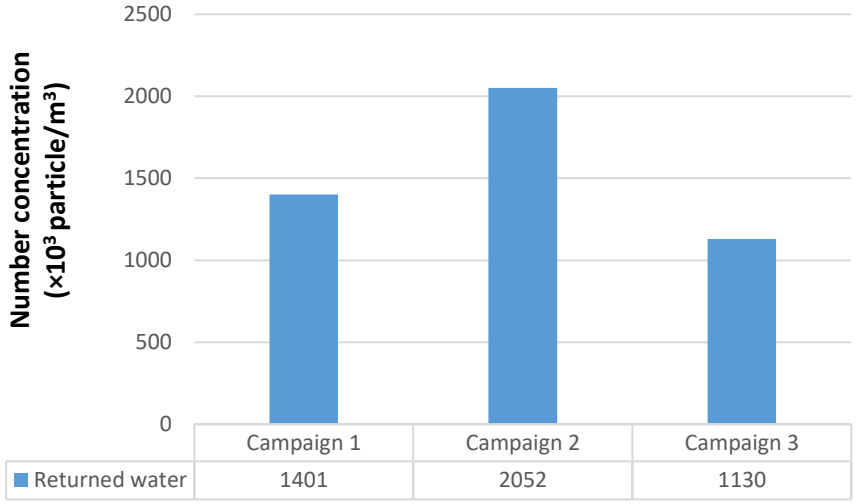


Figure 5: MP concentration in sludge line of Seine Centre

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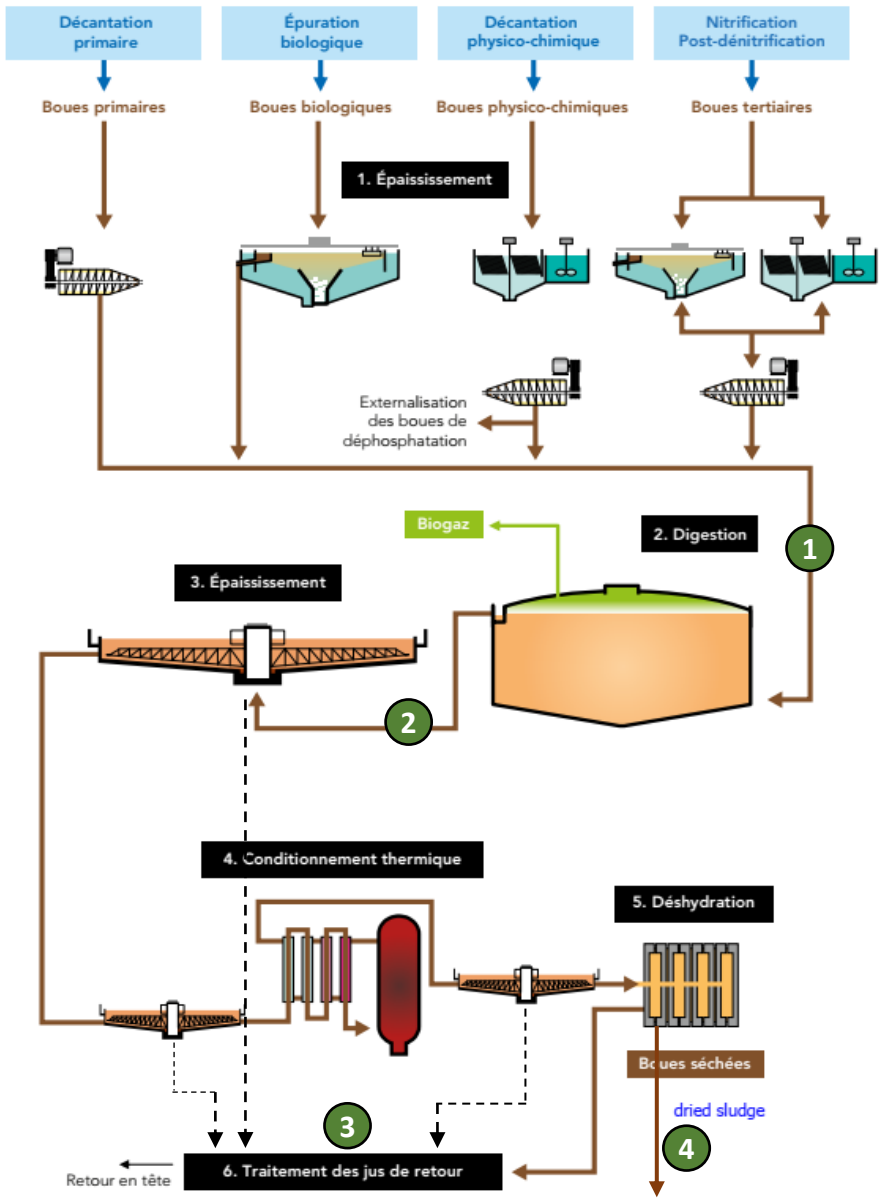
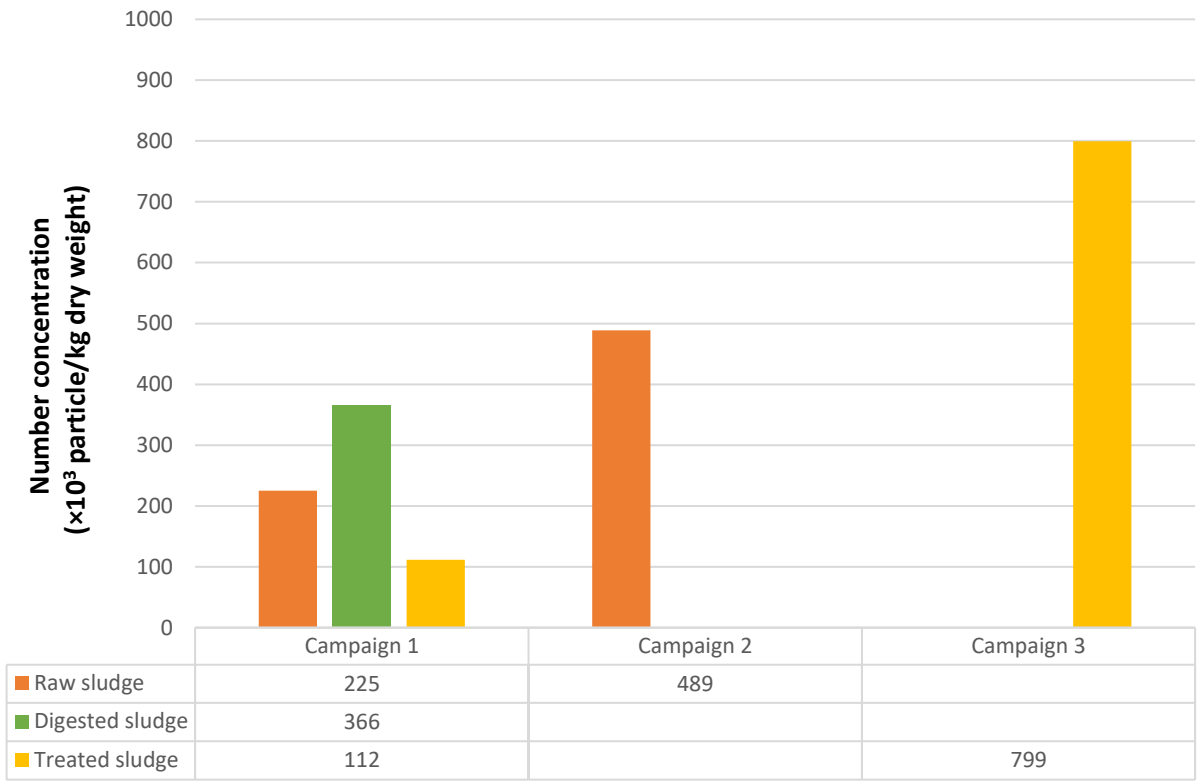
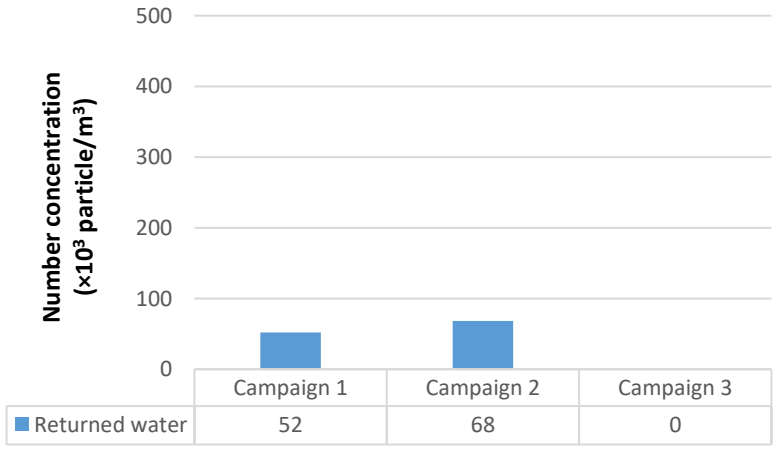
Seine Aval

4 564 000 habitants
1 500 000 m³/day (dry weather)
2 900 000 m³/day (wet weather)





	Campaign 1	Campaign 2	Campaign 3
Raw sludge	225	489	
Digested sludge	366		
Treated sludge	112		799



	Campaign 1	Campaign 2	Campaign 3
Returned water	52	68	0

Figure 6: MP concentration in sludge line of Seine Aval

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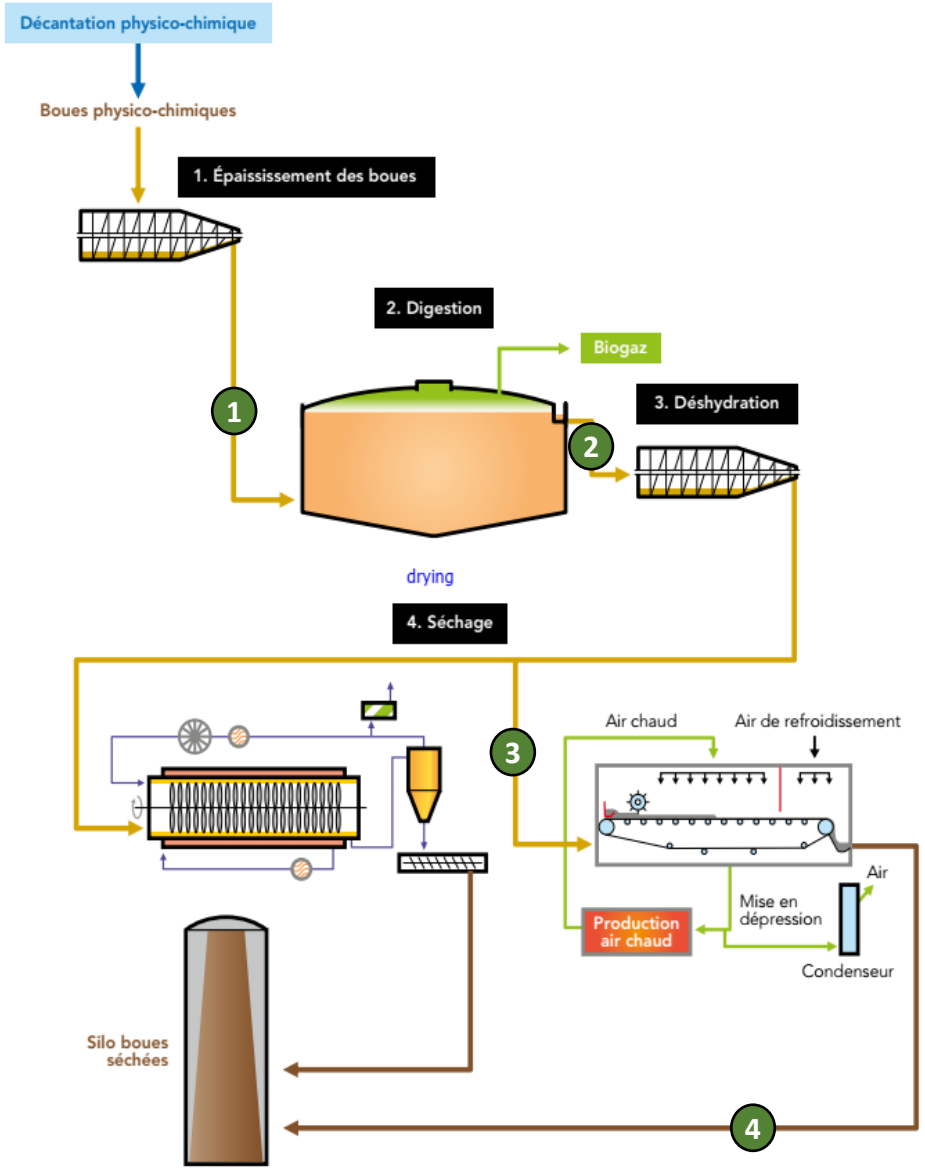
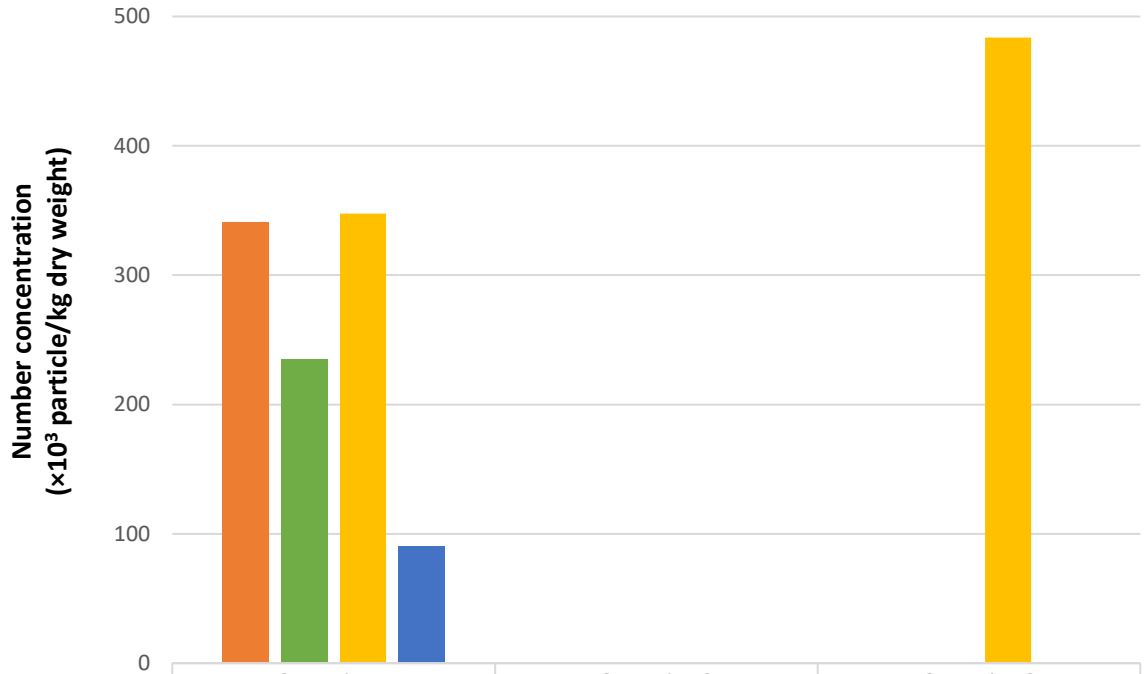
Seine Grésillion

1 149 000 habitants
300 000 m³/day (dry weather)
315 000 m³/day (wet weather)





	Campaign 1	Campaign 2	Campaign 3
Raw sludge	341		
Digested sludge	235		
Dewatered sludge	348		484
Treated sludge	91		

Figure 7: MP concentration in sludge line of Seine Grésillion

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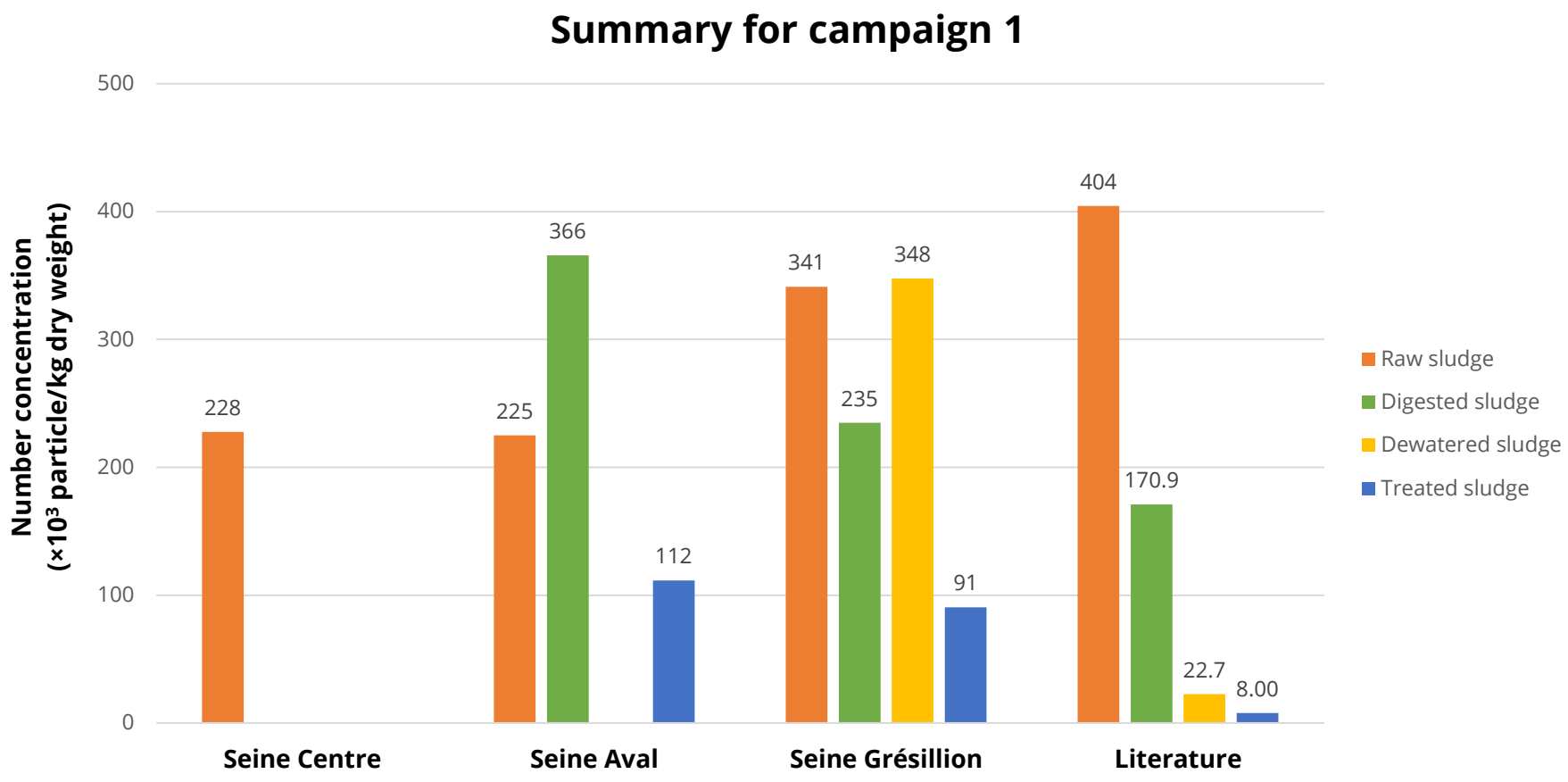

Figure 8: MP concentration of different sludge types compared to literature

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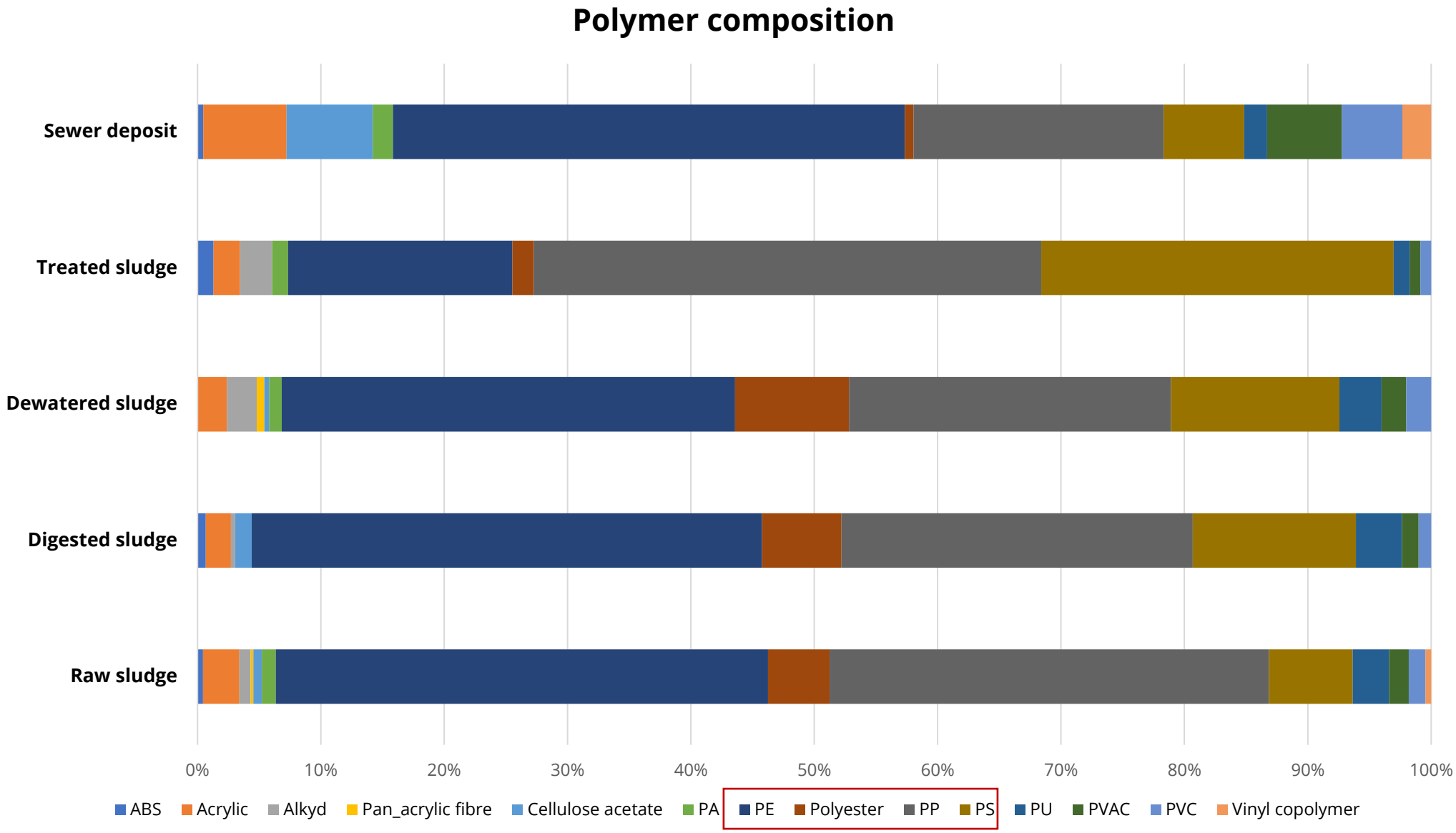

Figure 9: Polymer composition of detected particles

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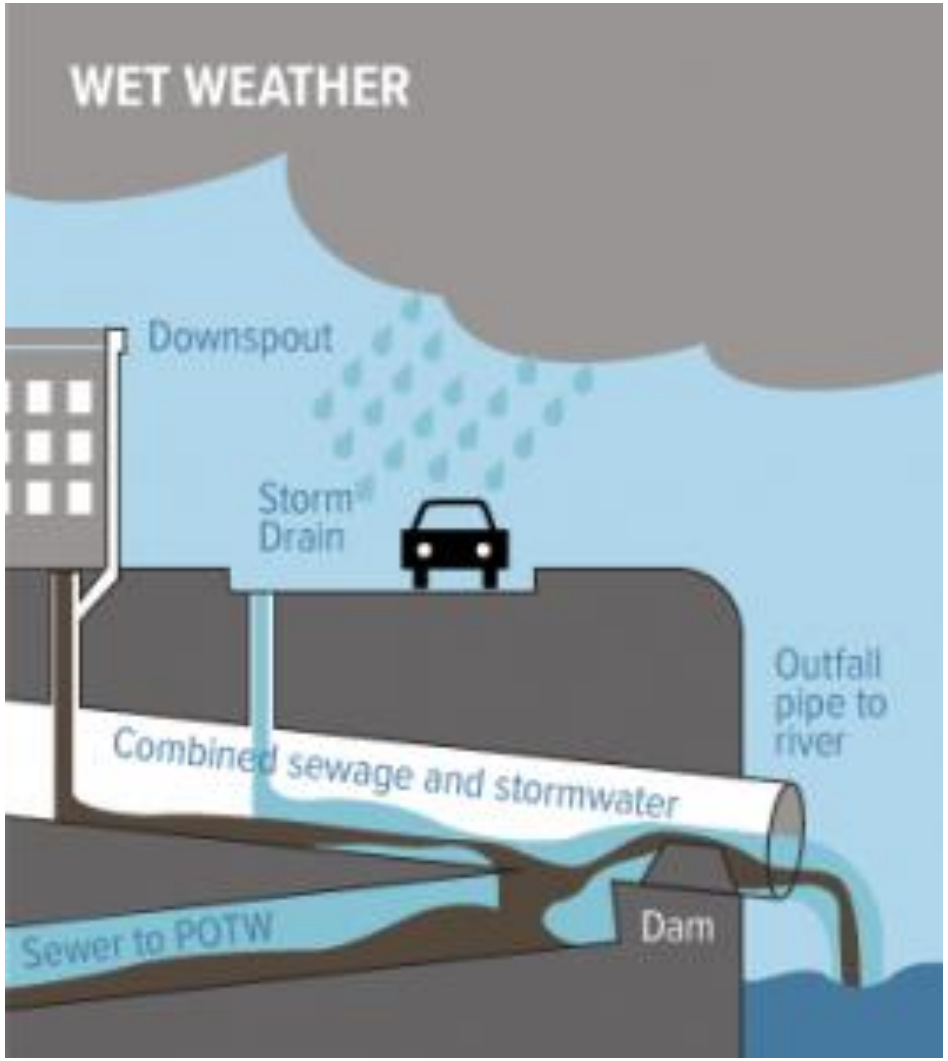
Combined sewer overflow (CSO)

Why it makes sense? What we have until now? What we expect?



Secondment (NTNU)

Toxicological effects of particles discharged along with CSOs on aquatic organisms

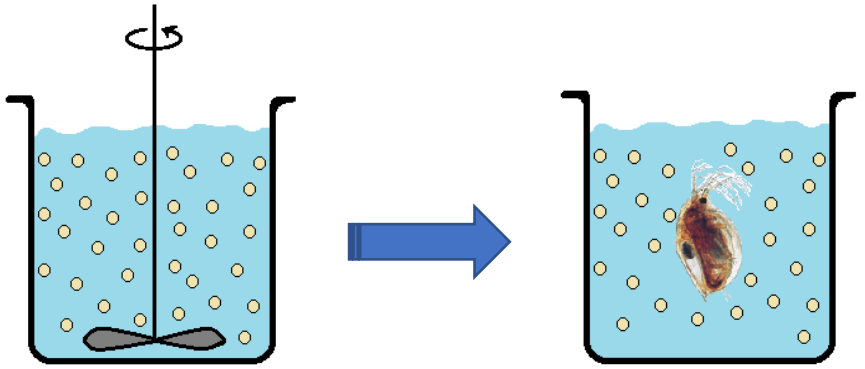


Figure 10: Experiment design with incubated particles

To be continued....

Thank you for your attention

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Scientific questions and Answers?