

Indagini sulle microplastiche nel Lago di Lugano



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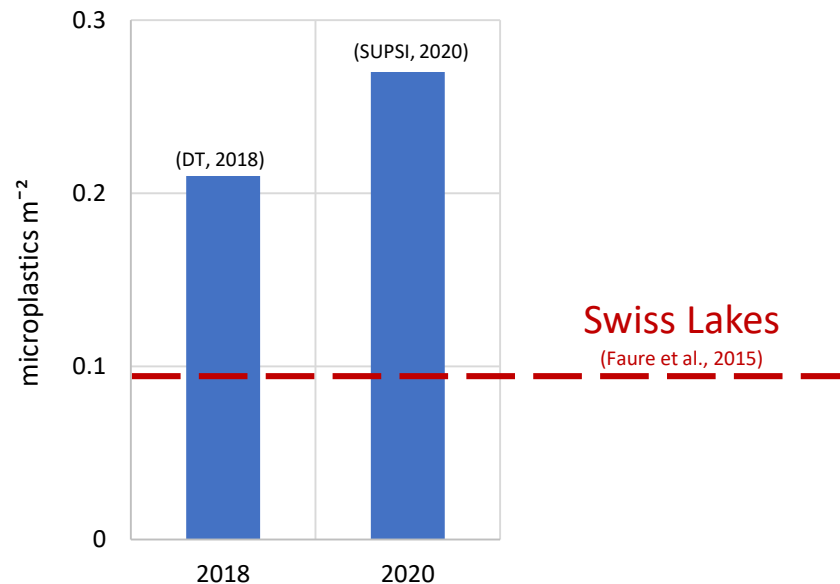
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Microplastics in Lake Lugano

Perialpine lake with one of the most relevant concentrations in terms of **surface microplastics**



Outstanding questions...



1. Are **levels of contamination** in lake water **changing over time**?
2. Are there **microplastics under the surface**? How are they **distributed**?
3. What **role do rivers play** in watershed contamination?

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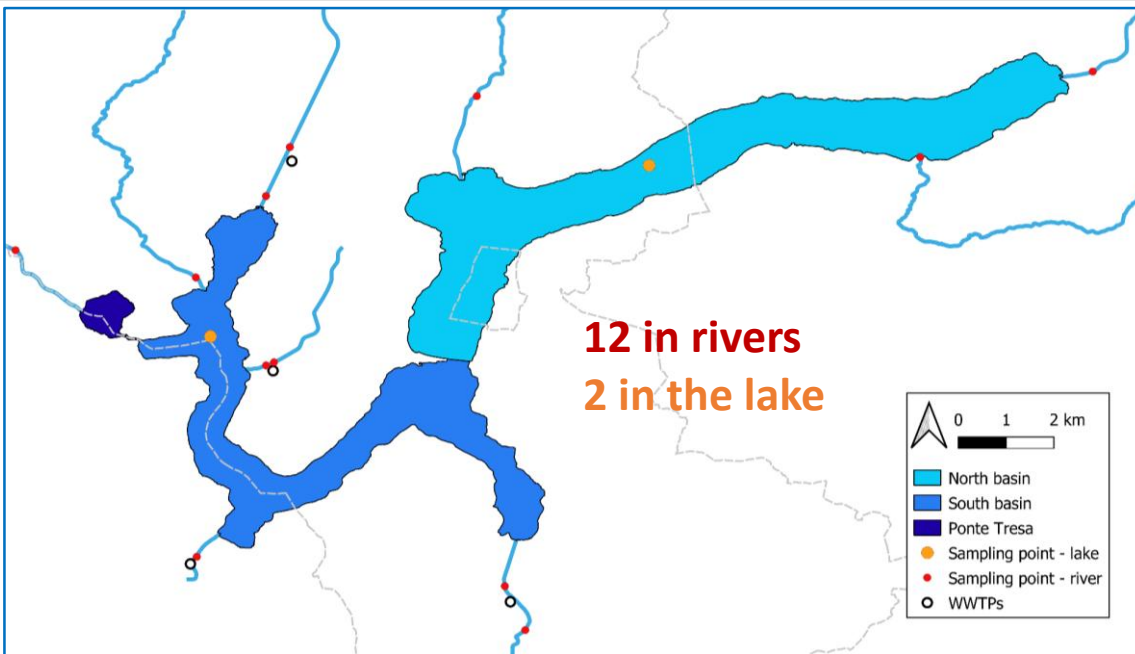
CIPAIS
Sez.3

2022
Rivers

2023
Water column

2024
Surface waters

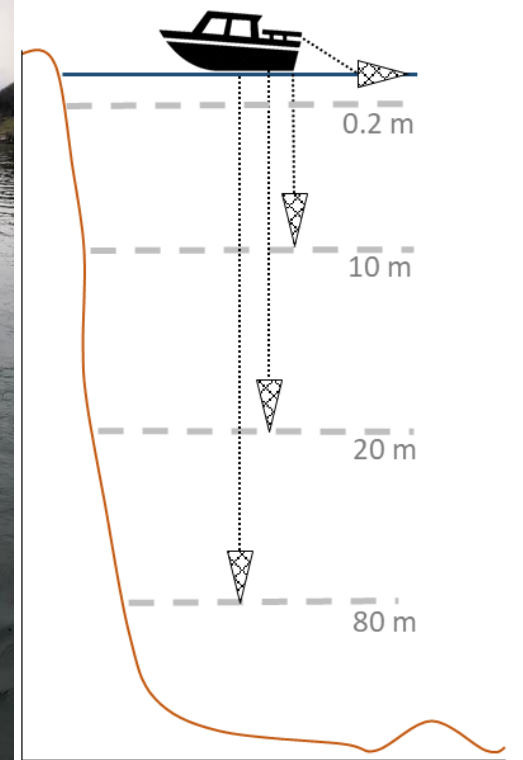
Where...



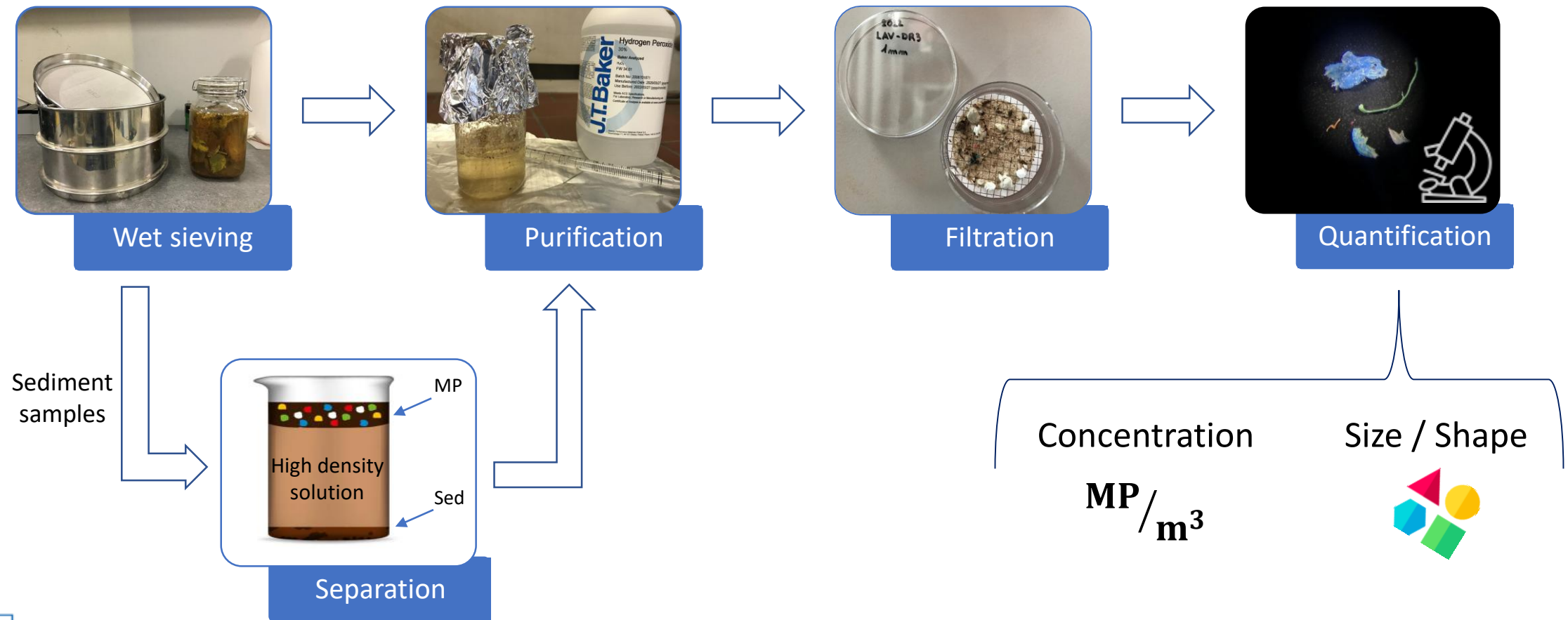
Tributaries and outlet = low flow conditions



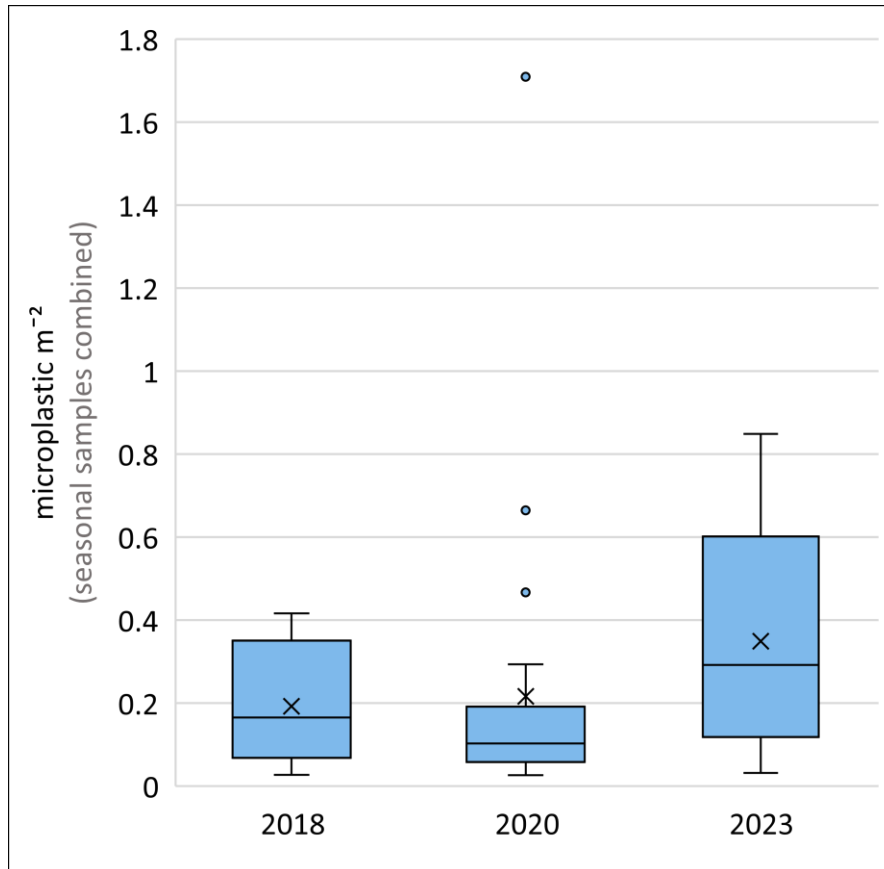
Lake surface and water column = seasonal sampling



... and **how** are microplastics analysed?



Monitoring trend in surface waters

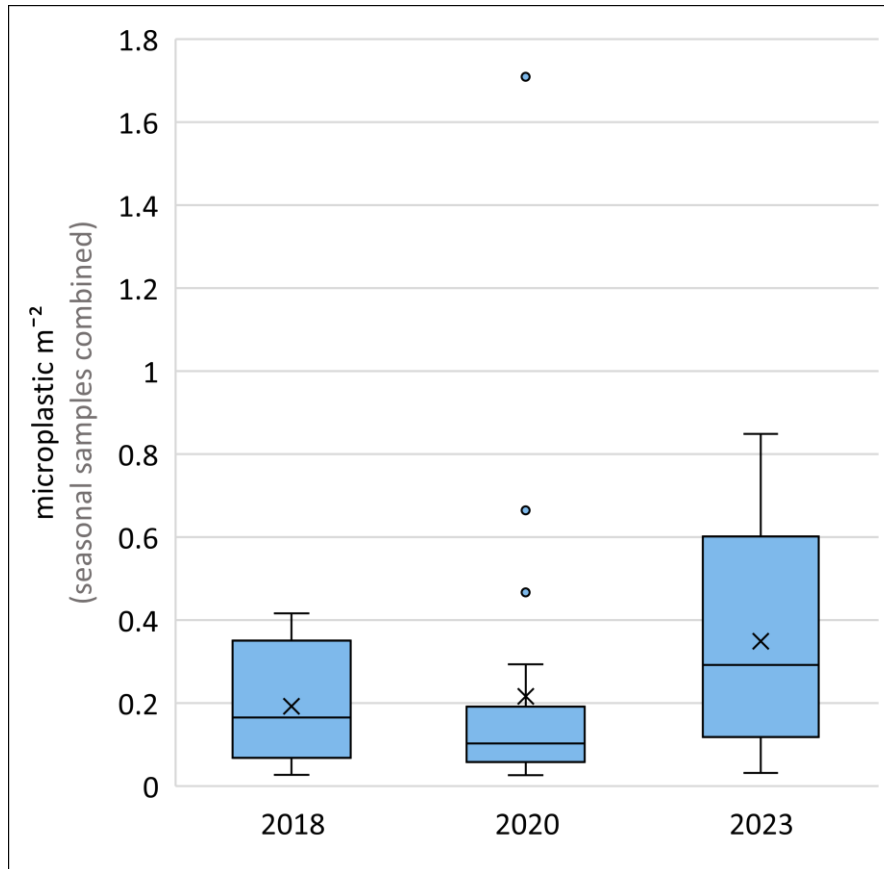


Average concentration **0.35 MP m⁻²**

- No relevant changes between years

↘ **steady input**

Monitoring trend in surface waters



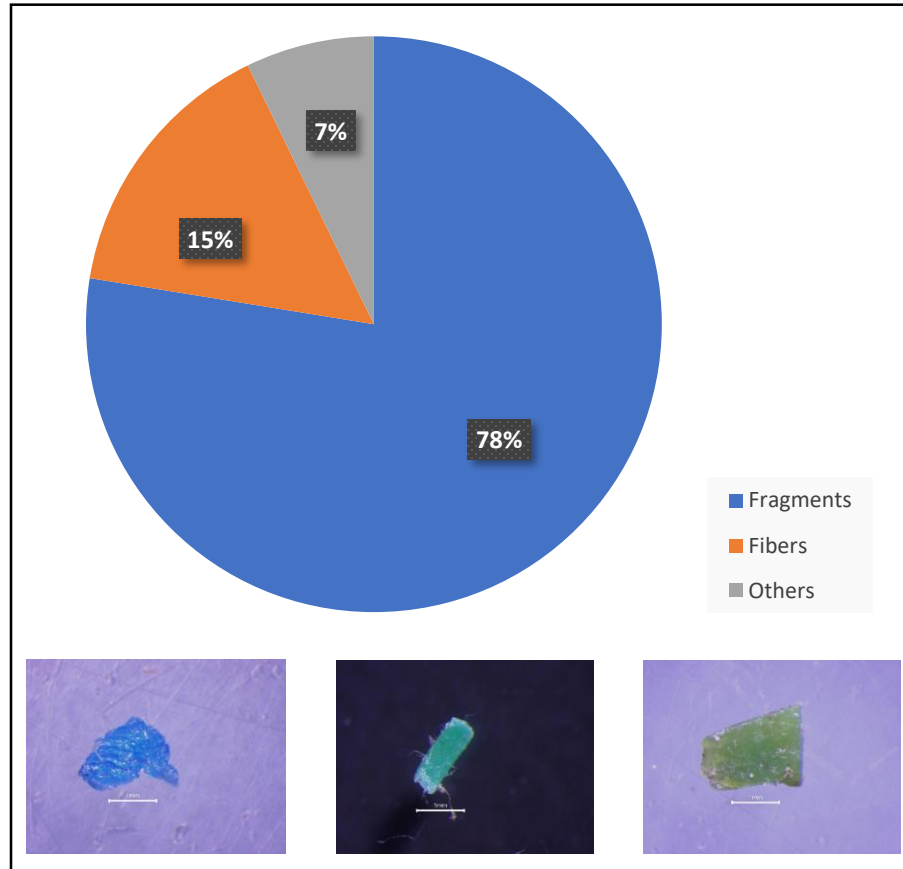
Average concentration **0.35 MP m⁻²**

- **No relevant changes** between years
 - ↳ **steady input**
- **Uniformly distributed** in the two basins
 - ↳ **same type of sources**

N
0.4 ± 0.2
MP m⁻²

0.3 ± 0.1
MP m⁻²
S

Monitoring trend in surface waters



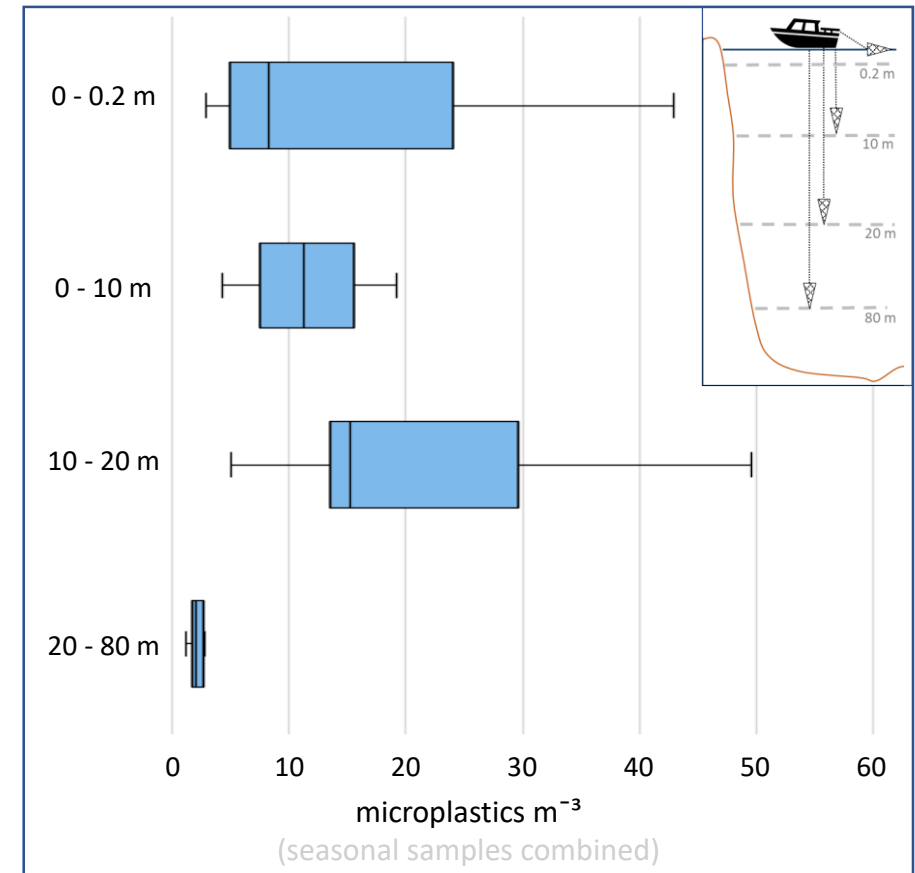
Average concentration **0.35 MP m⁻²**

- **No relevant changes** between years
 - ↳ **steady input**
- **Uniformly distributed** in the two basins
 - ↳ **same type of sources**
- **Fragments dominant**
 - ↳ **littering + run off**

Contamination in the water column

Average concentration **4.89 MP m⁻³**

- **Mid-depths layers** have similar or higher concentrations than the surface

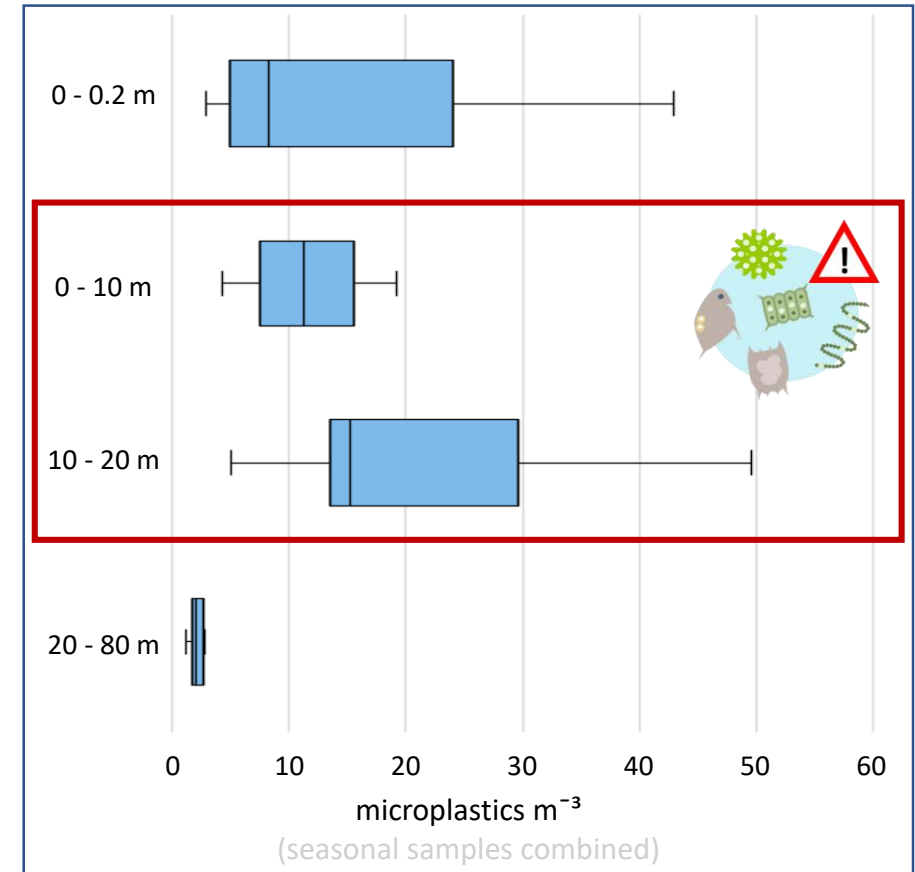


Contamination in the water column

Average concentration **4.89 MP m⁻³**

- **Mid-depths layers** have similar or higher concentrations than the surface

↳ **euphotic zone**



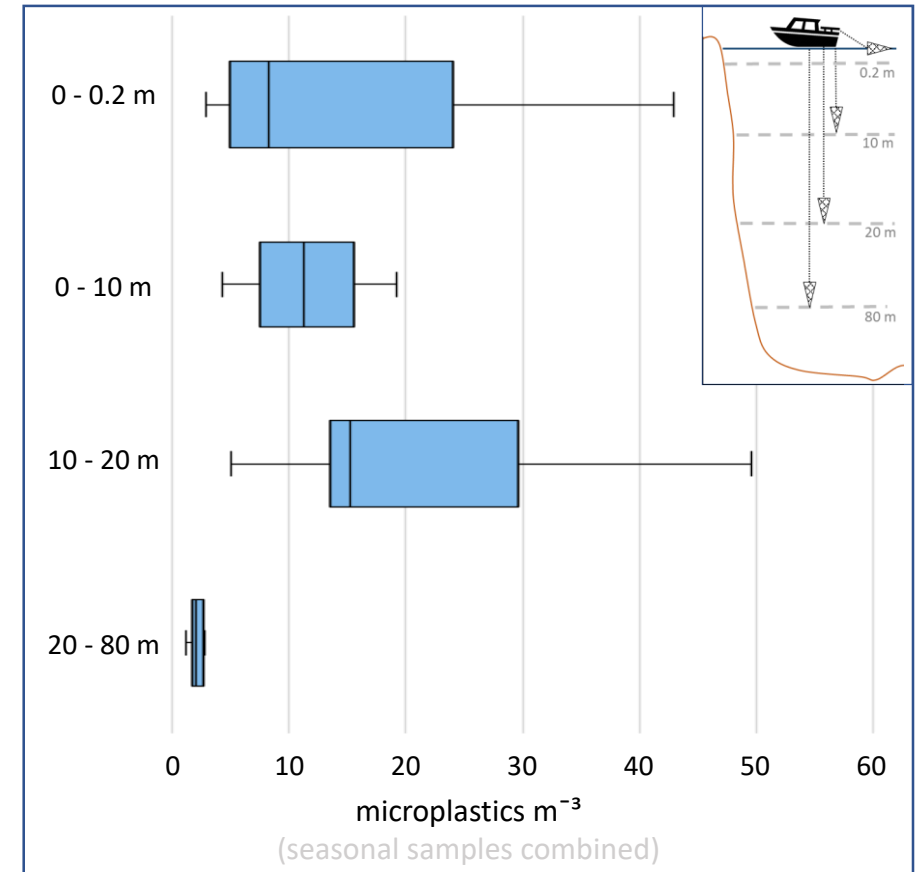
Contamination in the water column



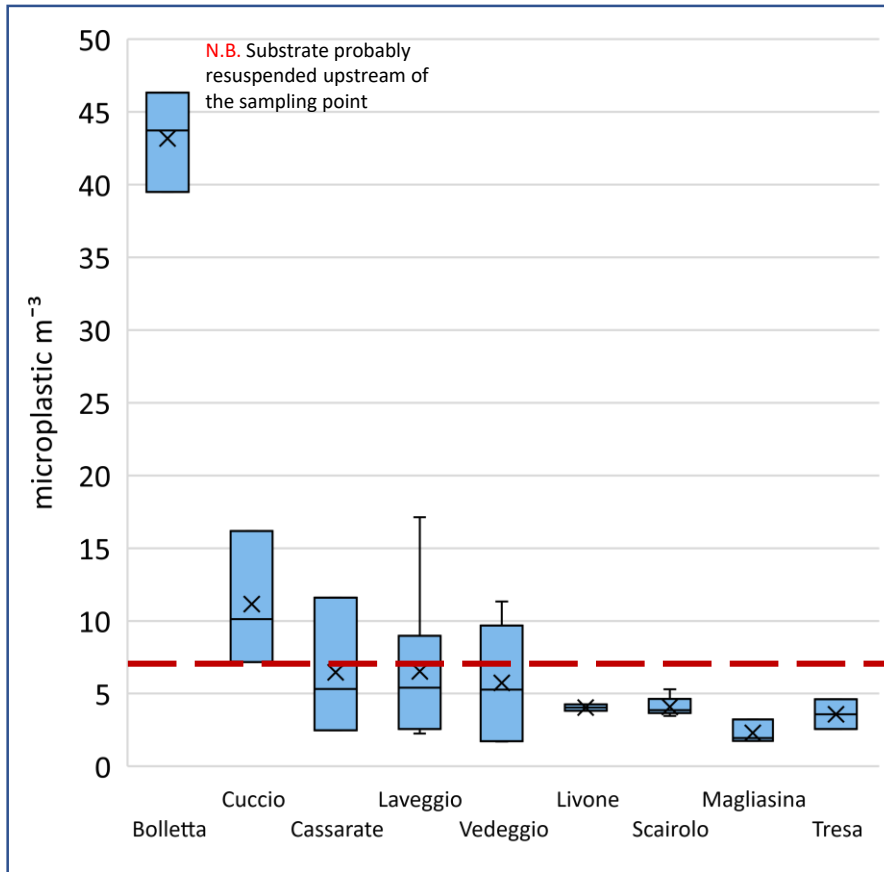
Surface monitoring can **underestimate total concentration** in the lake



Monitoring the **water column** is **essential for risk assessment**



Transport and accumulation in rivers



Average water transport **8.63 MP m⁻³**

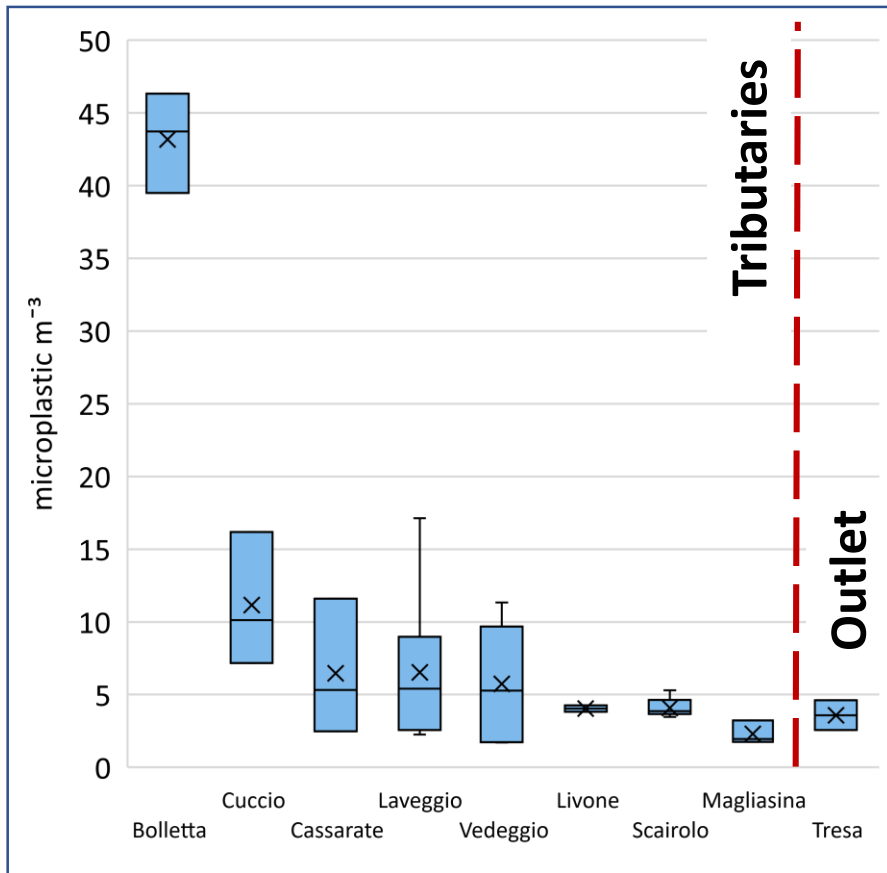
- Comparable to **larger rivers**

↘ **relevant transport in small rivers**

Swiss Rivers

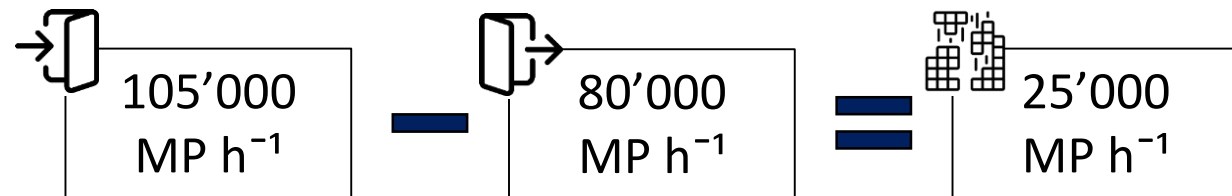
(Faure et al., 2015)

Transport and accumulation in rivers

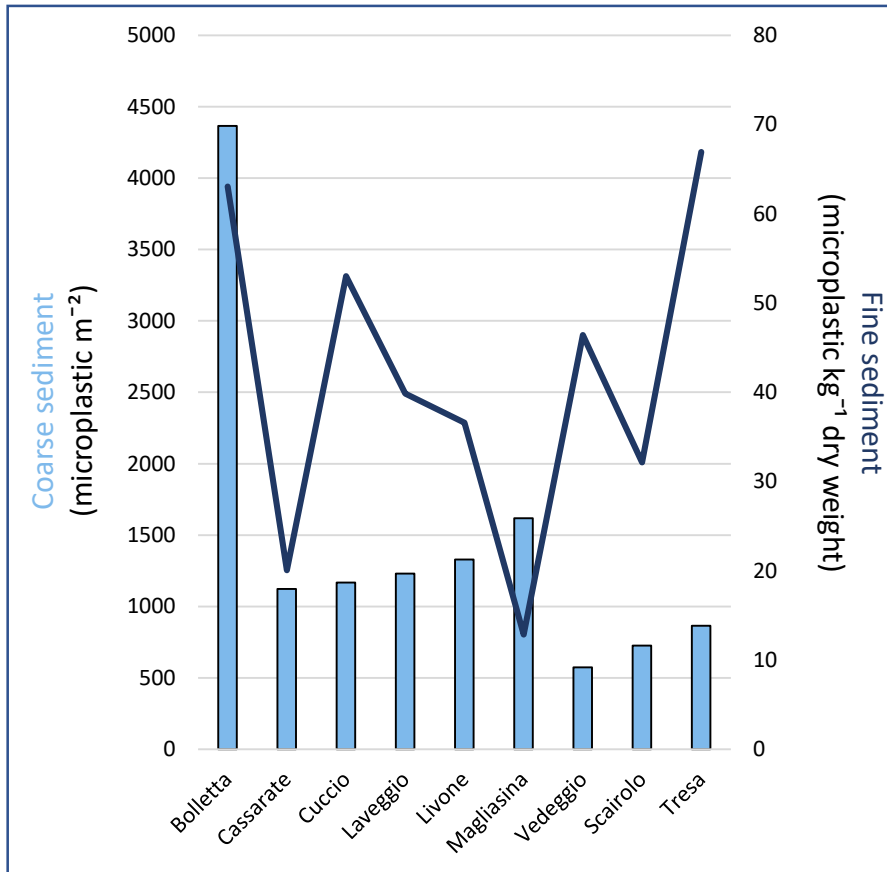


Average water transport **8.63 MP m⁻³**

- Comparable to **larger rivers**
 - ↳ **relevant transport in small rivers**
- Tributaries total load **exceeds** outlet's transport
 - ↳ **accumulation in the lake**



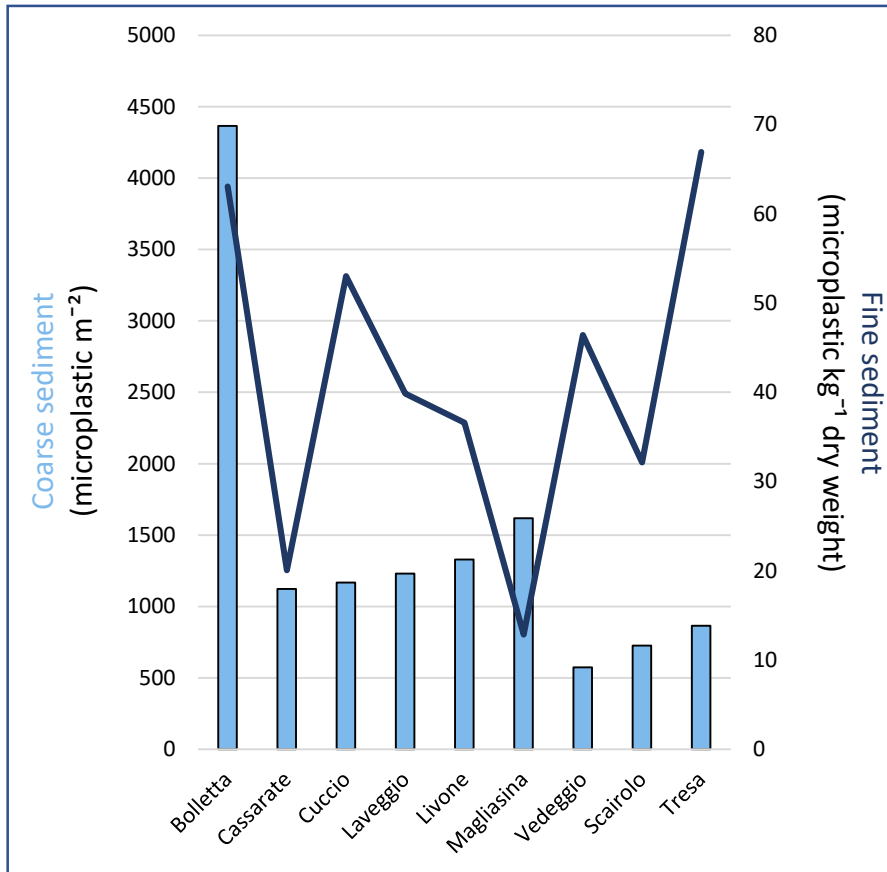
Transport and accumulation in rivers



Average water transport **8.63 MP m⁻³**

- Comparable to **larger rivers**
 - ↳ **relevant transport in small rivers**
- Tributaries total load **exceeds** outlet's transport
 - ↳ **accumulation in the lake**
- **Accumulate** in fine and coarse substrates
 - ↳ **hot spots**

Transport and accumulation in rivers



Small rivers are **key transport system**
from land sources to lakes



**Accumulated particles can be made
accessible due to riverbed
resuspension**



Why is the level of contamination so relevant?

Watershed characteristics?



Smaller volume
High urbanisation
+65% artificial shoreline

Sources of contamination?



No relation with WWTPs
Identify point sources
Estimate diffuse inputs

Environmental conditions?



Sampling representativeness
Effect of weather conditions
Hydro / ecological dynamic

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Grazie per la
vostra attenzione

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