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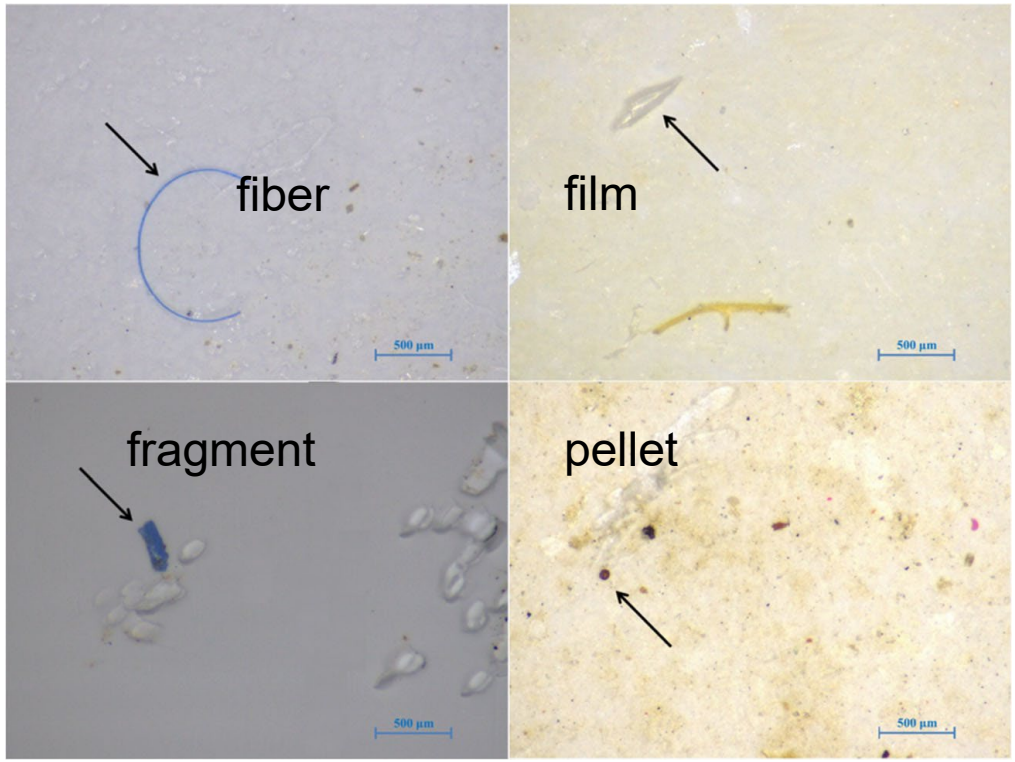
Distribution and sedimentation of microplastics in Taihu Lake

Zhang, Qiji, et al. "Distribution and sedimentation of microplastics in Taihu Lake." Science of The Total Environment (2021):148745.

Background

(tech.sina.com.cn)



(Xu et al., *Environ Sci Pollut R.*, 2020)

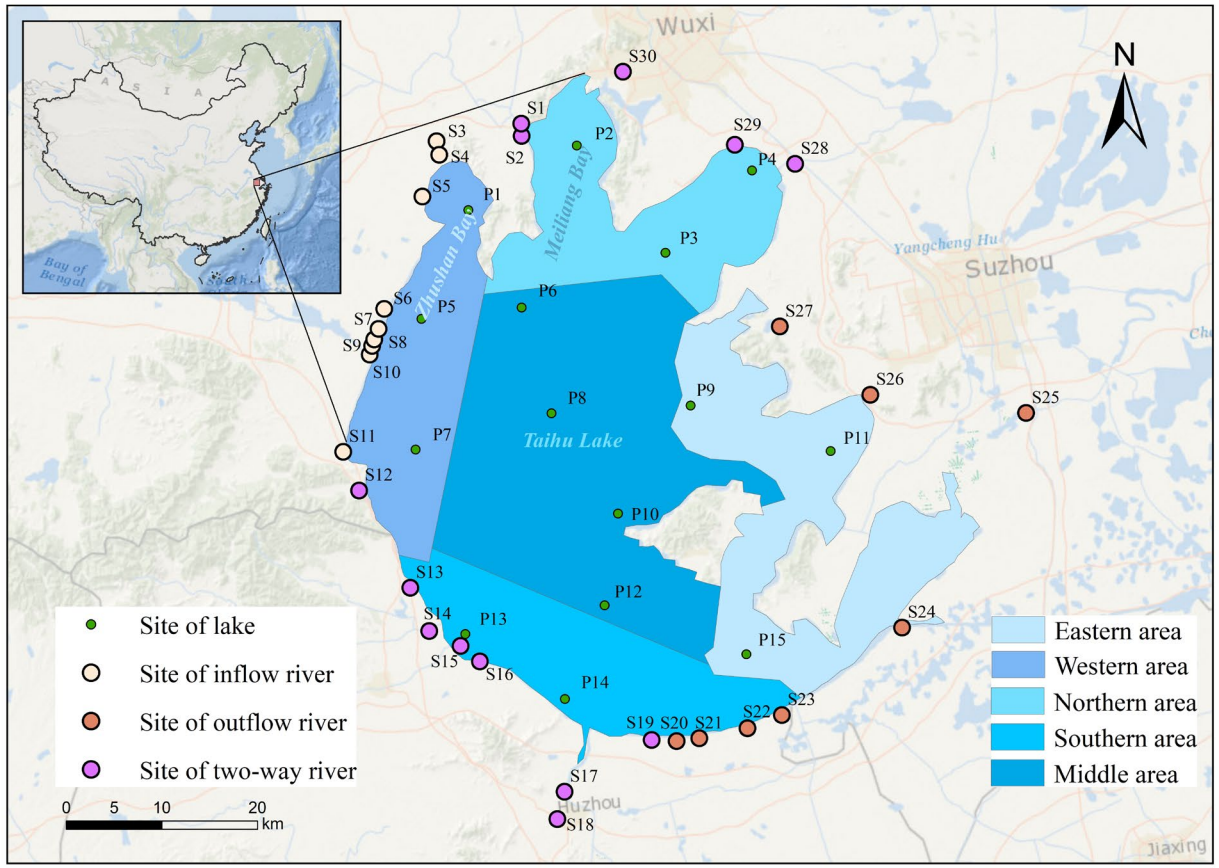
Definition of Microplastics (MPs): Plastic debris < 5mm

Classification of MPs: fragment, pellet, film, fiber, and foam.

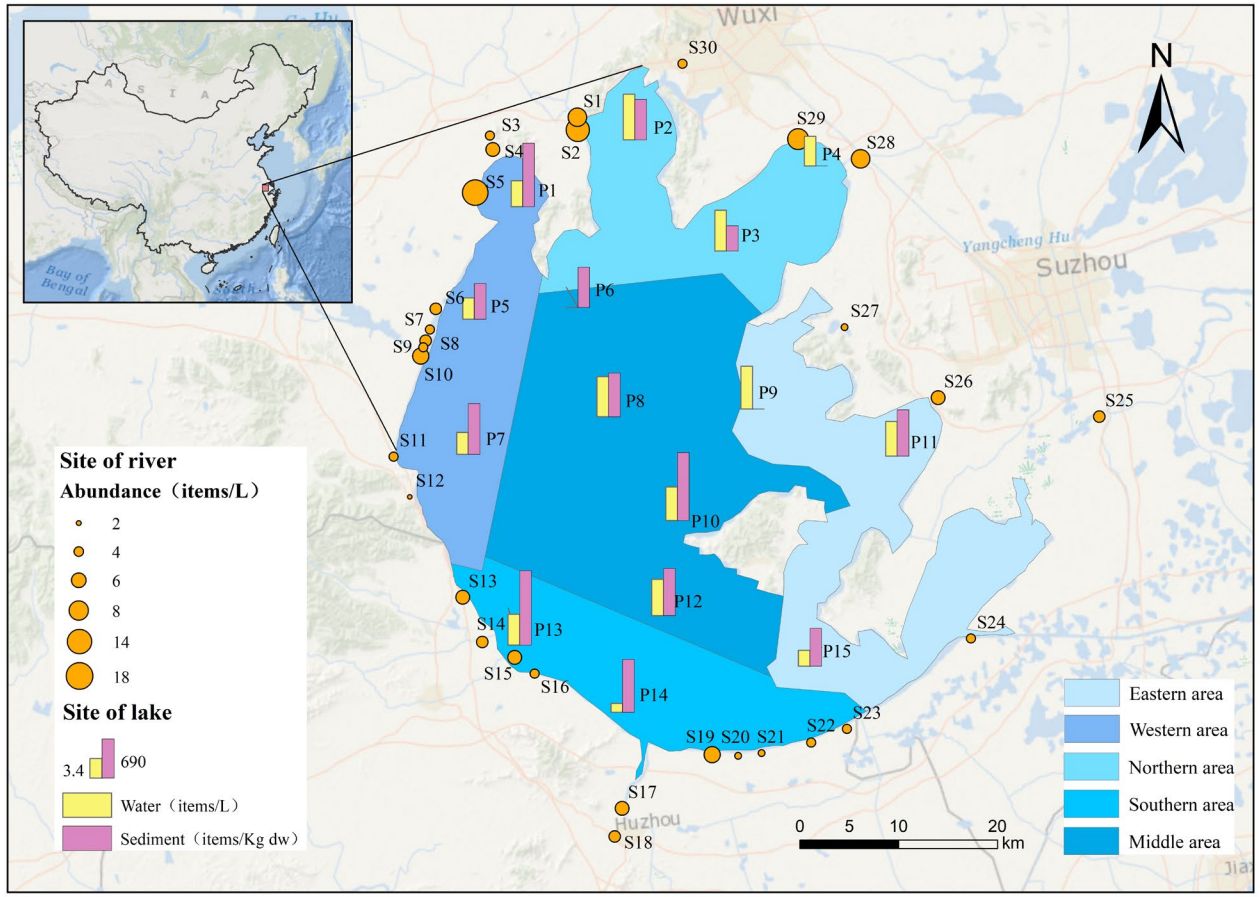
Survey area and sample treatment

◆We surveyed the main 30 main rivers around the lake and 14 sites in lake area.

◆We treated samples via wet peroxide oxidation, and filtered through 20 μm filter paper, then observed under a stereomicroscope.



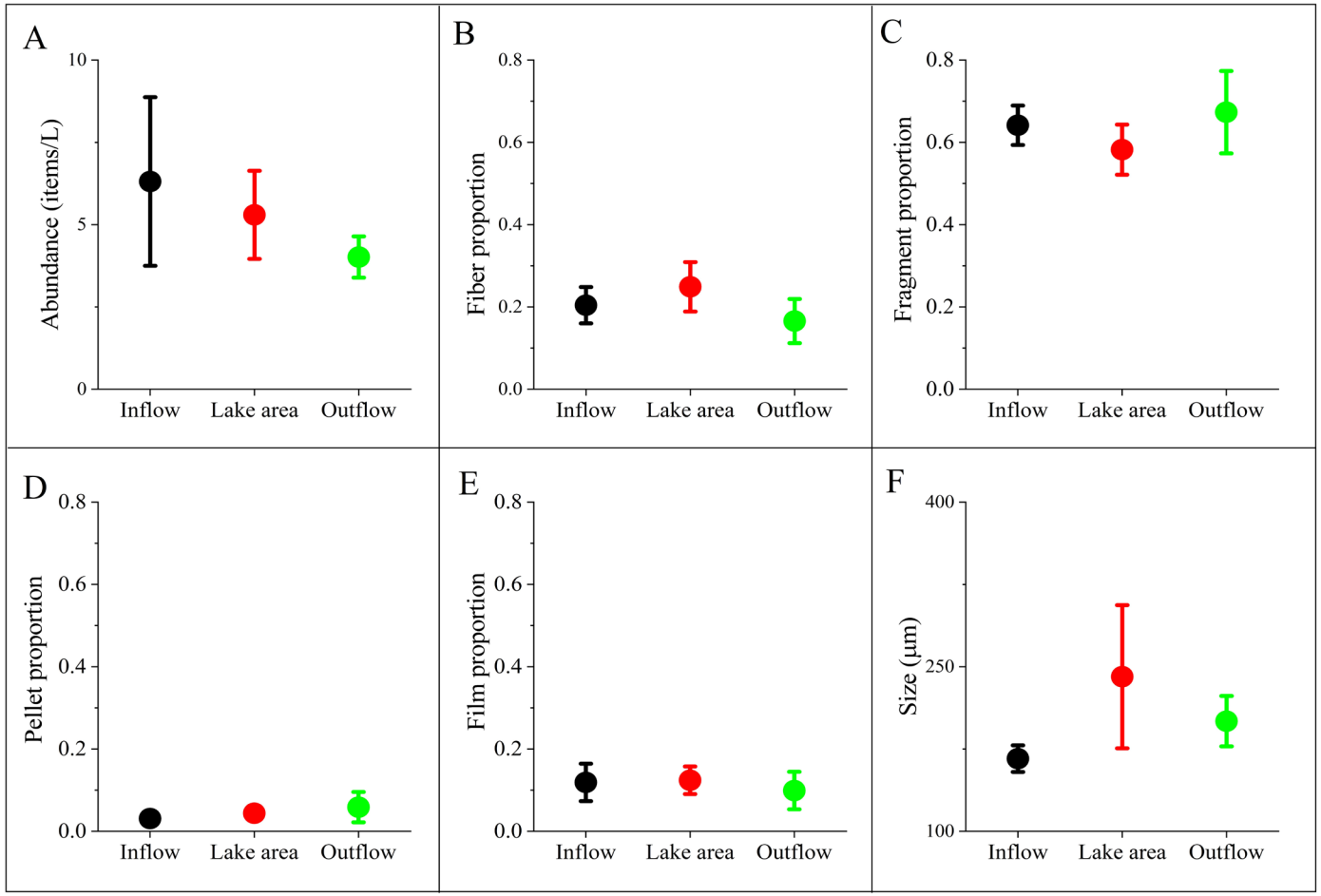
Microplastics pollution levels in the Taihu Basin



◆The abundance of microplastics varied from 2-8 items/L in the surface water of the lake and from 2-18 items/L in the rivers.

◆The abundance of microplastics in sediment varied from 464-1380 items/kg.

Comparison of microplastics in inflow and outflow rivers

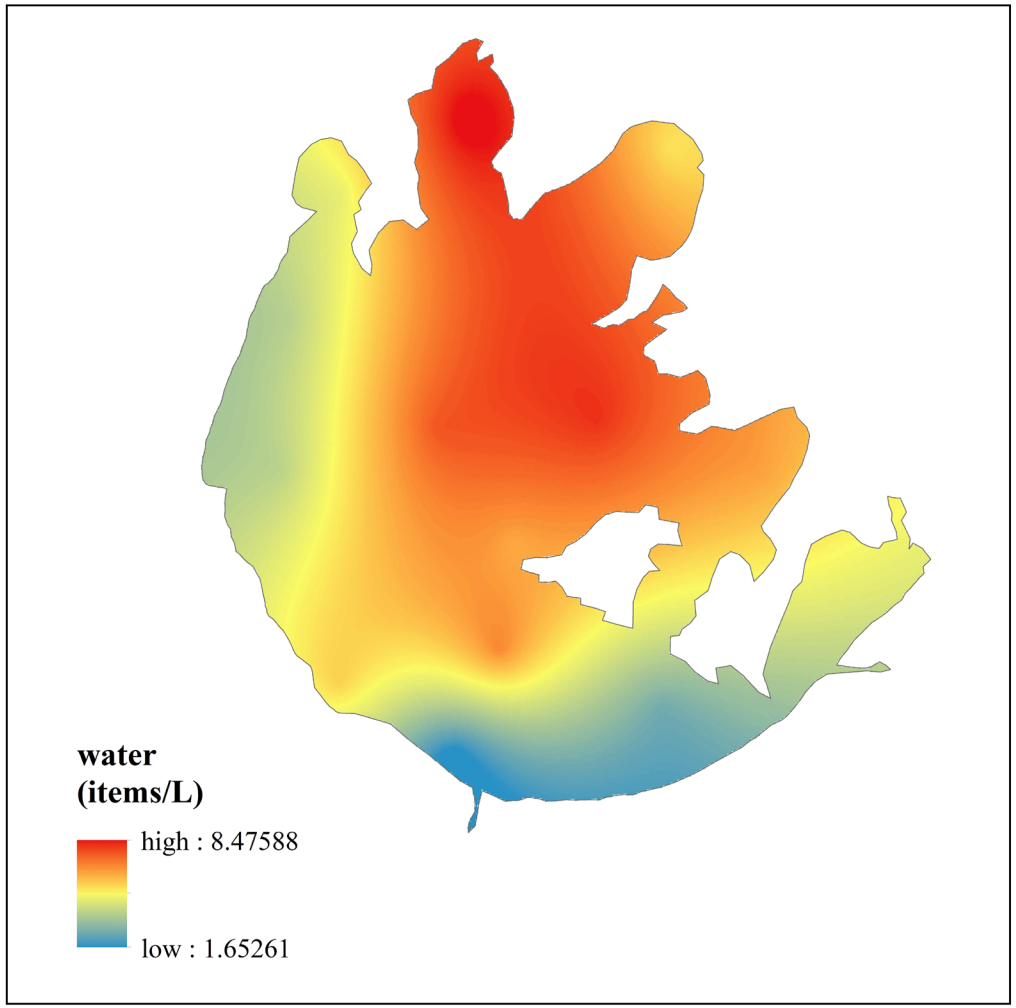


- The average concentrations of inflow rivers were higher than that of outflow rivers.
- The sizes of microplastics in outflow rivers were larger than those in inflow rivers.

Microplastics distribution and characteristics in the lake

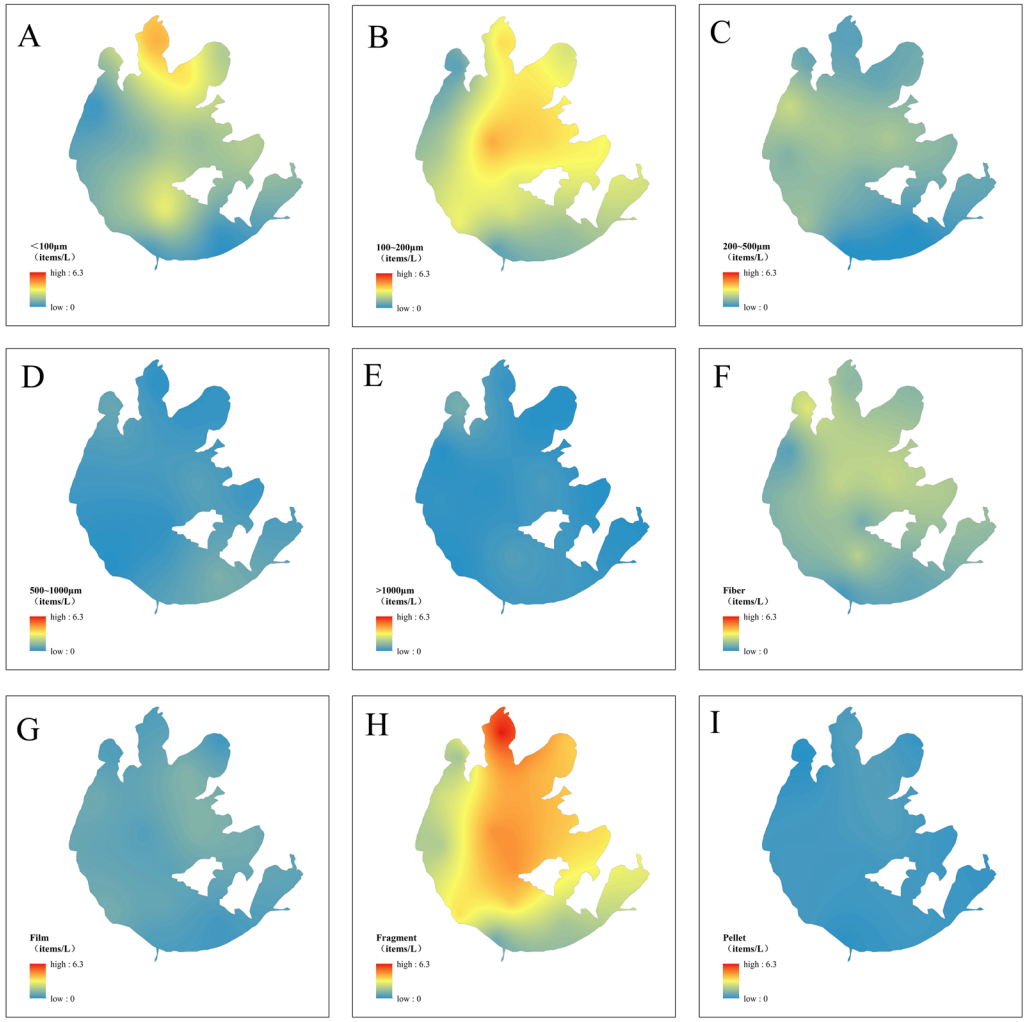
- The concentrations of microplastics in surface water were higher in the northern, eastern and middle part of the lake.

- Microplastics' distribution patterns in a large lake differ from other pollutants.

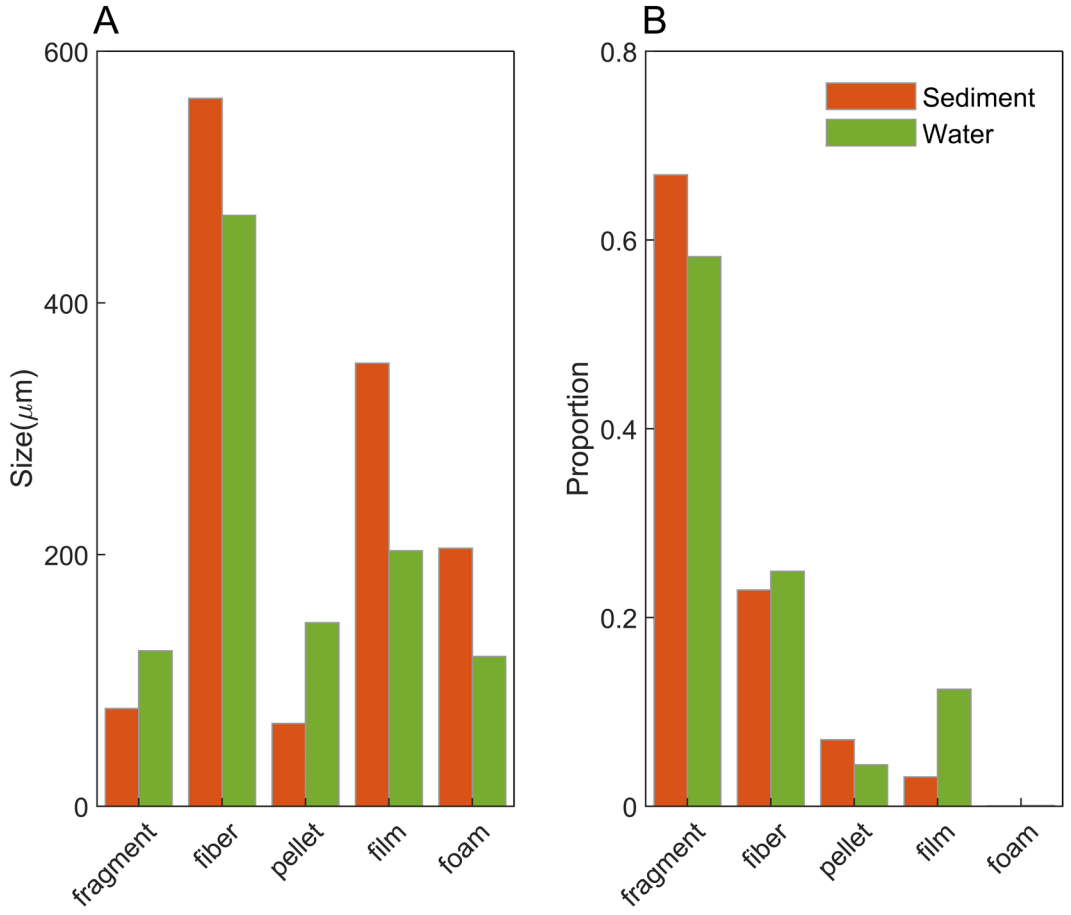


Microplastics distribution and characteristics in the lake

The different distributions of microplastics of different sizes (Fig. A–E) and types (Fig. F–I) resulted from interplay among pollutant sources, densities, etc.



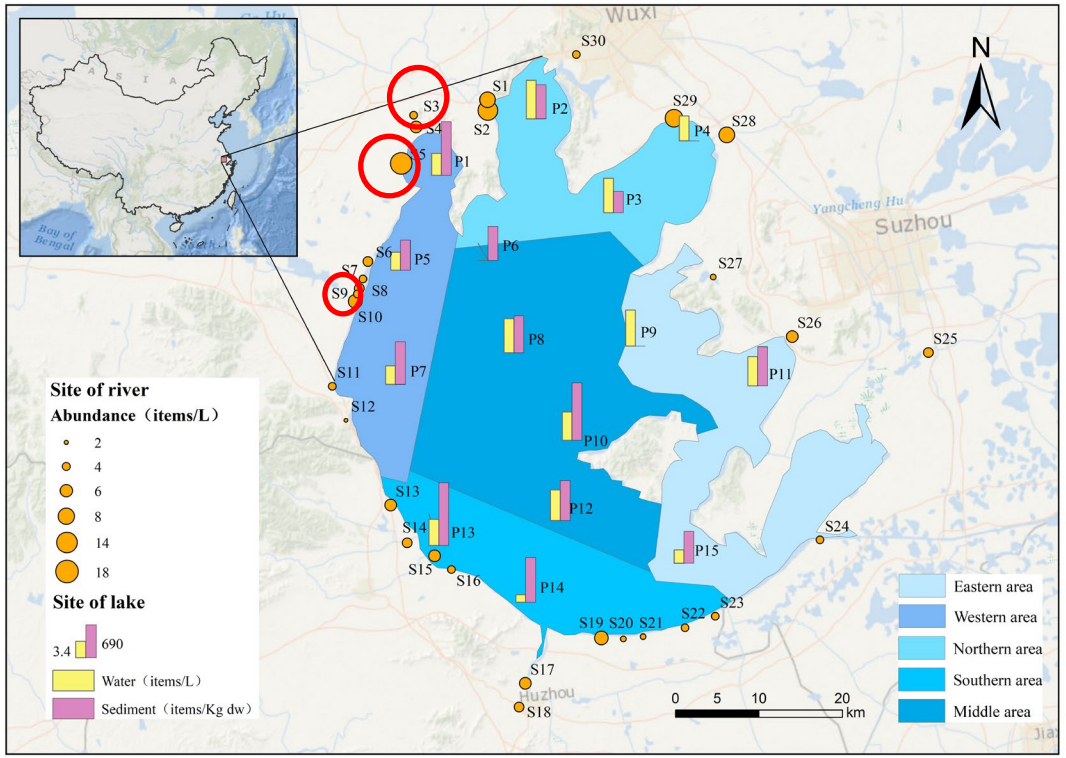
Settling features



- The average size of fragments and pellets in sediment was smaller than that in surface water.
- Fragments and pellets accounted for more in sediment than in the surface water, indicating that small fragments and pellets settled more easily.

Microplastic flux

- Microplastics fluxes: 1.2×10^6 items/s
- River S3, S5, S9 and S10 accounted for 73% of the total inflow fluxes.



Location	Abundance (items/L)	Discharge (m^3/s)	Flux (items/s)	Flux proportion
S1	8.46	1.29	10875	0.88%
S3	**4.03**	**34.77**	**139929**	**11.37%**
S4	5.73	0.66	3784	0.31%
S5	**18.27**	**14.44**	**263727**	**21.42%**
S6	5.05	6.27	31664	2.57%
S7	3.80	7.59	28823	2.34%
S8	4.69	9.74	45657	3.71%
S9	**4.28**	**80.00**	**342667**	**27.83%**
S10	**7.24**	**21.37**	**154683**	**12.56%**
S11	3.70	11.42	42236	3.43%
S15	6.13	4.00	24507	1.99%
S16	4.45	3.39	15086	1.23%
S17	6.21	5.82	36145	2.94%
S28	8.43	1.15	9689	0.79%
S30	3.75	21.80	81750	6.64%
sum		223.68	1231221	100.00%

Summary

- Inflow rivers were more polluted with microplastics compared with outflow rivers.
- The distribution patterns of microplastics in the lake differed from those of other pollutants.
- The small fragments and pellets settled most easily.

Thanks!

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