

# Is soft-sediment ecosystem service delivery compromised due to microplastics?

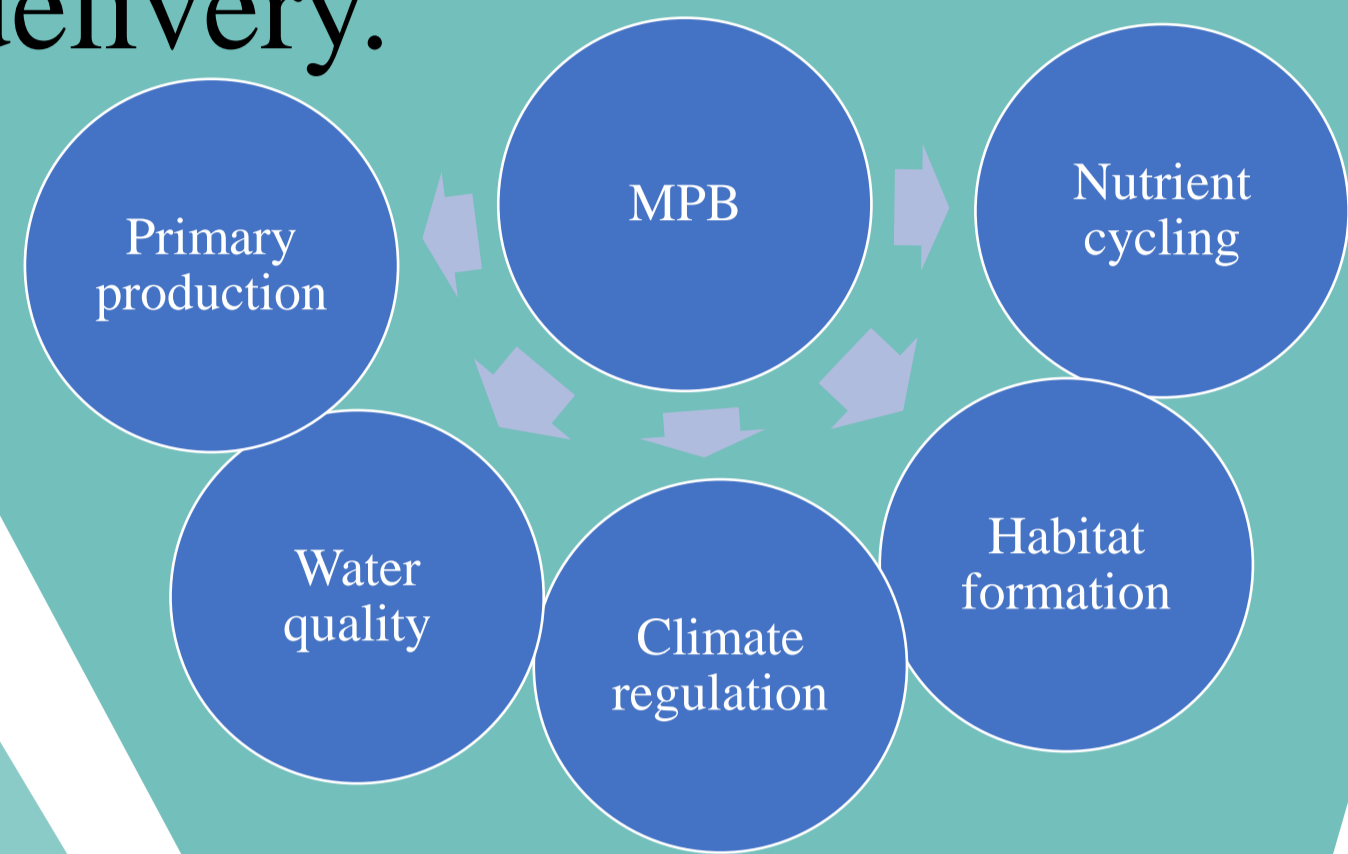


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Coastal and estuarine sediments provide essential ecosystem services, including nutrient dynamics, biogeochemical cycling, primary production and coastal protection. Microphytobenthos (MPB) are the key players to control these ecosystem services. The recently introduced microplastic pollutants are severe in these soft-sediment areas and effects microbial community structure. But there is scant information how this microplastics effect the overall ecosystem service delivery.

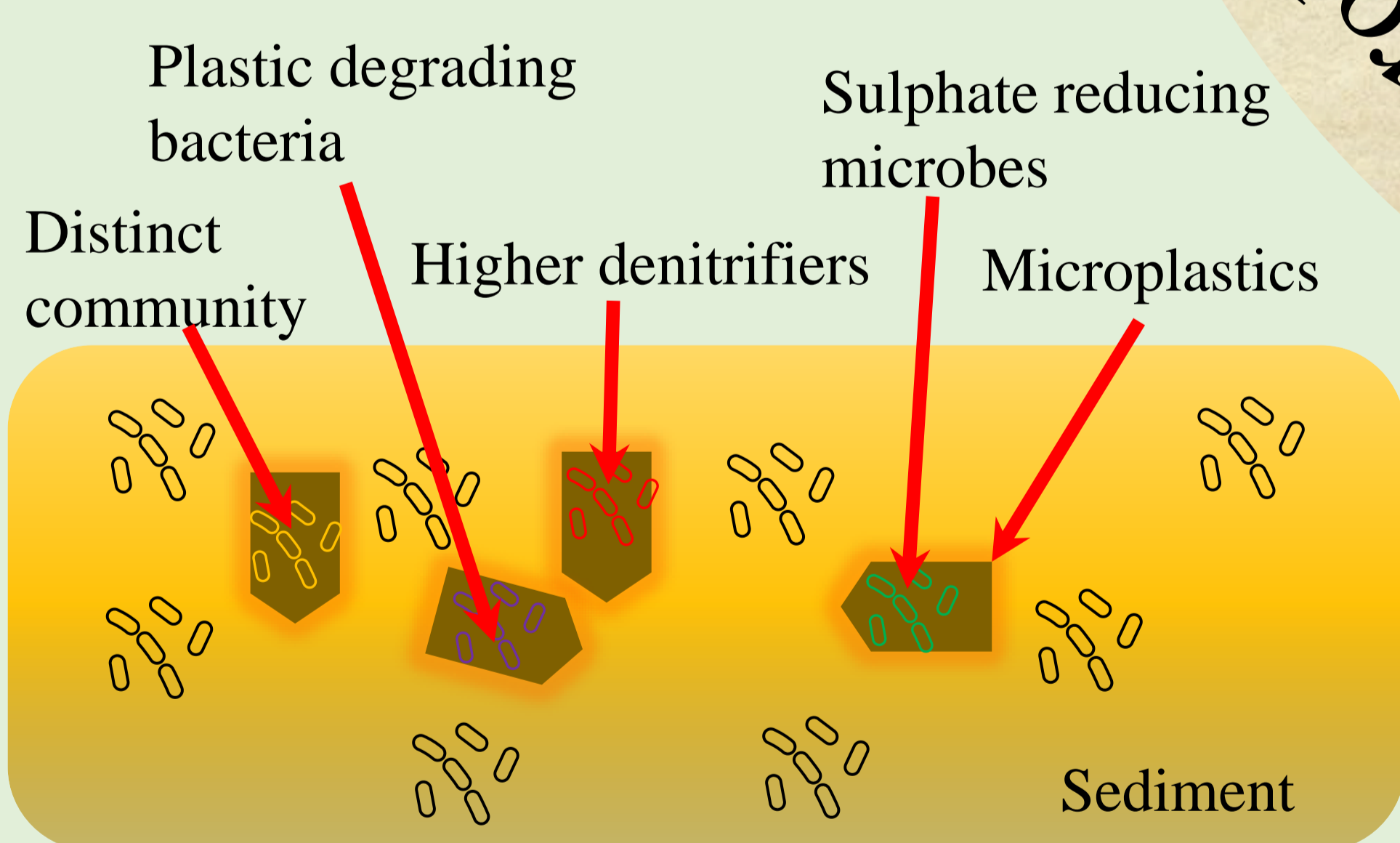


- Due to Carbon based compound plastic may contribute to the Sediment Organic Carbon (SOC) storage<sup>1</sup>.
- Do they provide similar services as innate SOC?

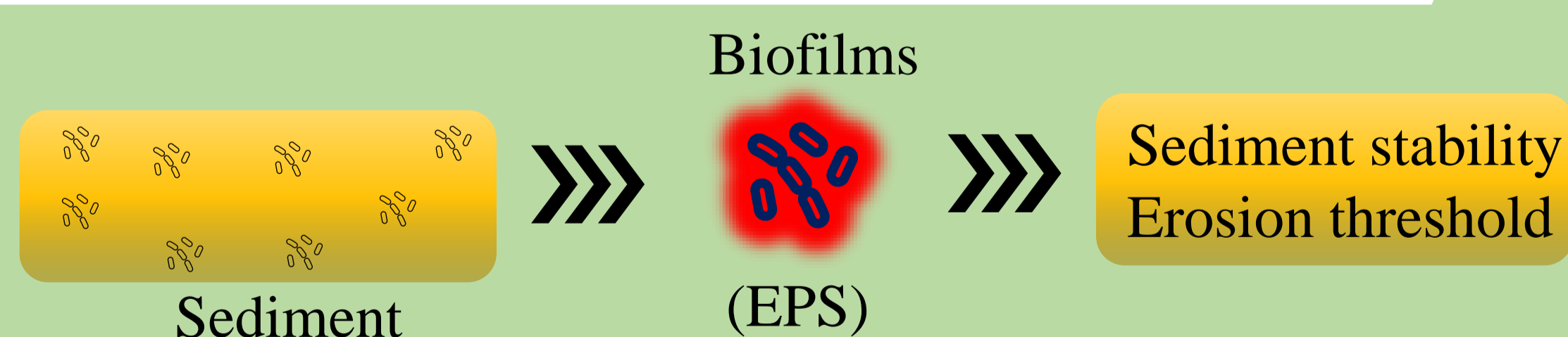
- Microplastics provide substrate for microbial growth.<sup>2</sup>



- Plasticsphere possess distinct microbial community.<sup>2</sup>



- SOC could be a substrate for the production of extracellular polymeric substances (EPS).<sup>3</sup>
- EPS significantly bind sediment particles and subsequently impact sediment stability.<sup>3</sup>

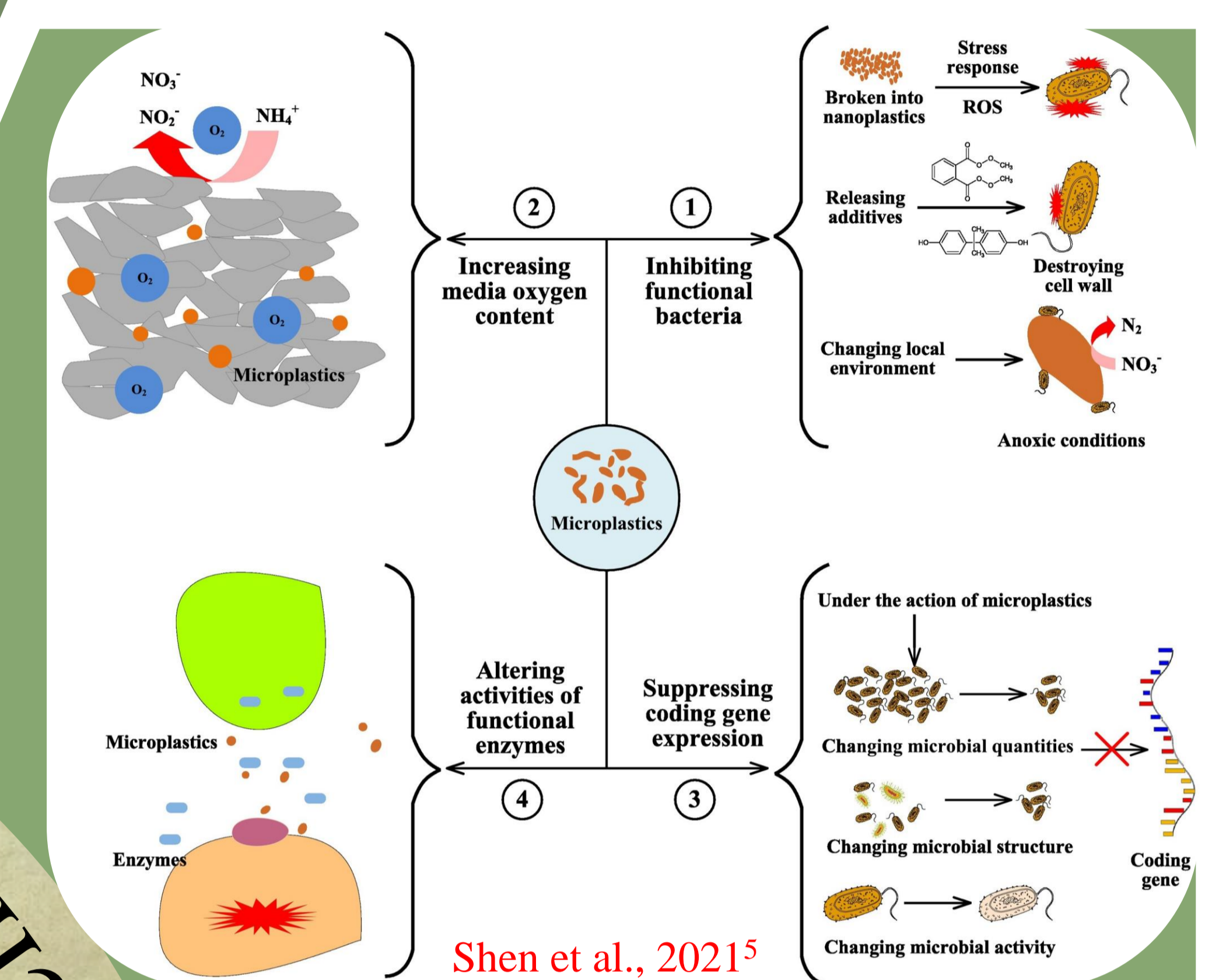


## Abstract

## Conclusion

- Plastic provide organic carbon in the sediment. Do they provide similar ecosystem services?
- Plastic effects microbial community. What is the long term impact on microbial EPS and stability?
- Plastics impacts C and N cycling, do they impact climate change mitigation potential?

- Coastal sediments are the hotspot of microplastic pollution as they receive microplastics from both offshore and terrestrial ecosystems.
- Habitat forming species have ability to trap microplastics through particle trapping mechanism.

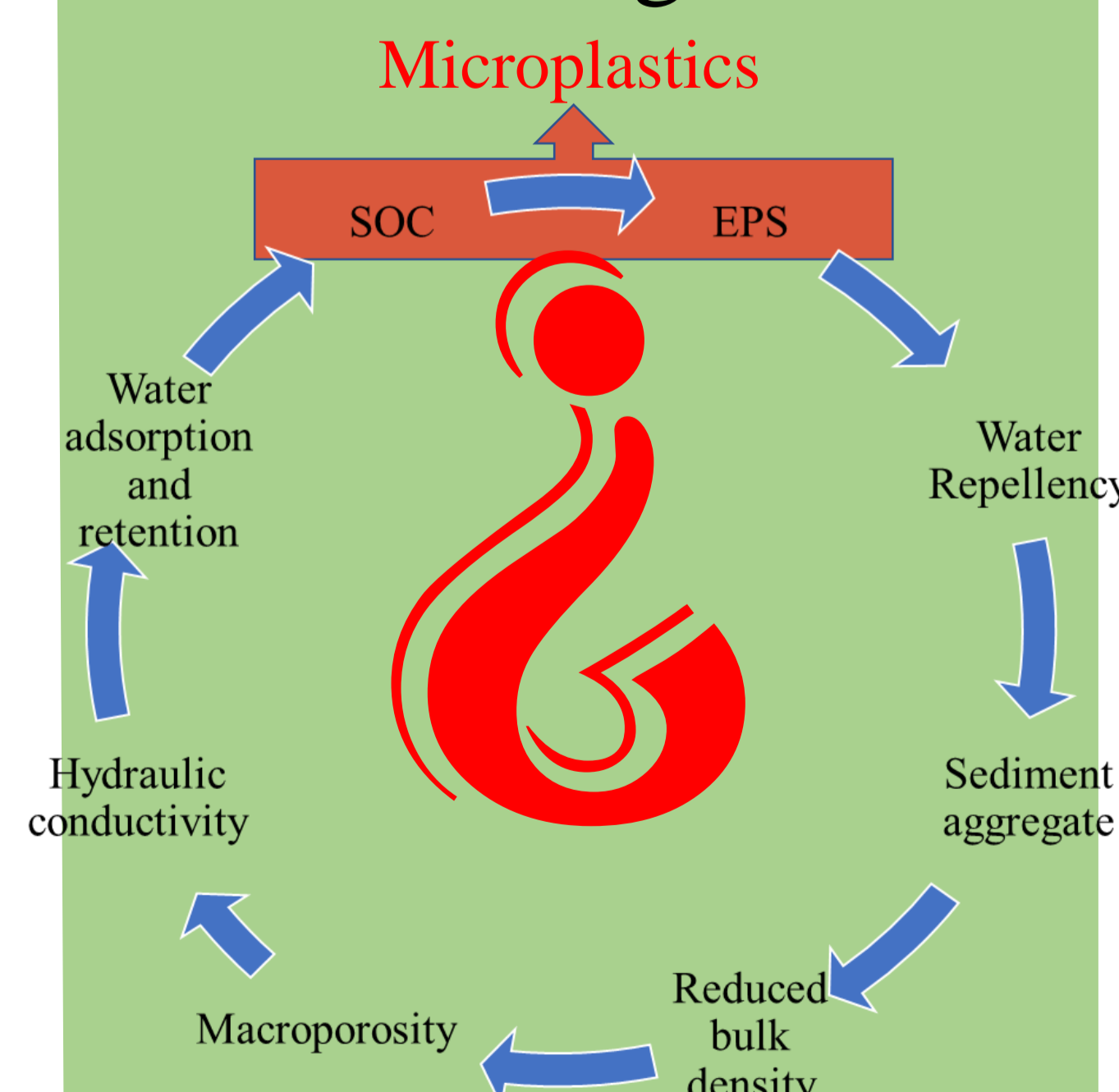


- Effect microbial community and nitrogen cycling<sup>6</sup>
- Facilitate Denitrifiers and emits N<sub>2</sub>O from sediment<sup>6</sup>

- Biodegradable plastics produced a two-fold CO<sub>2</sub> release to the water column<sup>7</sup>
- Biodegradable plastics effect C and N cycle more intensely than conventional plastics<sup>7</sup>
- Microplastic decomposition emits GHGs from the bottom sediment<sup>8</sup>

## EPS

Microplastic triggers the secretion of protein-rich EPS in microalgae.<sup>4</sup>



- A link with microplastics and climate change mitigation and adaptation is missing.

## References

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