Ocean plastic cleanups need a global framework with science-based criteria

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Responding to a Science News story, Zouxia Long argues we should "Begin ocean garbage cleanup immediately" (*1*) since removal outweighs direct impacts on organisms or species. This notion is unsubstantiated, and overlooks the potential long-term loss of ecosystem function and biodiversity from non-selective plastic removal technologies (PRTs), such as by-catch mortality (*2-7*), if implemented on the necessary scale. Long argues that harm to species cannot justify postponing cleanups because they are widespread and populations cannot be reduced by PRTs. However, neustonic species and their population dynamics are poorly known (*7*). A single Ocean Cleanup net could affect 675 tons of zooplankton annually (*5*). While Long dismisses defaunation and species loss, ecology is replete with examples of how losing key species reverberates through ecosystems (*8*). Long grossly underestimates the difficulty of making PRTs efficient and scalable (*5, 6*), for example, 200 Ocean Cleanup

devices, operating for 130 years, would capture only 5% of the world's floating plastics (*9*). Towed by two large ships each, the activities could release significant CO_2, especially if non-recyclable material is subsequently incinerated.

Long argues that delaying cleanup leads to further accumulation of ocean plastics. It is the exponential growth in plastic production (*10*), not delayed removal, that drives increasing marine plastic pollution, underscoring the importance of reducing global plastics production (*11*). During accelerating marine extinction (*8, 12*), there is an urgent need for global science and precautionary criteria to assess the necessity, safety, sustainability, and efficiency of PRTs to avoid greenwashing practices with regrettable outcomes. The alternative is to redirect investment from ineffective and potentially harmful PRTs to effectively reducing production and pollution. Habitats and ecosystems, where remediation can be done safely, should be prioritized. To minimize adverse impacts and prevent further pollution, remediation should be conducted near sources of release and be independently and regularly monitored.

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