RESEARCH ARTICLE SUMMARY

ENVIRONMENTAL POLICY

Plastic bag bans and fees reduce harmful bag litter on shorelines

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INTRODUCTION: Plastic pollution has become a global problem, constituting the majority of marine litter, threatening wildlife, and damaging ecosystems. Among the most common and troublesome categories of marine litter are thin plastic shopping bags, which often evade waste management by floating away in the wind and can entangle or block the digestion of marine animals. Plastic bag bans and fees have emerged as popular policy solutions to address this problem, with >100 countries passing such regulations. Although research has shown that these policies can reduce plastic consumption in some settings, their effectiveness in reducing plastic litter in the environment has not been systematically evaluated. This question is gaining urgency as some US states move to prohibit bag policies, even as 175 countries are in talks to create the first global plastics treaty.

RATIONALE: Whether a plastic bag policy succeeds in reducing shoreline litter depends on how it affects both consumption and waste management. For instance, a partial ban could fail to reduce plastic consumption but still reduce litter if customers substitute thin bags for thicker ones that are less likely to blow away. Or it could reduce consumption but not litter if the bags most likely to become litter are exempted from the ban. To directly measure the impacts of policies on plastic litter in the environment we leveraged the patchwork of hundreds of state and local plastic bag policies that were adopted across the United States between 2017 and 2023. We combined this with crowdsourced citizen-science data from >45,000 shoreline cleanups, in which participants counted and categorized the items they found. Our research design allowed us to control for the share of plastic bag litter in shoreline cleanups before and after each policy's implementation as well as plastic bag litter trends from places that do not have a policy.

RESULTS: Although plastic bags' share of cleanup items increased in general over the study period, it increased by markedly less in areas with bag policies. We find that plastic bag policies lead to a 25 to 47% decrease in plastic bags as a share of total items collected relative to areas without policies. This relative decrease grows in magnitude over time after policy implementation, with no evidence of rebound or spillover effects. Both full plastic bag bans and fees reduce plastic litter, whereas partial bans lead to the smallest and least precise effects, likely owing to exemptions for thicker plastic bags. Policies at all geographic scales are effective, with state-level policies being the most robust. Bag policies yield similar effects along coasts and rivers, with suggestive evidence for larger effects along lakes. They have the greatest impact in places where plastic bag litter is most prevalent. Lastly, we find an imprecise 30 to 37% reduction in the presence of entangled animals in areas with plastic bag policies, although we cannot rule out a null effect.

CONCLUSION: Our findings demonstrate that plastic bag policies have been widely effective in limiting—but not eliminating—shoreline plastic bag debris in areas where it was previously prevalent. If the sample used in our analysis is representative, then expanding plastic bag bans or fees would continue to decrease plastic bag litter and potentially wildlife entanglement compared with business as usual. With waste generation projected to increase, plastic debris entering waters will remain an important global problem in the absence of large-scale policy shifts. □

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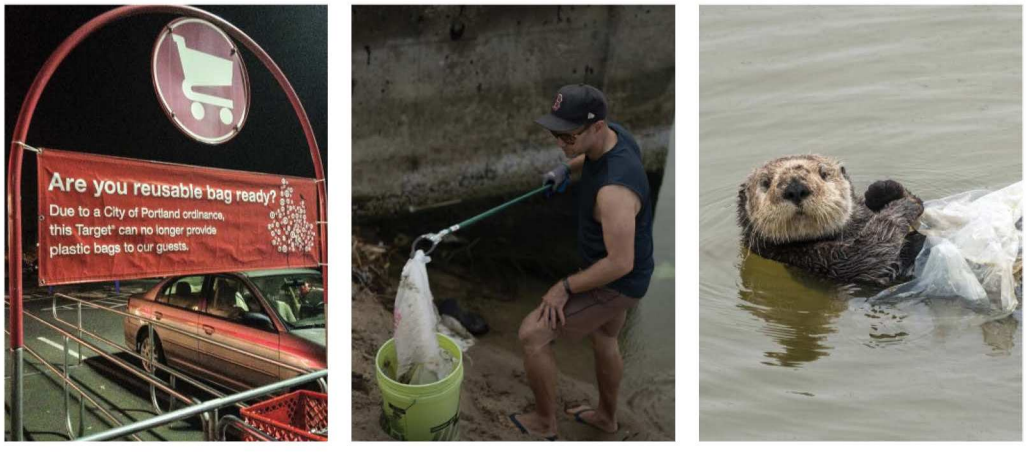

The effects of plastic bag laws on plastic litter in the environment. Plastic debris poses a threat to wildlife and ecosystems. Using data on US policies and cleanups, we show that plastic bag bans and fees limit shoreline plastic bag debris. [Photos (left to right): Tony Webster, 2012, Portland, OR, USA, CC BY 2.0 license; Val Vega, 2023, Los Angeles, CA, USA, courtesy of Ocean Conservancy; Douglas Croft, 2017, Monterey, CA, USA, courtesy of Ocean Conservancy]