Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds

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BREN SCHOOL OF ENVIRONMENTAL SCIENCE & MANAGEMENT
# Significance of Plastic Debris

<table>
<thead>
<tr>
<th>Introduction</th>
<th>Findings</th>
<th>Actions</th>
<th>Conclusion</th>
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<tbody>
<tr>
<td>Presence of plastics in the environment is ubiquitous</td>
<td>Wind and circulation patterns move plastic debris to ocean gyres</td>
<td>Plastic production is on the rise</td>
<td>Population density is positively correlated with increased plastic debris</td>
</tr>
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The Impacts of Plastic Debris

Consumption

Entanglement
Additional Impacts

- Inhibition of sea floor processes
- Transport of invasive species
- Decreased tourism
- Cleanups are expensive

Source: sea.edu
Emerging Impacts

Airplane Search Sheds Light On Massive Marine Pollution

"Any search and rescue attempt will be hampered by untold quantities of debris" - Charles Moore
The Sources of Plastic Debris

<table>
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<tr>
<td>~50% of trash entering the ocean is from land-based sources</td>
</tr>
<tr>
<td>~50% of that trash is plastic</td>
</tr>
<tr>
<td>~50% of all trash found in beach and river cleanups is plastic</td>
</tr>
<tr>
<td>~50% of all trash is single-use packaging</td>
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</table>
Conduct an analysis of plastic debris in the Los Angeles and San Gabriel River Watersheds and recommend policies to reduce this debris.
Objectives

- Background Investigation
- Literature Review
- Quantitative Analyses
- Policy Recommendations
Objectives: Policy Recommendations
Plastic Debris Quantity in Study Region

Introduction | Findings | Actions | Conclusion
---|---|---|---

Bar chart showing the percent of plastic in three different study regions: Bight Monitoring, Fullerton Monitoring, and City of LA Monitoring. The chart includes bars for both 'Open' and 'Urban' categories.
Three Common Types of Plastic Debris

**Litter**
- Often single-use plastic
- Can breakdown into <5 mm pieces, especially polystyrene

**Preproduction Plastic**
- 1 to 5 mm plastic used in manufacturing

**Microplastics**
- <1 mm plastics used in cosmetics and clothes

Sources: myplasticchallenge.com, ptmsc.org, nationalgeographic.com
People Litter – A Lot!

Los Angeles County (2007) found that, in just one month, litter:

- Is thrown on the ground or out of a car 830,000 times
- Blows onto a street more than 800,000 times
- Ends up in a storm drain close to 280,000 times
- LA Police Department gives out ~7,000 tickets per year
Plastic Debris Characterization in the Watersheds

Most Common Types of Plastic Debris

- Cigarette Butts: 45%
- Plastic Bags: 35%
- Polystyrene: 25%
- Food Packaging: 10%

Type of Plastic

 percent of plastic composition
Zero Trash TMDLs are Hit or Miss

Los Angeles River Watershed Trash TMDL
- Catch basin inserts reduce plastic debris
- Inserts miss <5 mm debris
- 25% of cities not in compliance with TMDL

East Fork San Gabriel River Trash TMDL
- Recent trash collection shows high amounts of plastic debris

Legg Lake Trash TMDL
- No annual reports submitted since 2008

Source: stormtekcps.com
# Three Common Types of Plastic Debris

## Litter
- Often single-use plastic
- Can breakdown into <5 mm pieces, especially polystyrene

## Preproduction Plastic
- 1 to 5 mm plastic used in manufacturing

## Microplastics
- <1 mm plastics used in cosmetics and clothes

Sources: myplasticchallenge.com, ptmsc.org, nationalgeographic.com
Facilities use preproduction plastic

- Spills are common and accepted within the industry
- Industry is dominated by small volume producers (< 1 million pounds per year)

Operation Clean Sweep

- Only 13% participation rate in California
- Only 8 facilities in LA River Watershed and 4 facilities in SG River Watershed

Source: California State Water Board
### Three Common Types of Plastic Debris

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<td>Litter</td>
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<td>• 1 to 5 mm plastic used in manufacturing</td>
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Sources: myplasticchallenge.com, ptmsc.org,, nationalgeographic.com
## Microplastics are an Emerging Concern

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<td>&lt;1 mm and used in cosmetics and clothes</td>
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<tr>
<td></td>
<td>Discharged from wastewater treatment plants</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Assumed to end up in biosolids, but fate is unknown</td>
<td></td>
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Source: motherjones.com
## Actions to Reduce Plastic Debris

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<th>Industry</th>
<th>Agency</th>
<th>Consumer</th>
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<td>• Better Plastic Facility Tracking</td>
<td>• Develop a Comprehensive San Gabriel River Watershed TMDL</td>
<td>• Litter Law Enforcement and Education</td>
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<td>• Improved Data Collection</td>
<td>• Amend LA River Watershed TMDL</td>
<td>• Bans (Plastic Grocery Bags and Polystyrene)</td>
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<td>• Extended Producer Responsibility</td>
<td>• Enact Comprehensive Statewide Legislation</td>
<td>• Single-Use Plastic Reduction</td>
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<tr>
<td>• Operation Clean Sweep Program Improvements</td>
<td>• Trash Boom Improvements</td>
<td>• Increased Recycling Efforts</td>
</tr>
<tr>
<td>• Incentivize Packaging Innovations</td>
<td>• Declare Plastic as a Hazardous Substance</td>
<td></td>
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<tr>
<td>• Develop Marine Biodegradable Plastics</td>
<td>• Address Homeless Encampments Litter</td>
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**Introduction**

**Findings**

**Actions**

**Conclusion**
Actions to Reduce Plastic Debris

Tier 1
1) Litter Law Enforcement & Education
2) Bans (Polystyrene and Plastic Bags)
3) New San Gabriel River TMDL
4) Single-Use Plastic Reduction
5) Better Plastic Facility Tracking

Tier 2
6) Amend LA River TMDL
7) Better Data Collection
8) Extended Producer Responsibility
9) Increased Recycling Efforts
10) Improved Operation Clean Sweep

Tier 3
11) Incentivized Packaging Innovations
12) Address Homeless Encampments
13) Enact Statewide Legislation
14) Trash Boom Improvements
15) Declare Plastic as Hazardous
16) Marine Biodegradable Plastics
Litter Law Enforcement and Education is a High Priority

Implement civil administrative penalty enforcement

Educational outreach – Erase the Waste Campaign

Source: California Water Boards. From the Erase the Waste Campaign
# Ban Single-Use Plastic Bags and Polystyrene

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## Single-use plastic bag bans
- Already banned in 87 cities in California
- Three states considering bans - California, Massachusetts, and Washington

## Single-use polystyrene (e.g., Styrofoam™) bans
- Already banned in 33 cities in California

Source: Miramar Landfill utsandiego.com
Implement San Gabriel River Watershed Trash TMDL

Introduction of a Comprehensive Zero Trash TMDL

Include monitoring for effectiveness and for improvement
Reduce Single-Use Plastic

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<th>CRV Eligible Items</th>
<th>Not Eligible Items</th>
</tr>
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<tbody>
<tr>
<td>Wine coolers and distilled spirit coolers</td>
<td>Milk jugs</td>
</tr>
<tr>
<td>Carbonated fruit drinks, water or soft drinks</td>
<td>Medical food</td>
</tr>
<tr>
<td>Coffee and tea beverages</td>
<td>Infant formula</td>
</tr>
<tr>
<td>100% fruit juice less than 46 oz.</td>
<td>Wine</td>
</tr>
<tr>
<td>Vegetable juice 16 oz. or less</td>
<td>Spirits</td>
</tr>
<tr>
<td>Sports drinks</td>
<td>100% vegetable juice more than 16 oz.</td>
</tr>
<tr>
<td></td>
<td>Food and other non-beverage containers</td>
</tr>
</tbody>
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Assess Point-of-Sale Fees on Common Litter Items

Expand Items Covered Under the California Redemption Value Program (CRVs)

Source: CalRecycle.com
Collect Better Business License Information to Track Industry

Gather industry information on which facilities handle preproduction plastic

Compile a shared database between cities and regional water boards

Do you handle preproduction plastic materials?
Interviews, literature review, site visits, and data analyses demonstrate the magnitude, sources, and types of plastic debris.

A suite of approaches is needed now to reduce plastic debris.

Plastic reduction can result in healthier ecosystems and economies.

Onsite visit to San Gabriel River with advisor Derek Booth
Source: Michael Mori
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The Bren School
Faculty and Staff
Plastic Debris Conceptual Model

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