Plastic Inputs into the Ocean: Global Overview and The Arctic

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Humans have created about 8.3 billion metric tons of plastics to date, outgrowing all man-made materials other than steel and cement.

The rapid rise of plastics
A world without plastics seems unimaginable today, yet their large-scale production and use only dates back to around 1950.

HOW HEAVY IS 8.3 BILLION METRIC TONS?

How heavy is 8.3 billion metric tons?

- Empire State Building: 25,000 metric tons (331,000 tons)
- Eiffel Tower: 822,000 metric tons (20,000 tons)
- Blue Whale: 80 million metric tons (104.5 tons)
- Elephant: 1 billion metric tons (7.5 tons)

1 million metric tons (Mt) = 1.1 million tons

GLOBAL PLASTIC PRODUCTION ESTIMATES

<table>
<thead>
<tr>
<th>Year</th>
<th>Metric Tons</th>
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<tbody>
<tr>
<td>1950</td>
<td>2M</td>
</tr>
<tr>
<td>2017</td>
<td>8.3B</td>
</tr>
<tr>
<td>2050</td>
<td>34B</td>
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TOTAL PLASTIC WASTE

Plastic waste can be recycled, incinerated or discarded where it accumulates in landfills and the natural environment.

Combined sewers carry sewage as well as storm water. During heavy rains, the handling capacity of the wastewater treatment system may be exceeded, resulting in the sewage and storm water not being treated, and are directly discharged into nearby rivers or oceans.

Run-off from landfills that are located in coastal areas or near to rivers may find its way into the marine environment.

Rubbish from streets can be washed into storm drains and is then discharged straight into the ocean or to streams which, in turn, may carry the rubbish to the ocean.

Beachgoers may carelessly leave litter at the coast. Food packaging and beverage containers, cigarette butts, and plastic beach toys will become marine debris.

Plastics and microplastics are often mistaken for food. Toxic substances enter the food chain and toxicity is amplified by bioaccumulation.

Plastic debris floating on the oceans provides a raft surface for organisms leading to potential expansion of invasive species.

Commercial fishermen generate marine debris when they fail to retrieve fishing gear or when they discard fishing gear or other rubbish overboard.

Marine debris injures or kills marine mammals, sea turtles, seabirds, and other organisms due to entanglement or ingestion.

Rubbish from vessels may be accidentally released or blown into the water or may be deliberately thrown overboard.

Boaters may deposit garbage overboard.

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Plastic Waste Input

8 Million Metric Tons is equal to 5 grocery-sized bags of plastic for every foot of coastline in the world – that is what is going in every year.

Mitigation options:
- Reduce plastic in waste stream
- Improve solid waste management infrastructure
- Increase capture

6.35-245 thousand metric tons**

8 Million metric tons of plastic waste goes into the ocean

Generated by 2 billion people within 50 km (30 miles) of the coast

Plastic Europe. “Plastics—The Facts 2013” (plasticsfacts.org)
Oliver et al. 2014; Ekstrom et al. 2014

Graphic by Lindsay Robinson/University of Georgia
Where is the missing plastic?
Influencing Factors... Currently?
Strategic Intervention Framework to Reduce Plastic Pollution

1. **REDUCE PLASTIC PRODUCTION**
   - Industry led or reduce demand

2. **INNOVATIVE MATERIALS & PRODUCT DESIGN**
   - Green engineering, circular economy

3. **REDUCE WASTE GENERATION**
   - Reusable items, sharing / collaborative economy

4. **IMPROVE GLOBAL WASTE MANAGEMENT**
   - Context-sensitive Solid Waste management infrastructure

5. **IMPROVE LITTER CAPTURE**
   - Litter capture and clean-up

6. **REDUCE INPUT CONCENTRATIONS (ZERO GOAL)**

**Marine DEBRIS TRACKER**

**Together, we can use data to understand the problem and move towards solutions.**

**Citizen Science.** With the Debris Tracker app, anyone can categorize litter they see on the ground and contribute data to a free online database showing litter around the world.

Over 2 million items logged.
Circularity Assessment Protocol

Influencers
NGOs • Academia
Citizens • Industry
Government

Policy
Governance
Economics

Input
Leakage

Consumers

End of Cycle
Collection

Product Design
Use