

Global Challenges of Plastic Pollution

Stories of Plastics, Cities and the Circular Economy



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GLOBAL PLASTIC PRODUCED

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

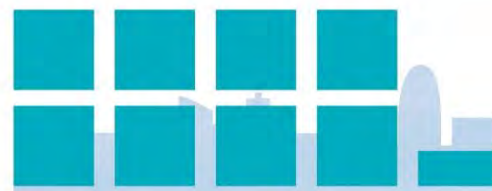
2M METRIC TONS



1950

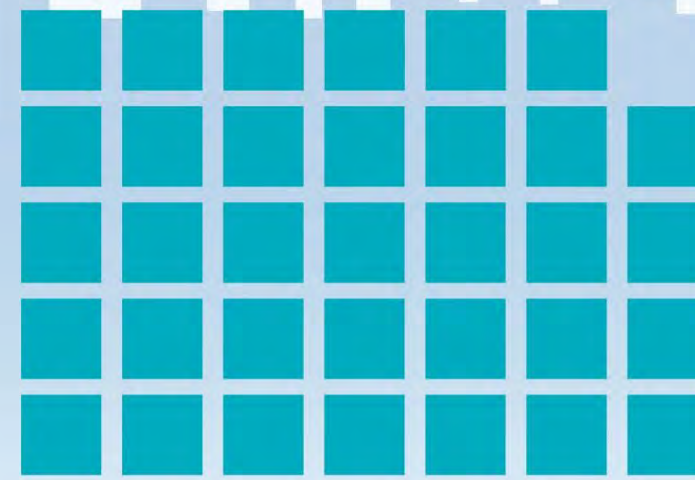
8.3B METRIC TONS

2015



2000

34B PROJECTED METRIC TONS



2050

PLASTIC WASTE

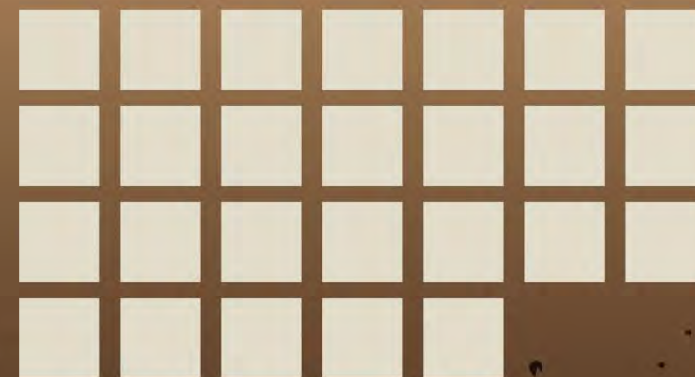
Plastic waste can be recycled, incinerated or discarded where it accumulates in landfills and the natural environment.

2015

6.3B METRIC TONS



26B PROJECTED METRIC TONS



9%

Recycled



12%

Incinerated



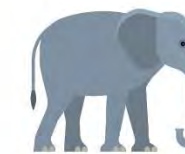
79%

Accumulated in landfills & natural environment



HOW HEAVY IS 8.3 BILLION METRIC TONS?

1 million metric tons (Mt) = 1.1 million tons



1,000,000,000 X
ELEPHANTS
(7.5 tons)

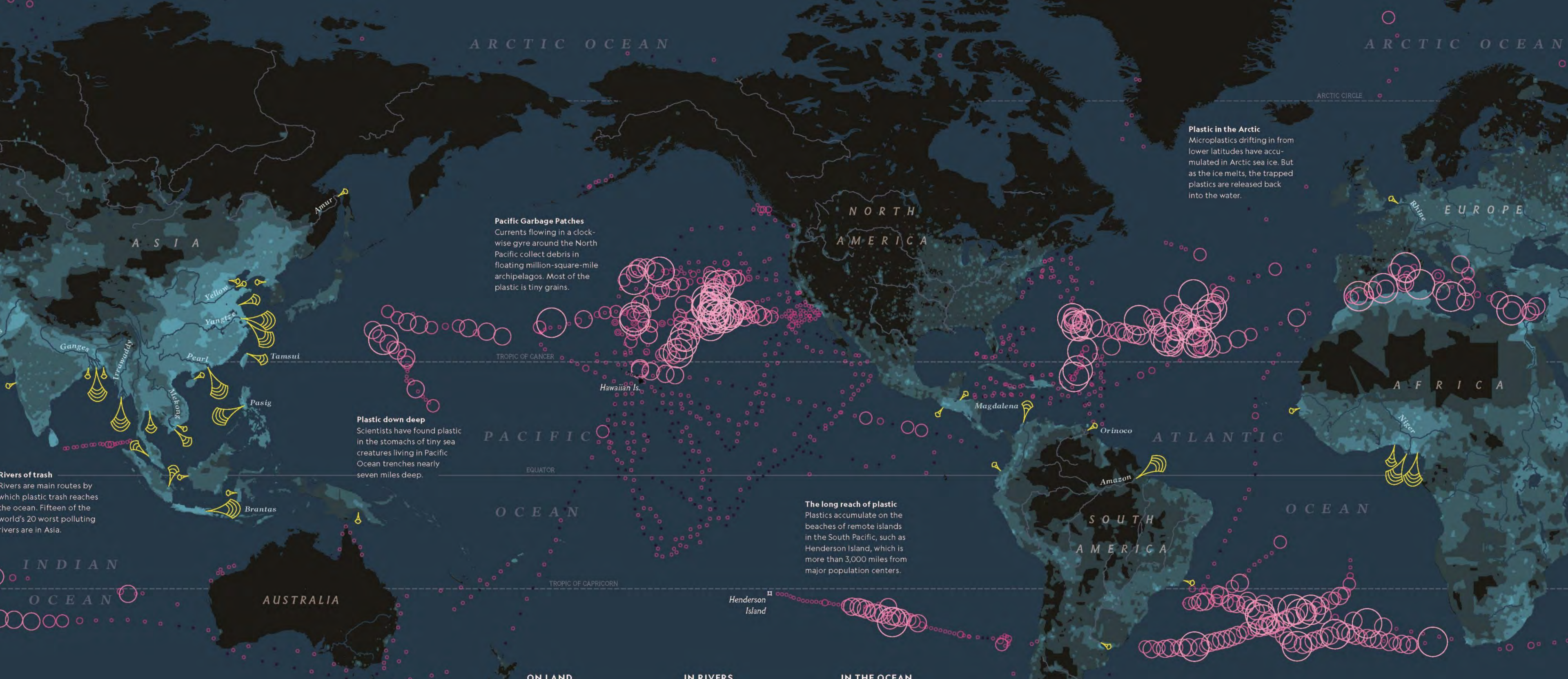
80,000,000 X
BLUE WHALE
(104.5 tons)



800,000 X
THE EIFFEL TOWER
(20,000 tons)

25,000 X
EMPIRE STATE BUILDING
(331,000 tons)





Plastic in the Arctic
Microplastics drifting in from lower latitudes have accumulated in Arctic sea ice. But as the ice melts, the trapped plastics are released back into the water.

Pacific Garbage Patches
Currents flowing in a clockwise gyre around the North Pacific collect debris in floating million-square-mile archipelagos. Most of the plastic is tiny grains.

Plastic down deep
Scientists have found plastic in the stomachs of tiny sea creatures living in Pacific Ocean trenches nearly seven miles deep.

Rivers of trash
Rivers are main routes by which plastic trash reaches the ocean. Fifteen of the world's 20 worst polluting rivers are in Asia.

The long reach of plastic
Plastics accumulate on the beaches of remote islands in the South Pacific, such as Henderson Island, which is more than 3,000 miles from major population centers.

Science Contents News Careers Journals

SHARE REPORT

Plastic waste inputs from land into the ocean

Jenna R. Jambeck^{1,*}, Roland Geyer², Chris Wilcox³, Theodore R. Sieglar⁴, Miriam Perryman¹, Anthony Andrady⁵, Ramani ...
+ See all authors and affiliations

Science 13 Feb 2015; Vol. 347, Issue 6223, pp. 768-771
DOI: 10.1126/science.1260352



Mismanaged waste includes all plastic that is not recycled, incinerated, or landfilled.



The map shows the 39 river basins that collectively discharge millions of tons of plastic a year into the ocean.



Dark dots are where ships looked and found no plastic. Outside the dots and pink circles, no data exist.

Missing plastic
Researchers found just one percent of the plastic they expected floating at the sea surface—the rest was missing. One reason: Plastic breaks down into tiny pieces, which are less visible but may greatly affect marine life.

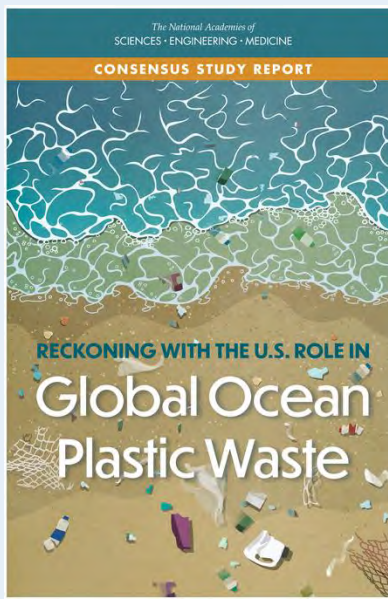
- Fragmentation**
Sunlight, waves, and bacteria break plastic into microplastics.
- Predation**
Microplastics are ingested by animals of all sizes, from plankton to whales.
- Sinking**
Plastic that's dense or weighed down by marine life sinks through the water.
- Shore deposition**
Plastic fragments transported by currents and tides to the shore.

ANTARCTIC CIRCLE



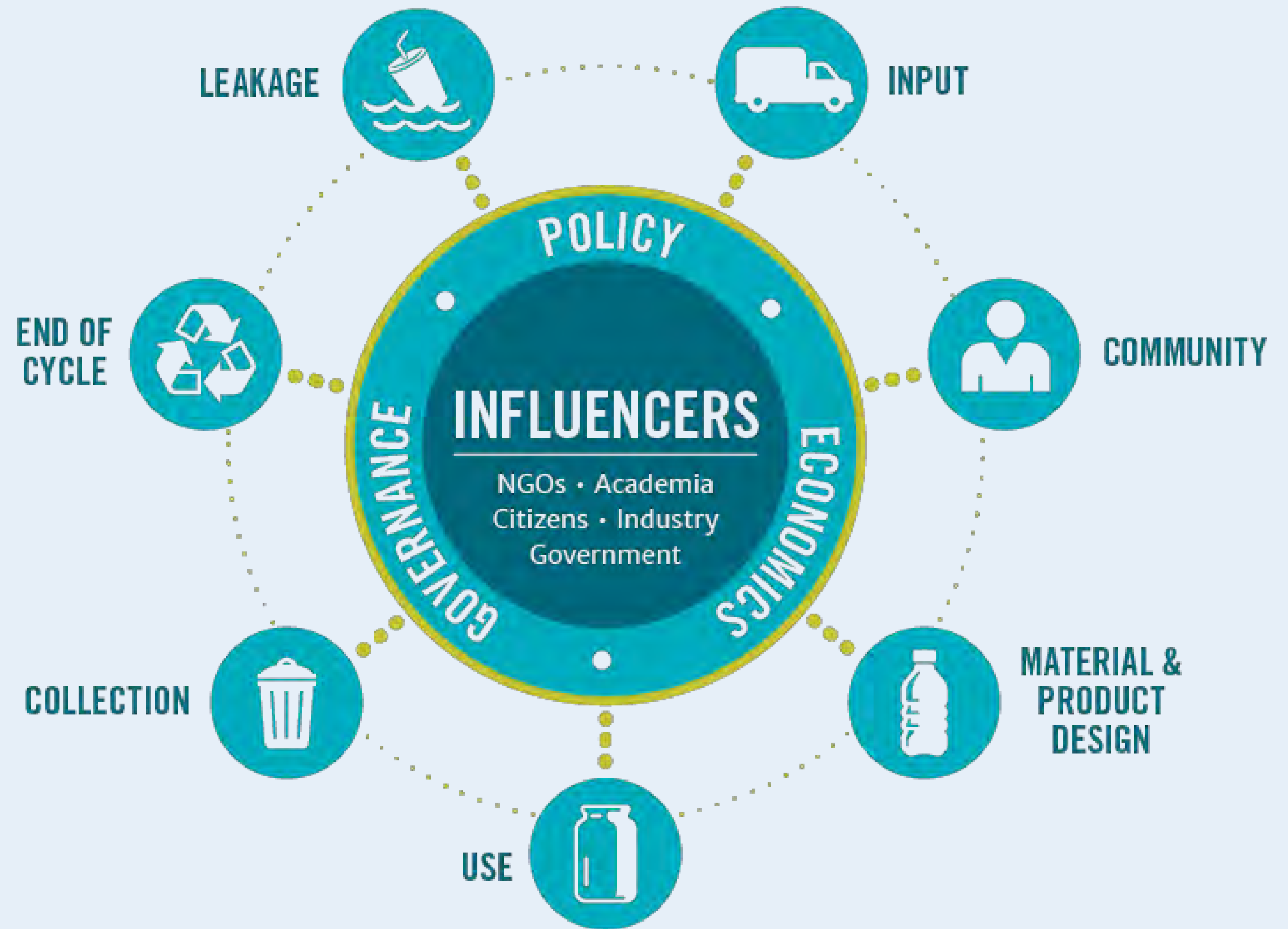


Strategic Intervention Framework to Reduce Plastic Pollution



The Circularity Assessment Protocol (CAP)

The Circularity Assessment Protocol (CAP) is a hub and spoke model that provides a snapshot of a city's circularity that can provide data for local, regional, or national decision-making to reduce leakage of waste (e.g., single-use plastic) into the environment and increase circular materials management.



PAPER • **OPEN ACCESS**

Advancing local circular economy of plastics from the ground up: a case study in Athens, Georgia, USA

Amy L Brooks*, Taylor Maddalene, Madison Werner, Kathryn Youngblood, Suki Janssen, Evan M White, Jason Locklin, Melissa M Bilec and Jenna R Jambeck

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[Environmental Research Communications, Volume 8, Number 1](#)

[Focus on Our Plastic Planet: from Problems to Solutions](#)

Citation Amy L Brooks *et al* 2026 *Environ. Res. Commun.* **8** 015015

DOI 10.1088/2515-7620/ae207f

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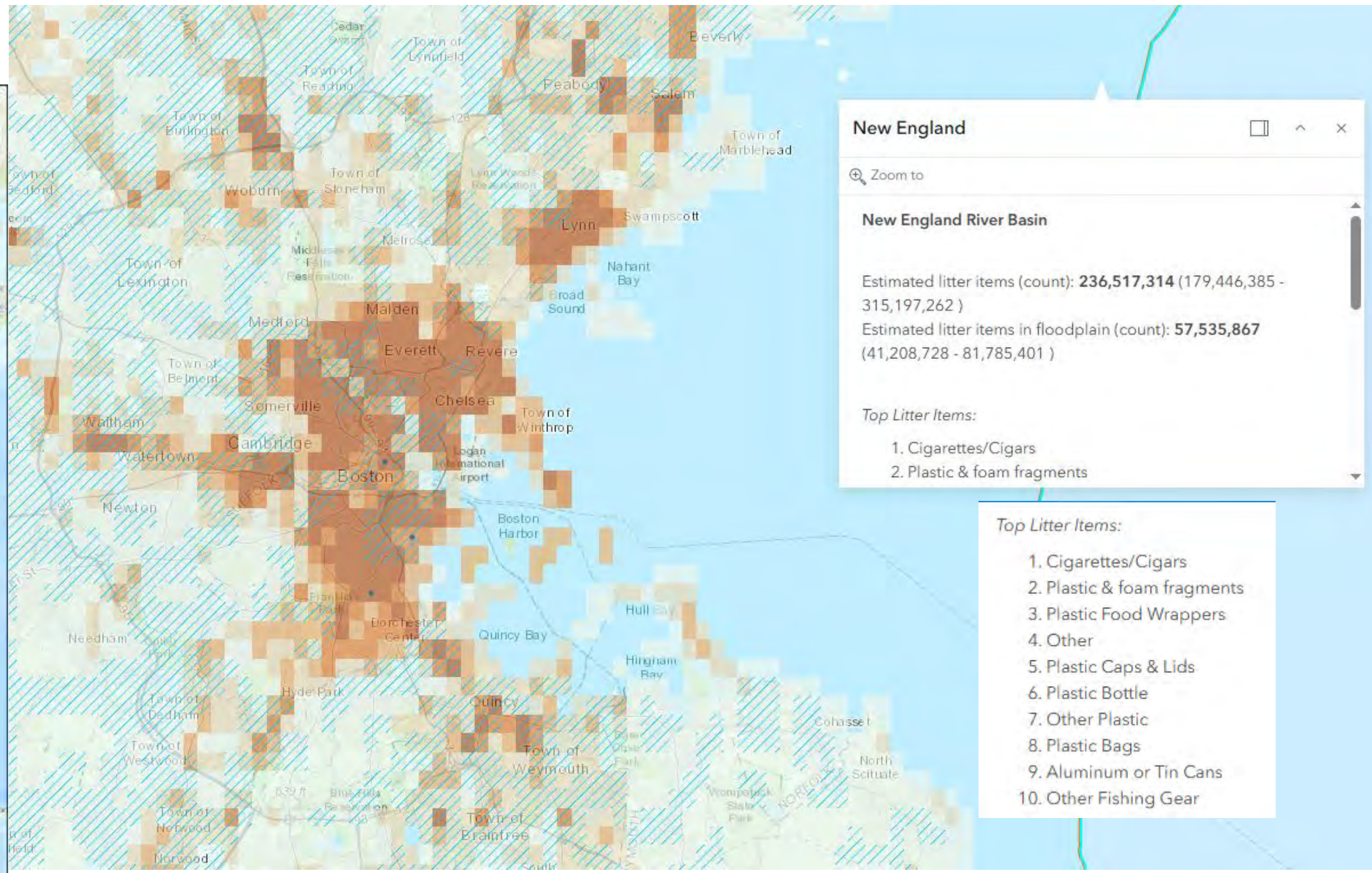
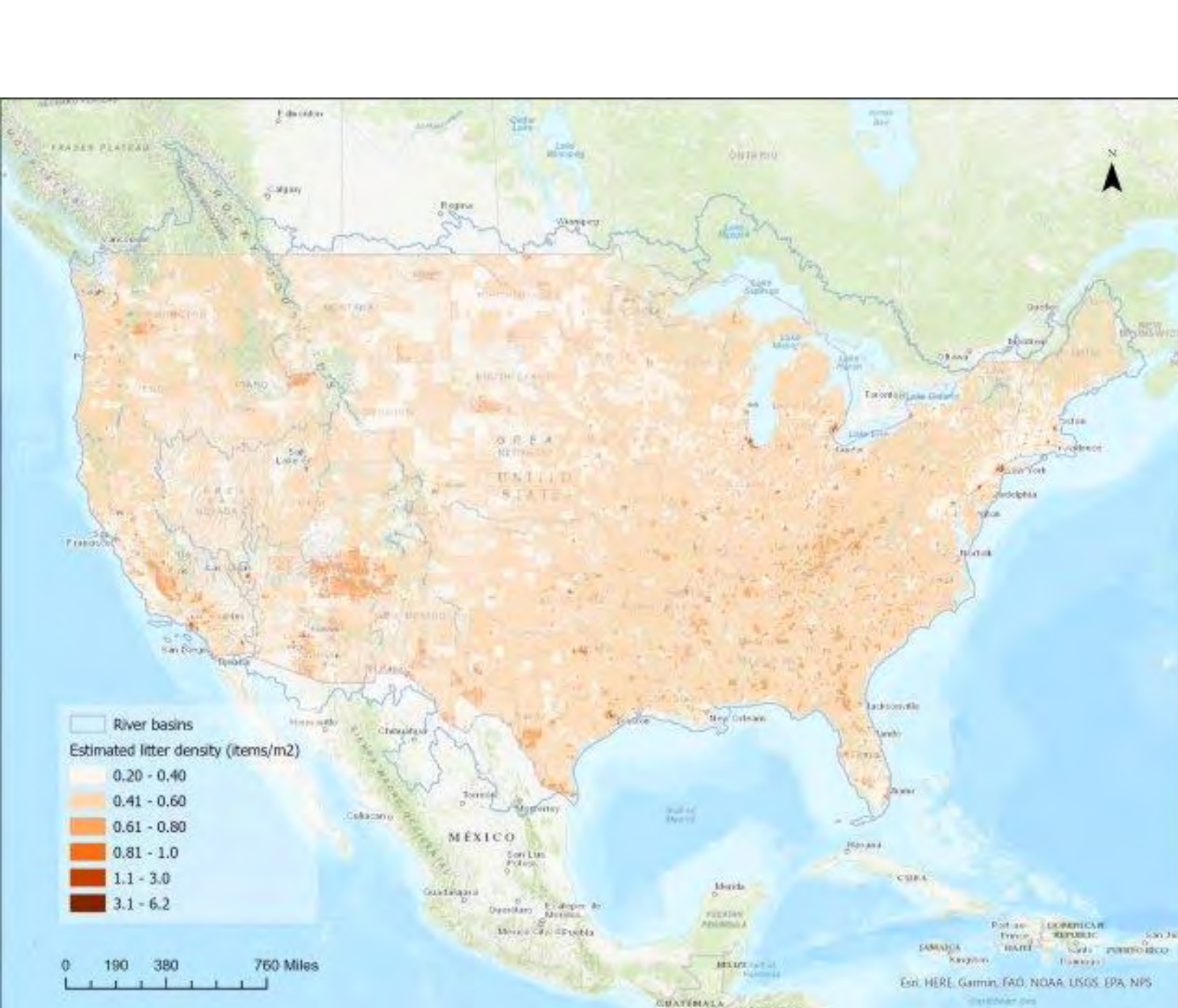
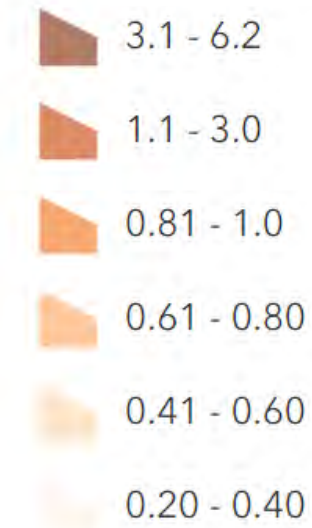
[Supplementary data](#)

Trash-Free Waters

Escaped Trash Risk Map

Estimated litter density (items/m²)

USCI



Cities and community members have the right to optimize their own circularity





INFORMATION SHARING

The local community's knowledge and expertise is honored. Partners and teams build capacity through learning methods and collaboration. **Debris Tracker** is an important tool that is used by researchers and the community alike. Open data is important to the process.

DATA ANALYTICS

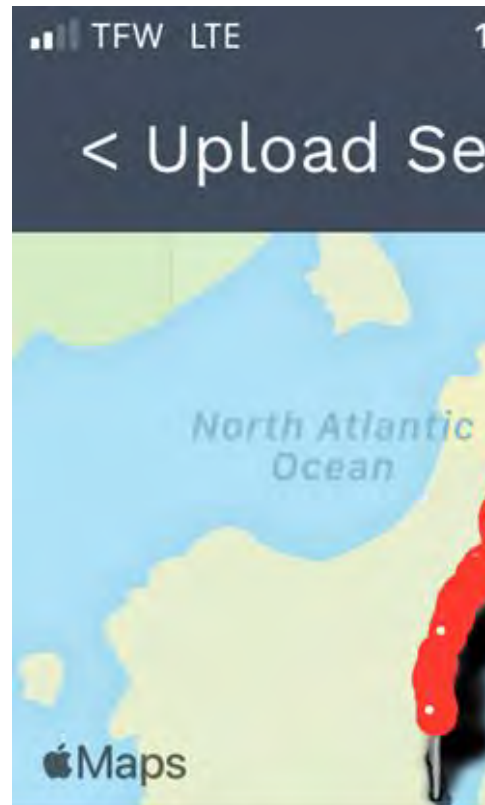
Data for each city's CAP is analyzed and co-owned by the researchers, city and sponsors. Trends across cities, countries and regions can illuminate global narratives and influencing factors.

EMPOWERING COMMUNITIES

Communities are empowered by local and global CAP data to inform their decisions about what is working - or where and how to intervene to increase circularity. Communities that participate in CAP can better define resource needs and participate in knowledge exchange.

SYSTEMS CHANGE





Distance
0.76km

Select
images



ists and volunteers
data to our public

Citizen-Based Litter and Marine Debris Data Collection and Mapping

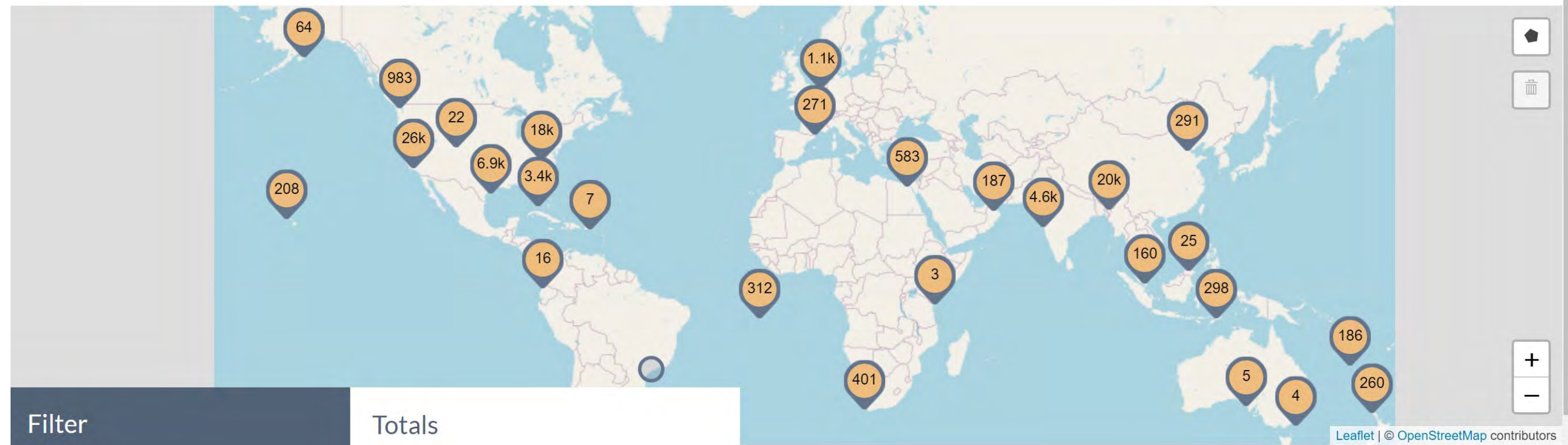
Jenna R. Jambeck and Kyle Johnsen | University of Georgia, Athens

The monitoring of litter and debris is challenging at the global scale because of disconnected local organizations and the use of paper and pen for documentation. The Marine Debris Tracker mobile app and citizen science program allows for the collection of global standardized data at a scale, speed, and efficiency that wasn't previously possible.





Since 2011, Debris Tracker volunteers have logged more than **10 million items** in 90+



Filter

All Organizations ▾

Categories ▾

All
 Exact
 Range

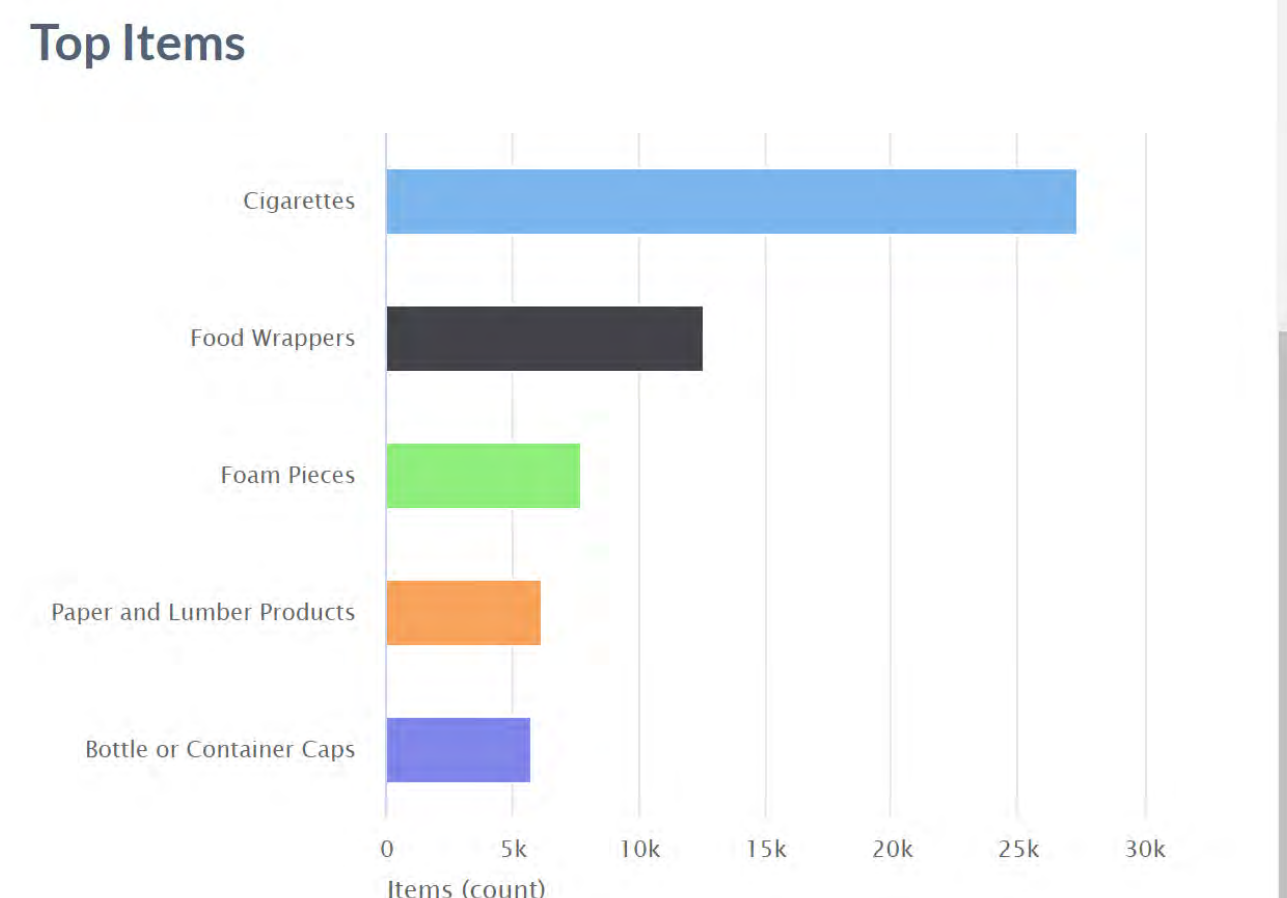
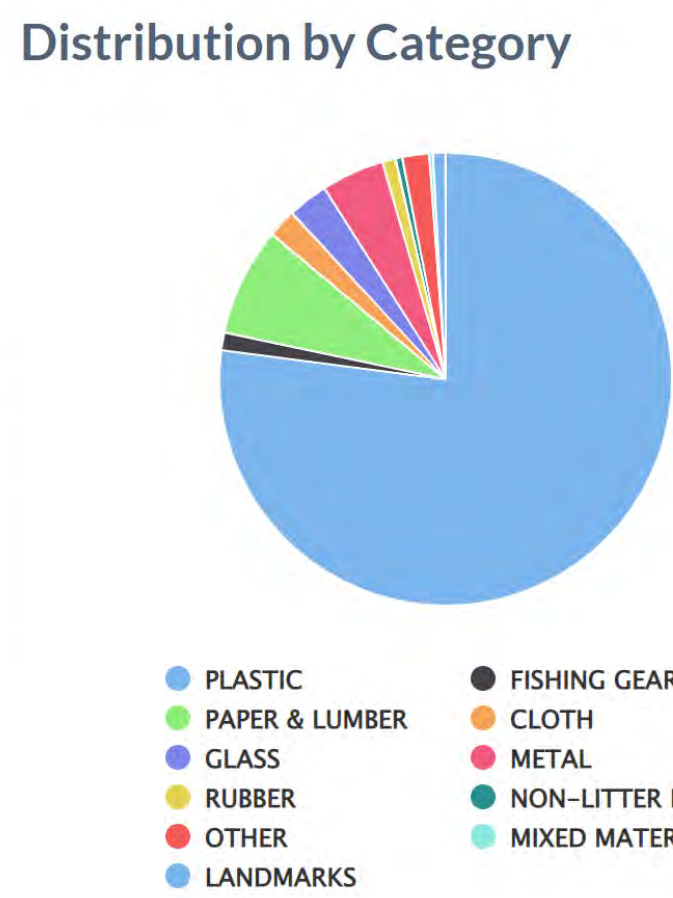
Search

[Download Selected Data](#)

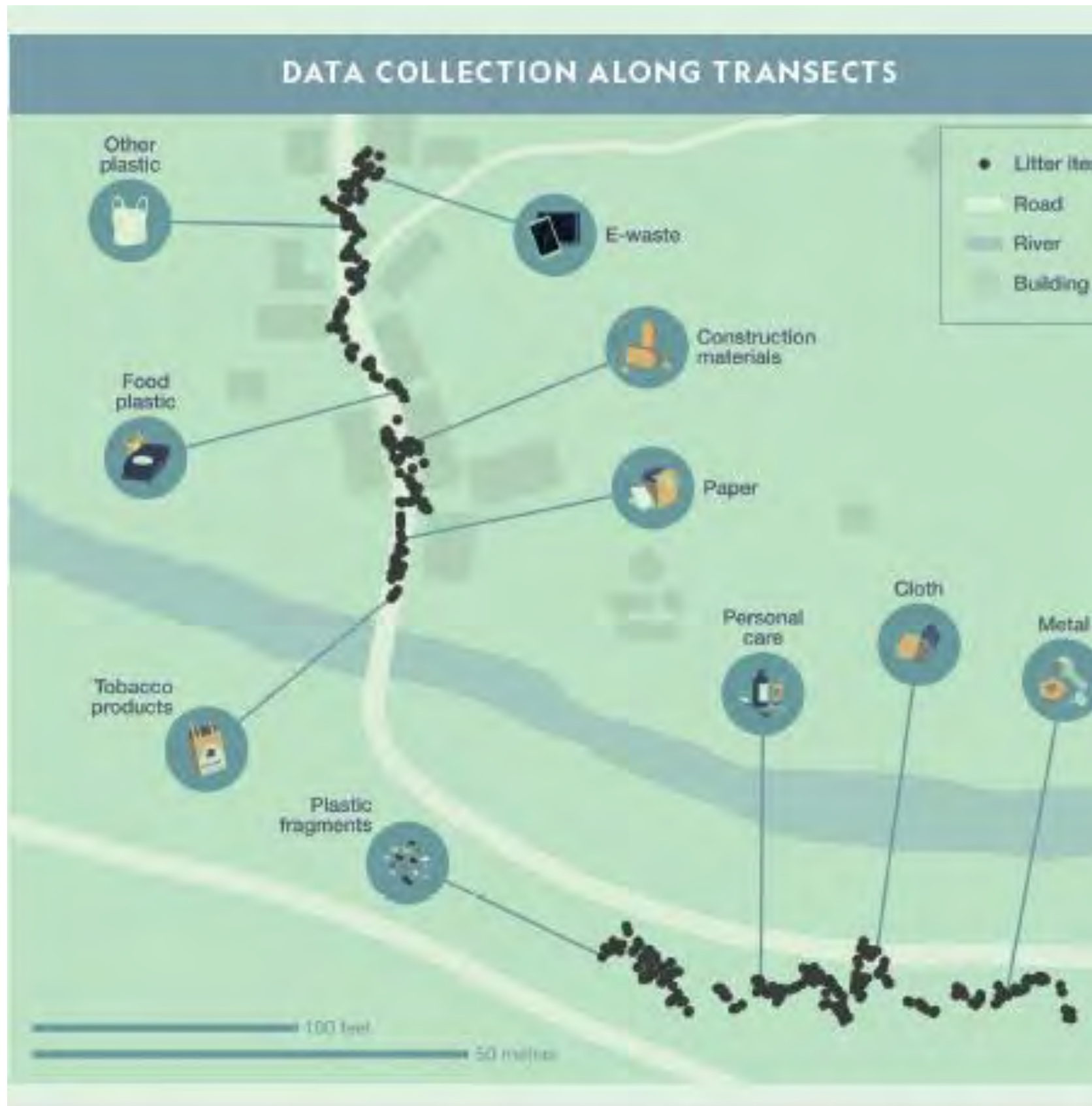
Totals

Total debris count: **225,086**

Total collection events: **84,484**



Debris Tracker Data Dashboard



1. What is it?

2. How did it get here?

3. What can “we” do about it?

CAP Cities

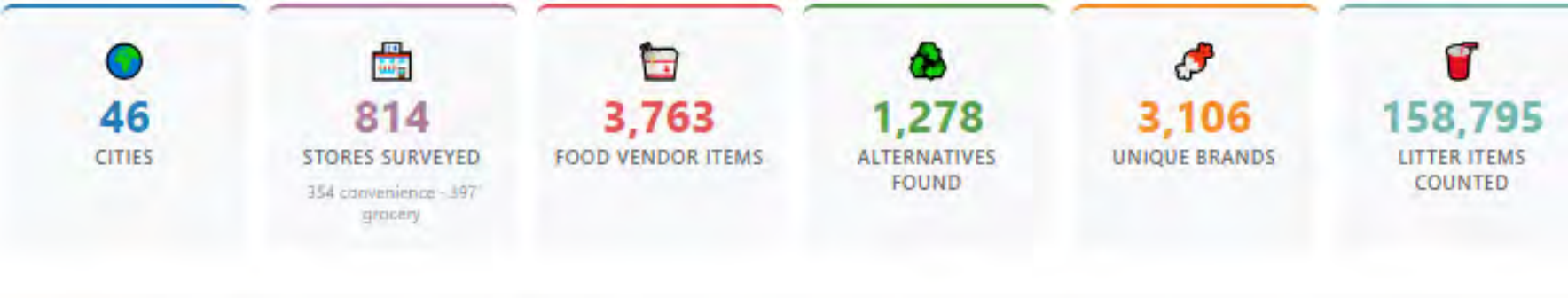
Explore the global footprint of CAP data collection. Click a city dot to filter all charts below, or use the filters above. Grey dots are outside the current filter.

Data is powerful if it's open



Currently viewing: **All locations**

DATA IN CURRENT SELECTION



Materials Used for Food Vendor Products

All locations

Select a product and/or food vendor type to see which materials are most commonly used. All results reflect the city type and location filters above.

Select product: Select food vendor:

Hard Plastic Paper / Paperboard Foam Item not present Other Compostable Plastic Film Plastic Wood / Natural Materials Aluminum



Litter Survey Results

All locations

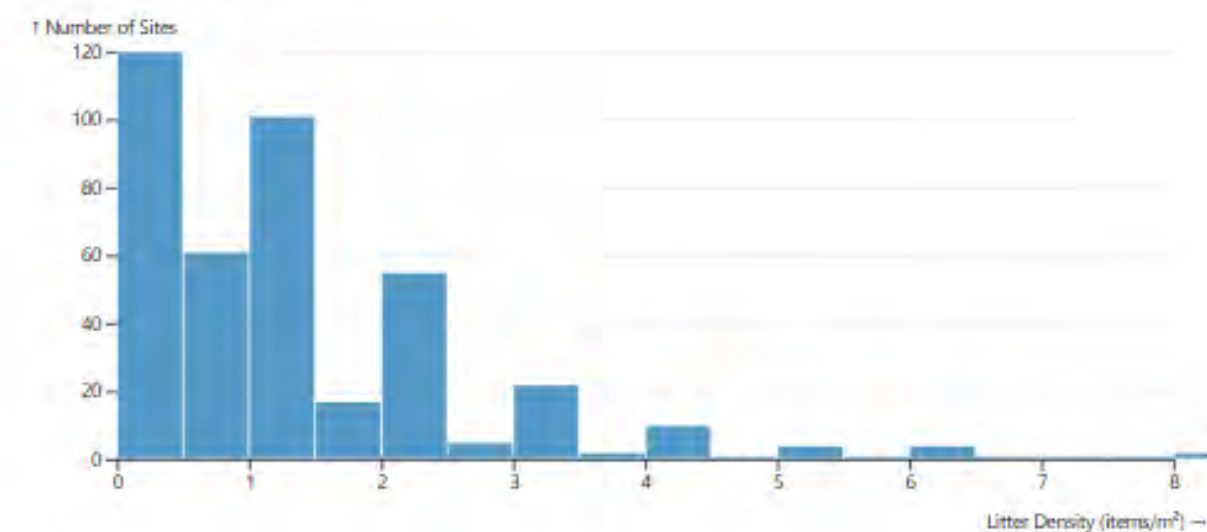
Litter density measured across 100m transects using a stratified random sampling protocol. Sites are classified by ambient population density (Low, Medium, High) using LandScan data.

Overall Density

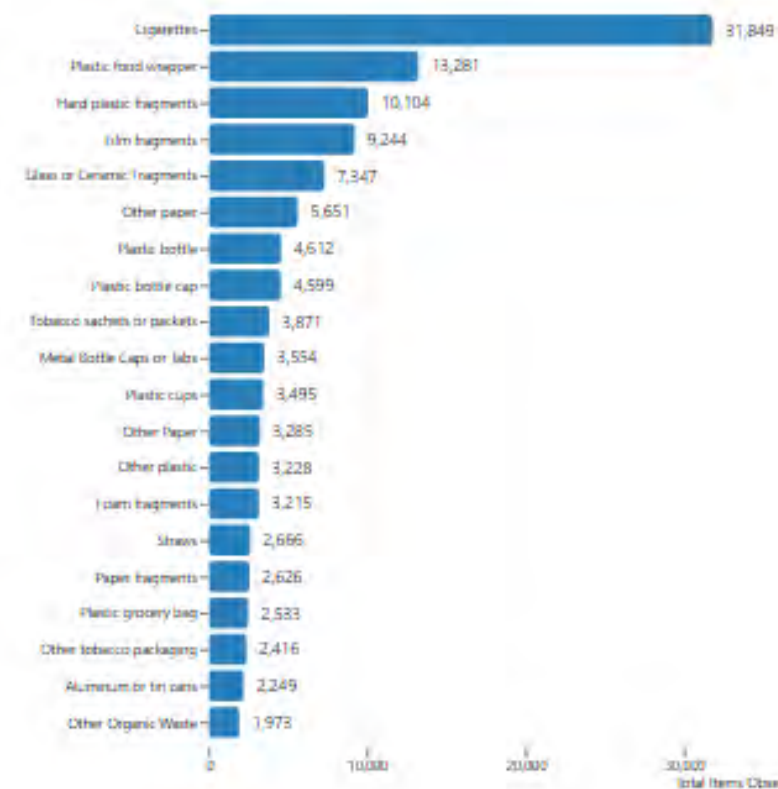


Density Histogram

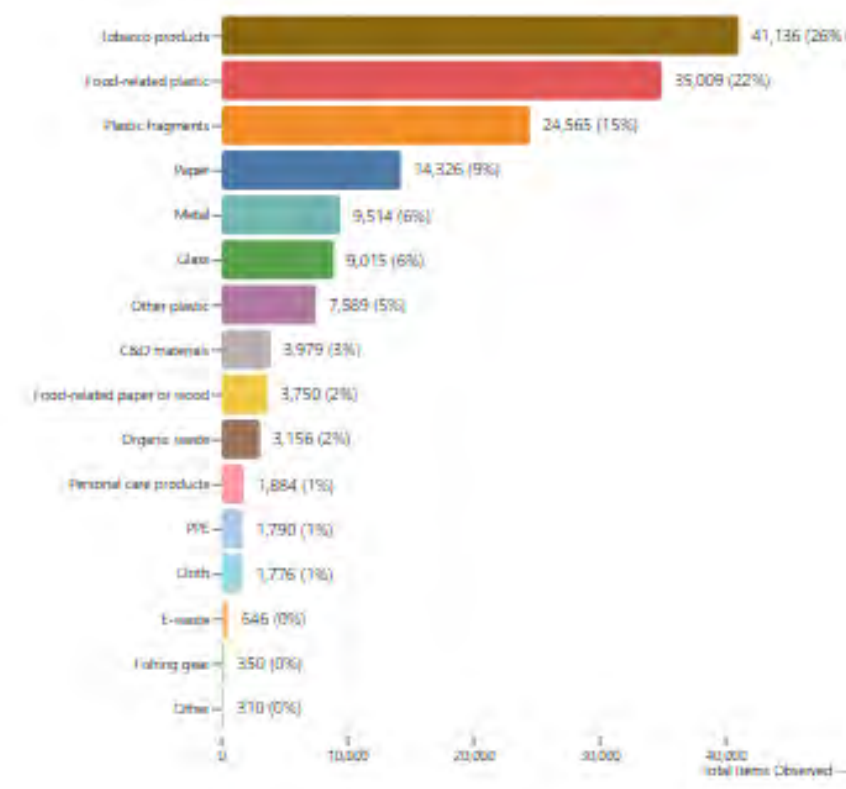
Distribution of litter density across all sites. Most sites have low density; a small number of hotspots drive the mean upward.



Top 20 Litter Items



Litter Characterization



Data is powerful if it's open




Data is powerful if it's usable

Conversation Log +

What materials are most commonly
What materials are most commonly us...
2/13/2026

What policies have been success...
What policies have been successful acr...
2/13/2026

 **SpheriCity**

GPT-4o-mini Ollama

Welcome to SpheriCity

Ask me anything about the Circularity Assessment Protocol that has been conducted in 50+ cities and 15+ countries around the world. I'm here to help!

What would you like to know about...?

Start Chat

Product design Community themes Cross-city insights Policy recommendations

Data is
powerful If
it's impactful



Data can create change when scaled



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SPHERICITY PRESENTS

Circularity Assessment Protocol (CAP) Training

Local Application Partner Training for the SpheriCity Plastics CAP

[Register for free!](#)

Sections

5

Starting Date

Asynchronous

Duration

2-3 Hours

Price

Included

Data can create change when scaled

← Back to course page


SpheriCity CAP Training

15 %


Path Discuss

- 1. Introduction and Background
- 2. Input, Product Design, and Use
- 3. Community, Collection, End-of-Cycle,
- 4. Leakage
 - Section 4.1 Module 1 - Introduction 05:33 ✓
 - Section 4.1 Module 2 - Choosing a S... 07:35
 - Section 4.1 Module 3 - Conductin... 09:17 ✓**
 - Section 4.2 Module 1 - Introduction ... 01:07 ✓
 - What is Debris Tracker?
 - The Debris Tracker Story

Efficient Two-Person Survey Technique



04:02 / 09:17

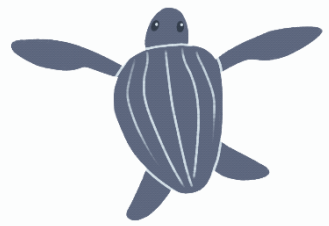
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Debris Tracker Jr.



Thanks to Young Futures

We are not going to immediately “solve” plastic pollution, but together we can change the system of what is possible.





Thank You

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debristracker.org

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