# Circularity Assessment Protocol (CAP)

*and island opportunities to prevent plastic pollution*

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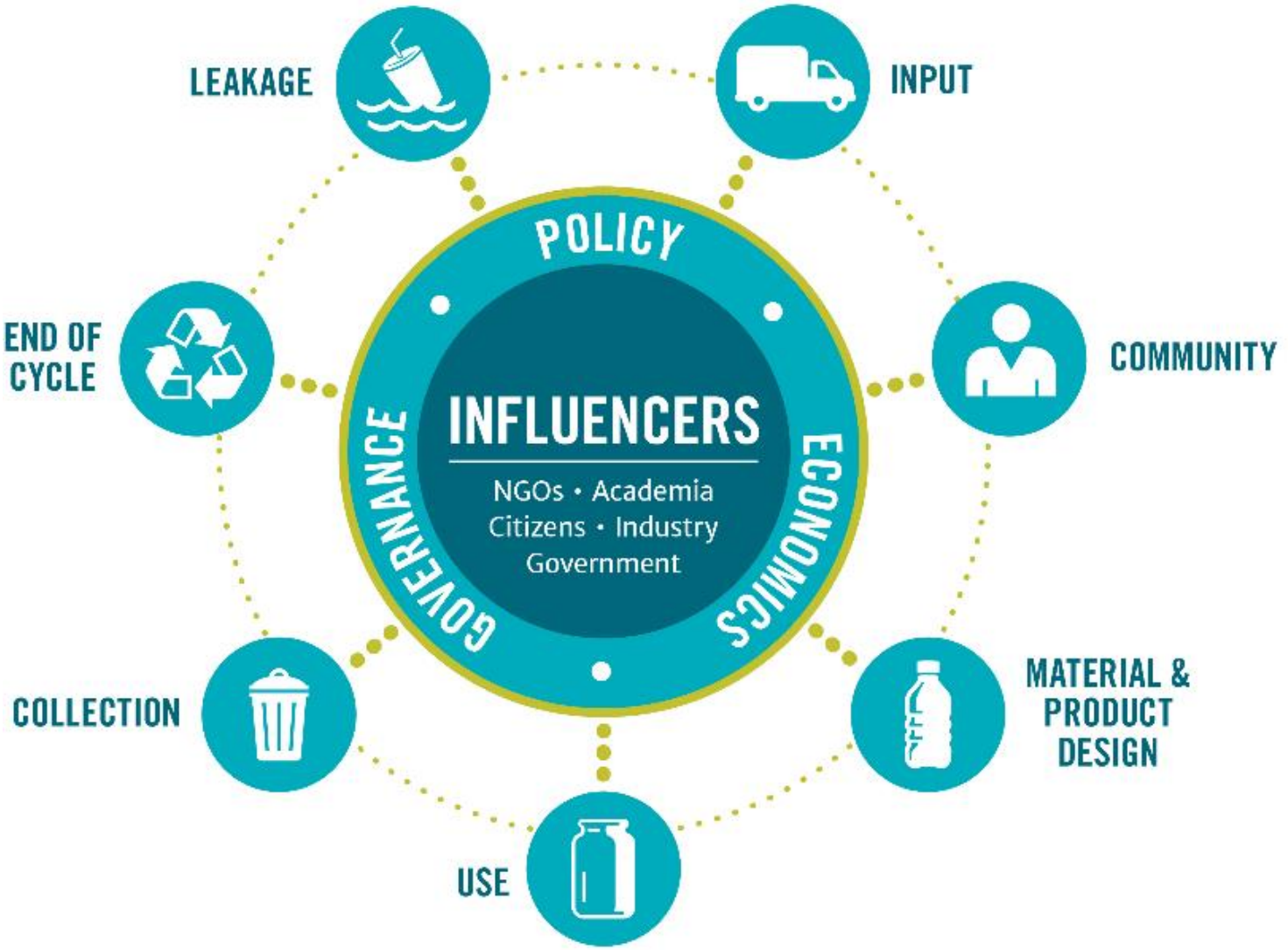
# *The* Circularity Assessment Protocol (CAP)

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.

**circularityinformatics.org**



# What questions do we ask for each component?

**INPUT**
What products are sold in the community and where do they originate?

**COMMUNITY**
What conversations are happening and what are the stakeholders' attitudes and perceptions?

**PRODUCT DESIGN**
What materials, formats, and innovations are found in products, particularly packaging?

**USE**
What are the community trends around use and reuse of product types?

**COLLECTION**
How much waste is generated, what does it comprise, how is it disposed? How much is collected and what infrastructure exists?

**END OF CYCLE**
What is the fate of waste once it is properly discarded? How is it treated?

**LEAKAGE**
What waste ends up in the environment? Why and how is it getting there?

CAP are in progress or completed in **56 cities** and **16 countries.**

## 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

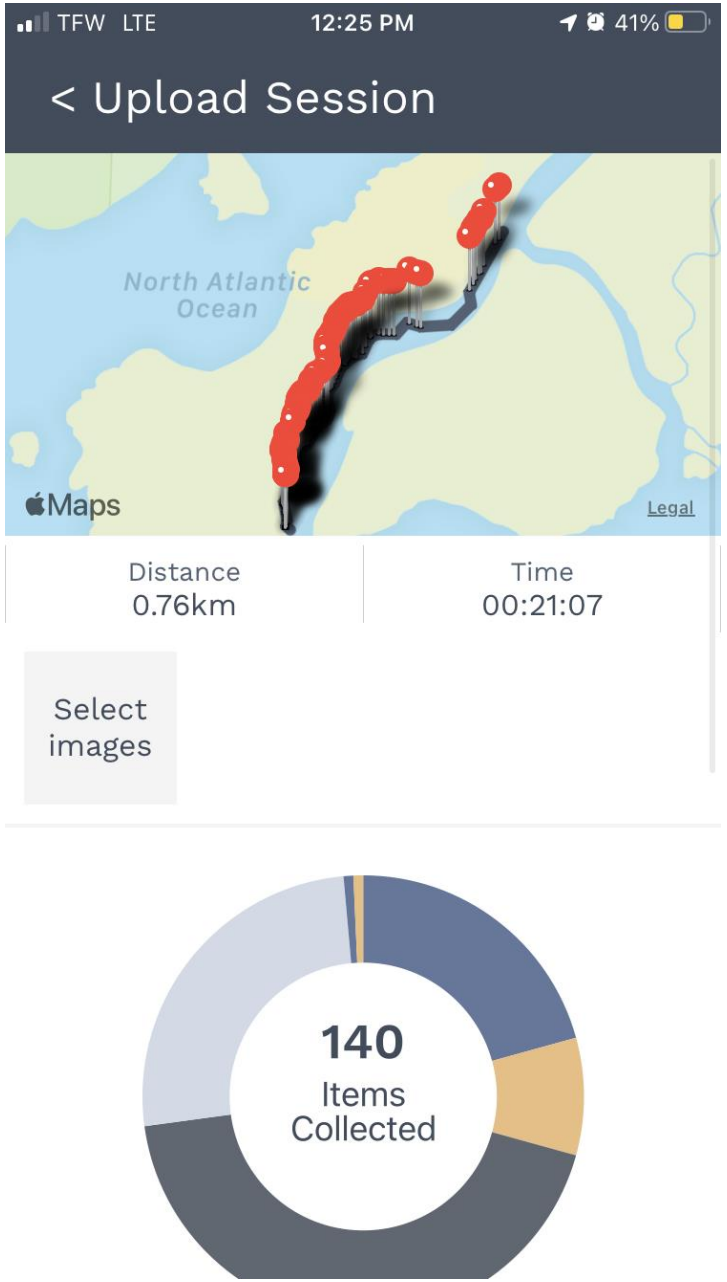
Data for each city's CAP is analyzed and co-owned by the researchers, city and sponsors. Trends across cities, countries and regions can illuminate global narratives and influencing factors.

## 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.

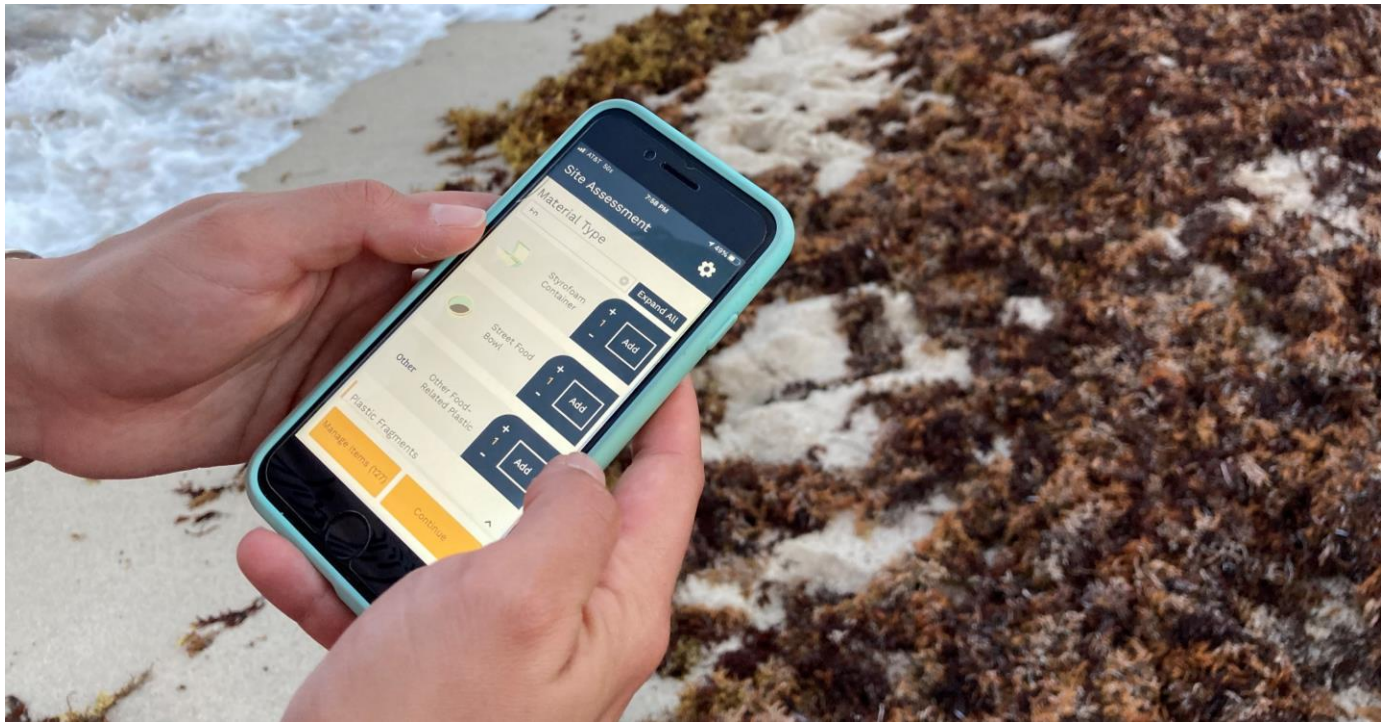
## Systems change

Information is power that can result in community-based systems change, measured by the Circularity Informatics Lab.




Marine Debris Tracker
Powered by Morgan Stanley

Debris Tracker is an open access mobile app used by the field team to collect geospatial data for the CAP. Anyone can categorize litter and contribute data to a free online database showing litter around the world.



Science of The Total Environment
Volume 797, 25 November 2021, 149098

# Source, sea and sink—A holistic approach to understanding plastic pollution in the Southern Caribbean

Winnie Courtene-Jones [a], Taylor Maddalene [b], Molly K. James [c], Natalie S. Smith [a], Kathryn Youngblood [b], Jenna R. Jambeck [b], Sally Earthrowl [d], Denise Delvalle-Borrero [e], Emily Penn [d], Richard C. Thompson [a]

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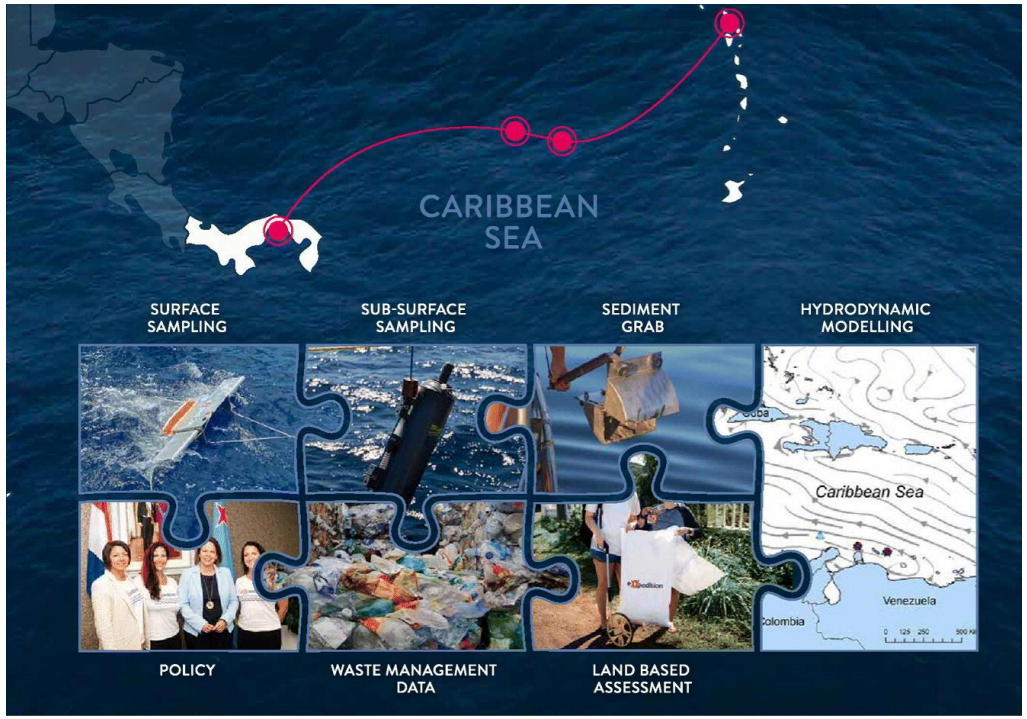
## Highlights

- A holistic approach to plastic pollution which integrates land and marine research



Community Science

Project Report | Open Access

# The Circularity Assessment Protocol in Cities to Reduce Plastic Pollution

J. R. Jambeck, T. Maddalene, K. Youngblood, A. Oposa, H. Perello, M. Werner, I. Himelboim, K. Romness, J. Mathis, C. Keisling, A. L. Brooks

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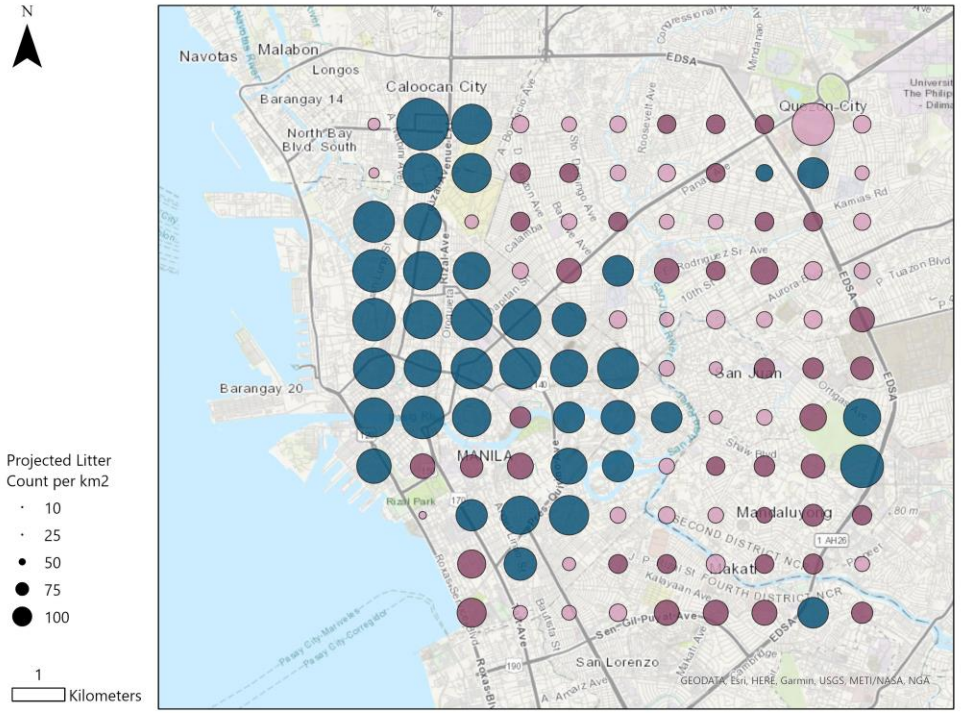
This article was corrected on 12 FEB 2024. See the end of the full text for details.



## Abstract

The circular economy has been promoted as a solution to plastic pollution, but cities and communities bear the brunt of plastic pollution. The Circularity Assessment Protocol (CAP) is a systems method of collaborative and open data collection for communities to use for decision- and policy-making. The CAP has been utilized in 51 cities in 14 countries and is illustrated here in Metro Manila. Results include identifying manufacturing and parent companies to bring to the table; documenting most (77%) products are in single-use multi-layer film packaging; a small, but growing formal refill and reuse system; 10% of to-go food containers composed of paper-based alternatives, and a snap-shot leakage concentration of plastics to the environment that is 1.8%–2.7% of current waste generation. Community narratives emerged from a collaborative workshop and are



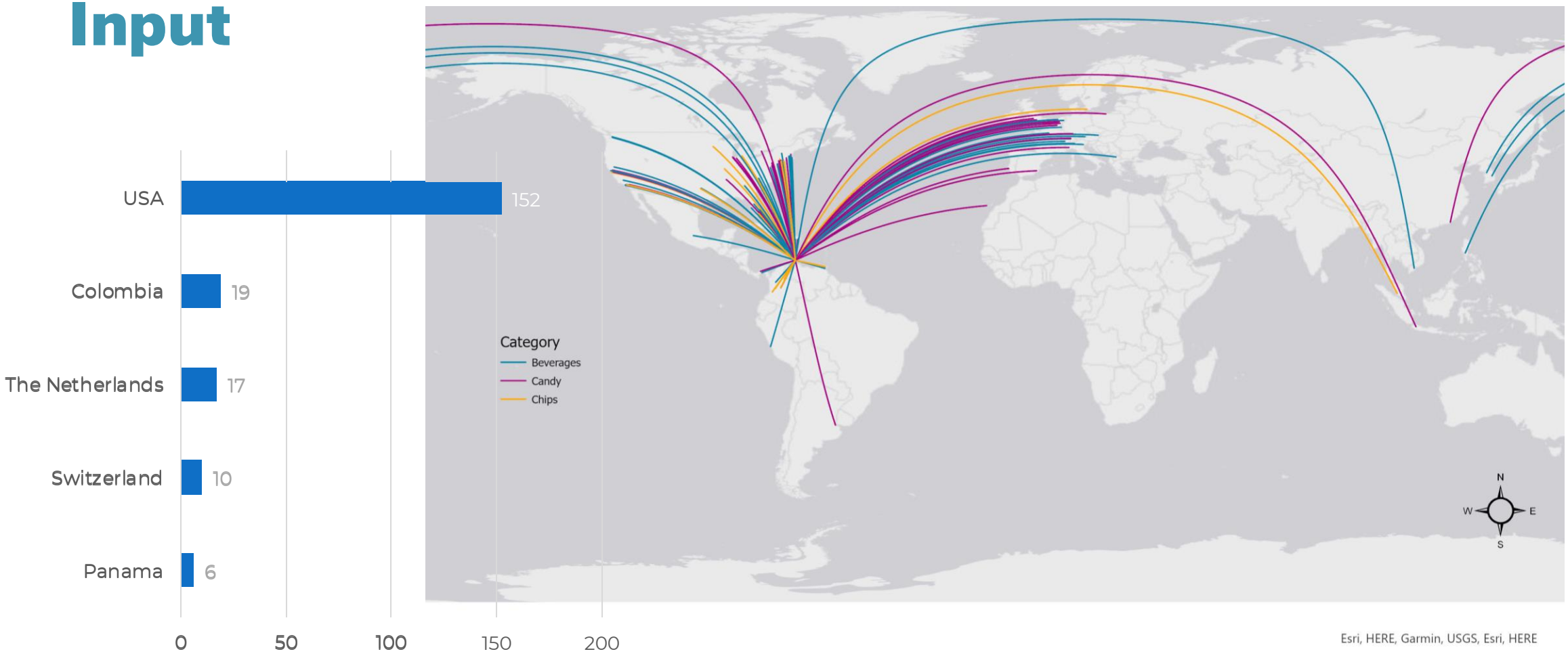
#makeyourimpactblue

GOVERNMENT OF ARUBA

1785

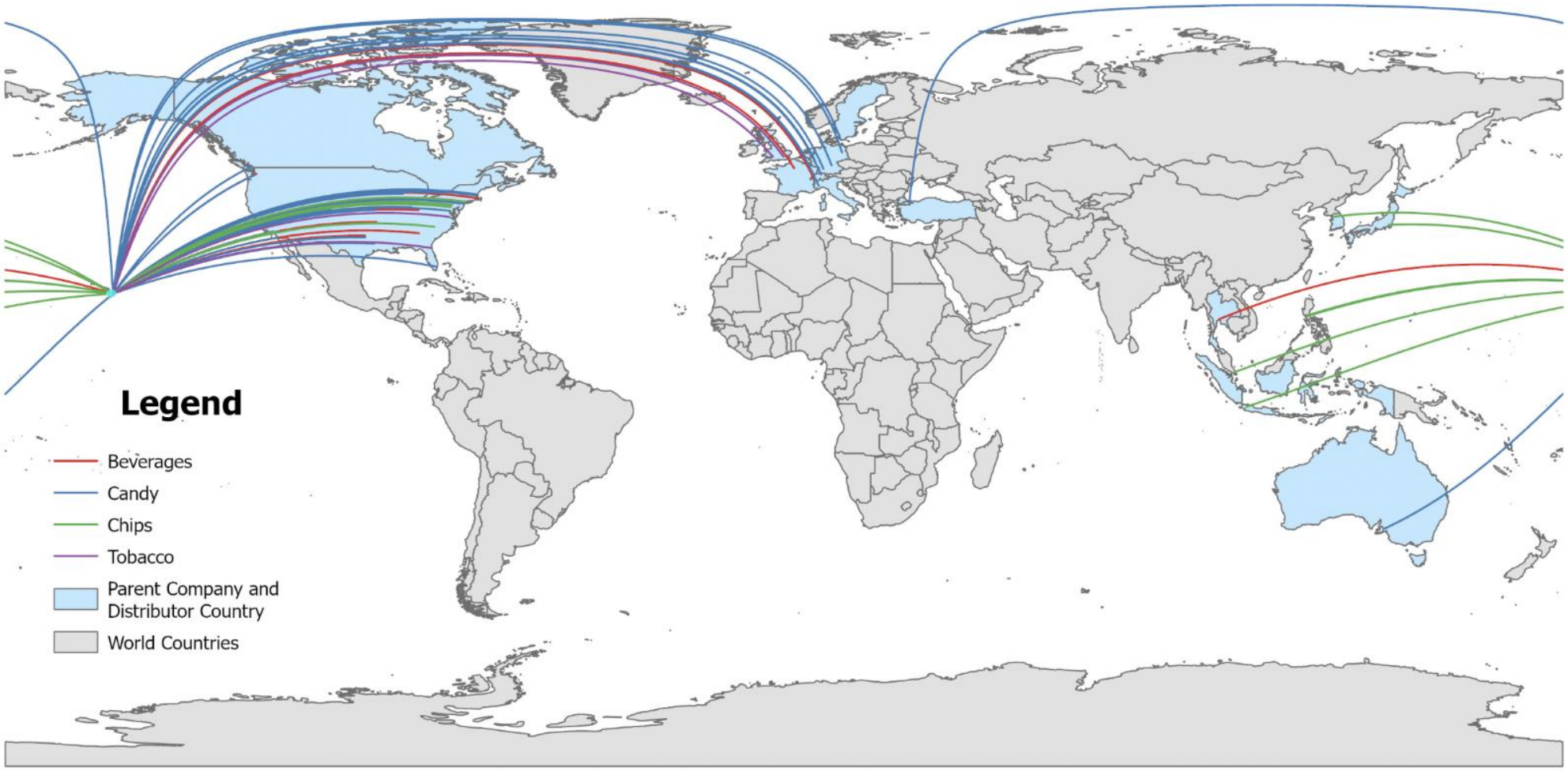
*Aruba:*

# Input



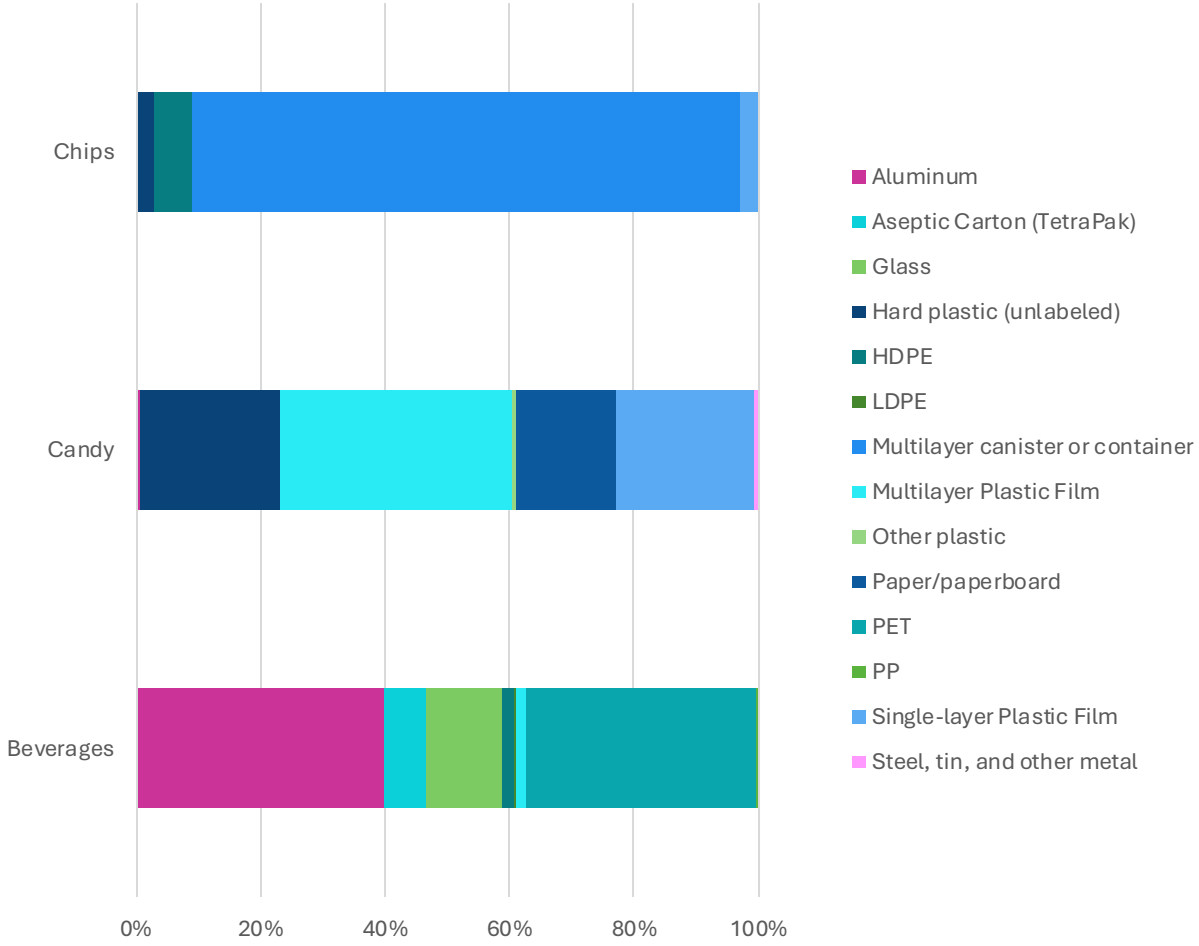

Parent company locations of FMCG brands (n=250)

# *Hilo, Hawaii:* **Input**

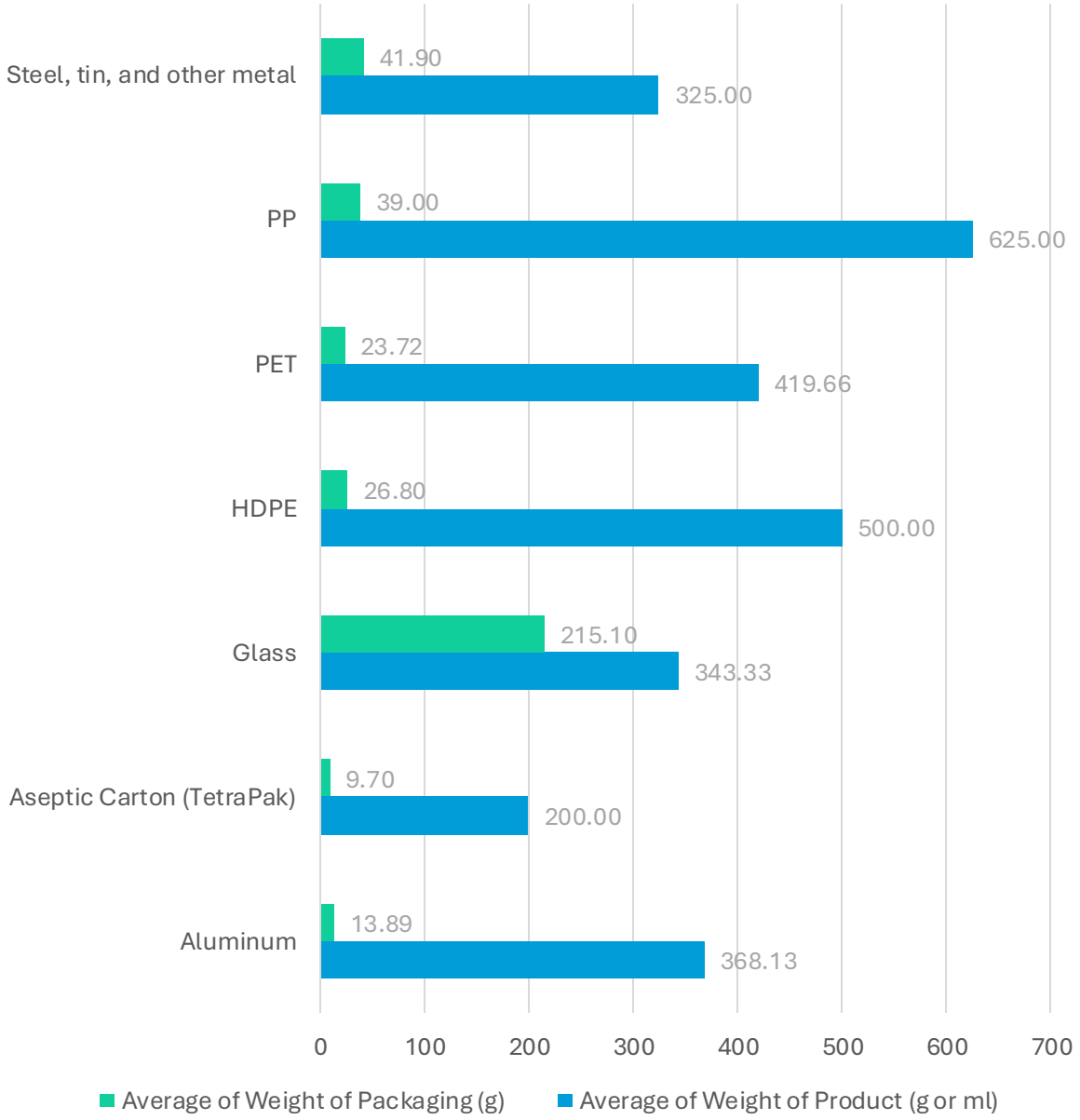


# *Aruba:* Product Design

Packaging material types of fast-moving consumer goods brands (n=392)

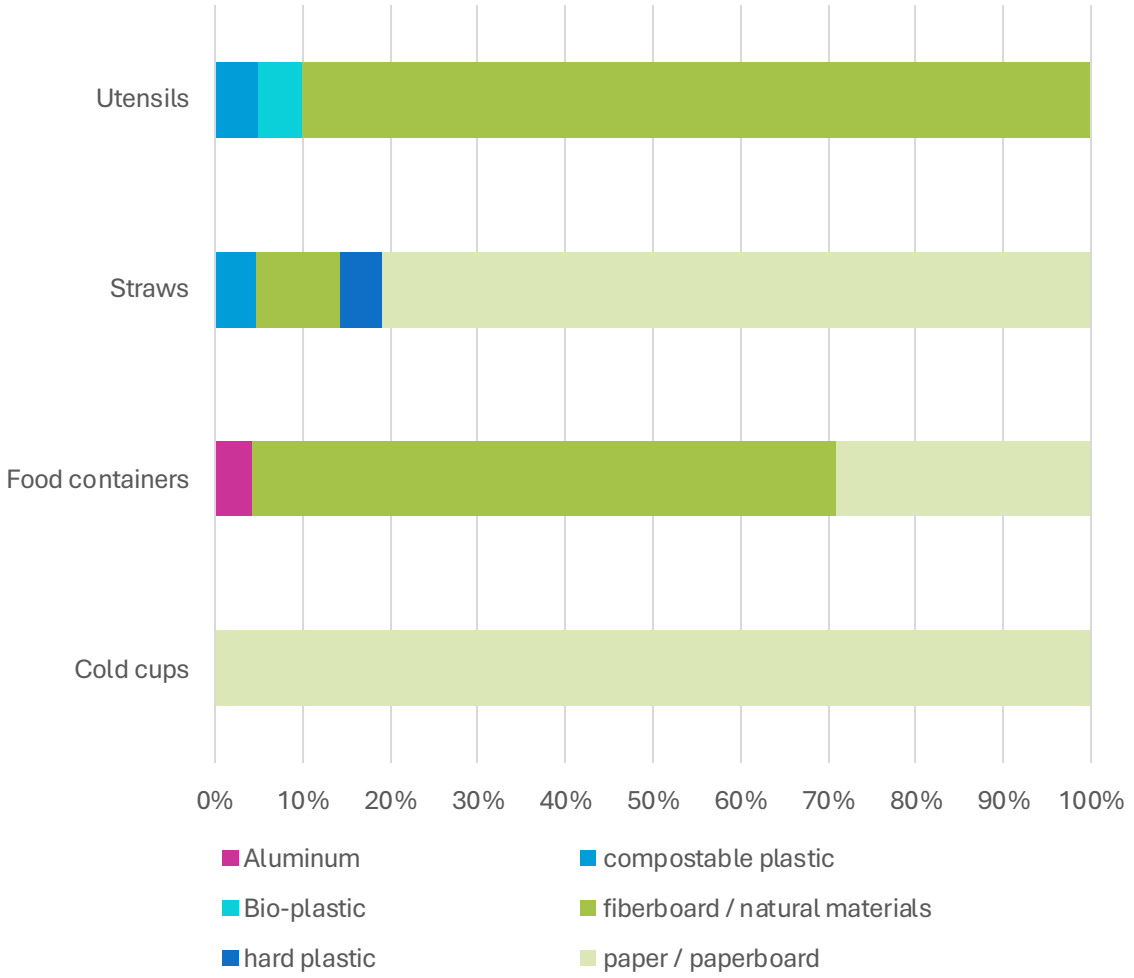



Average product & packaging weight of popular beverage brands by material type (n=36)

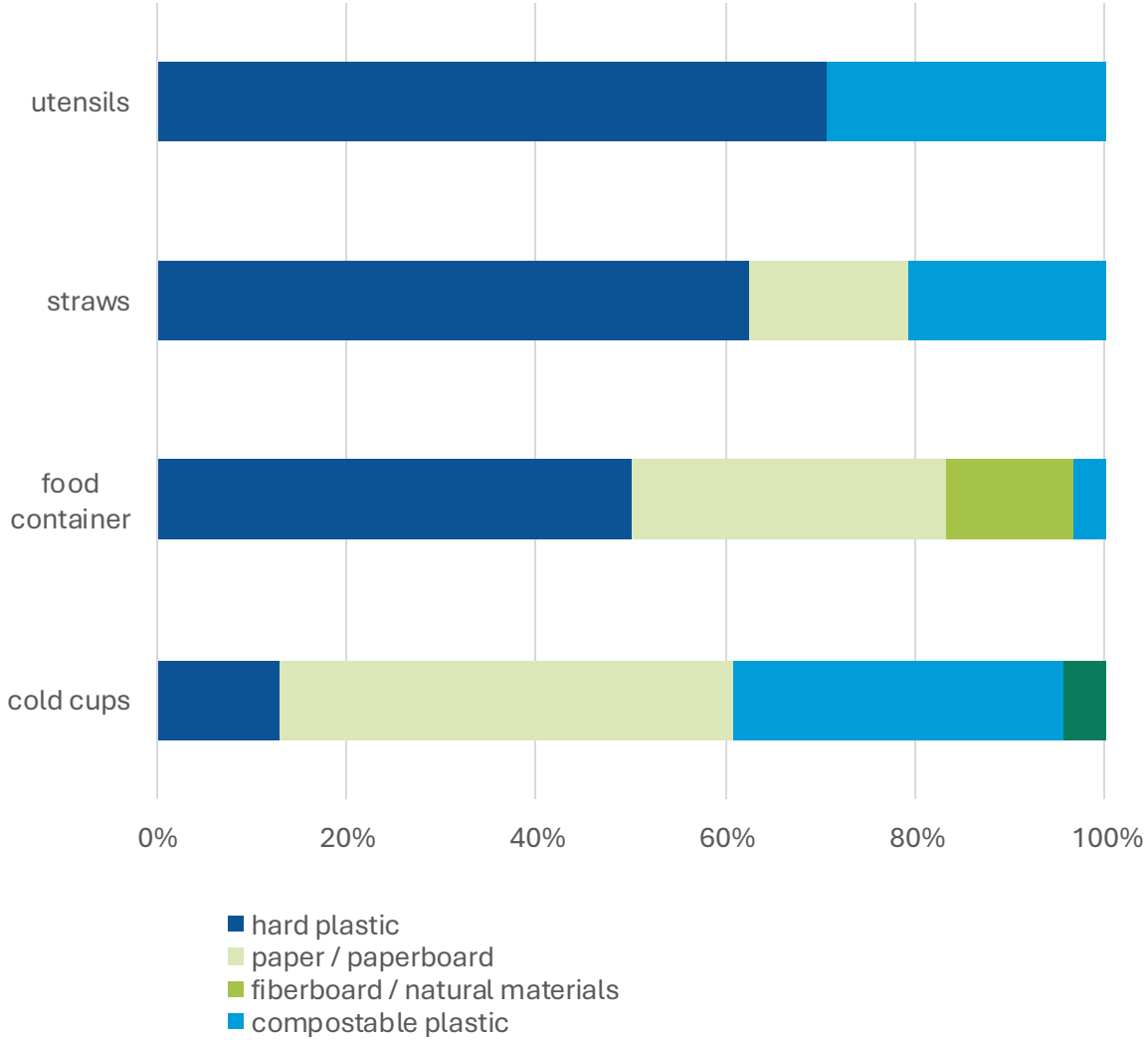


# *Aruba and Hilo:* **Product Design**

Aruba Material types of to go food ware in restaurants (n=29)

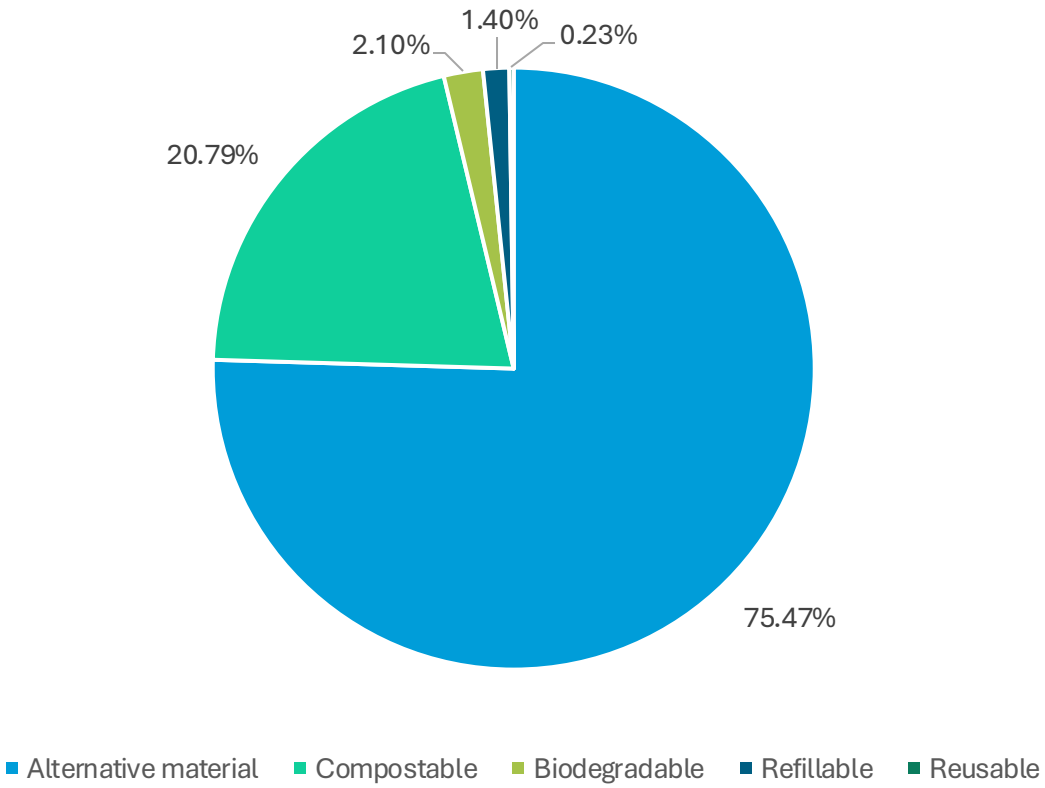



Hilo Material types of to go food ware in restaurants (n=XX)

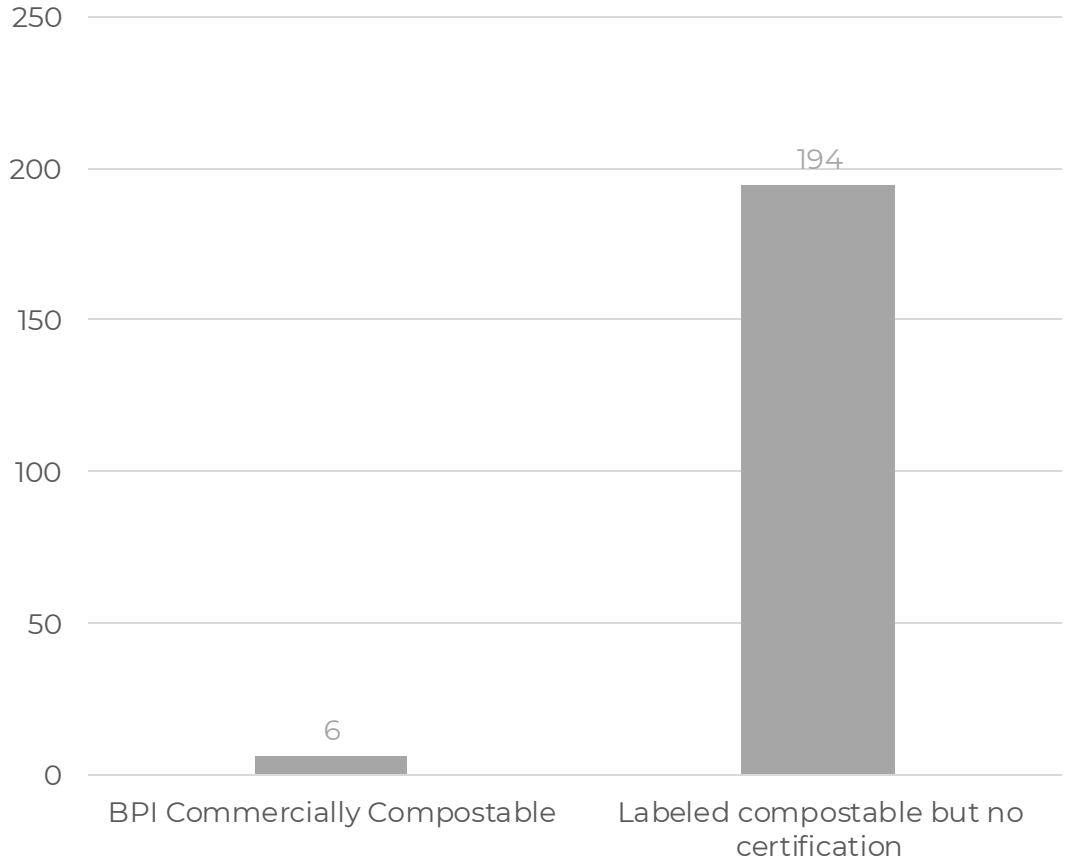


# *Aruba:* **Use**

Types of alternatives surveyed in personal care and household goods aisles of Aruban stores (n=428)

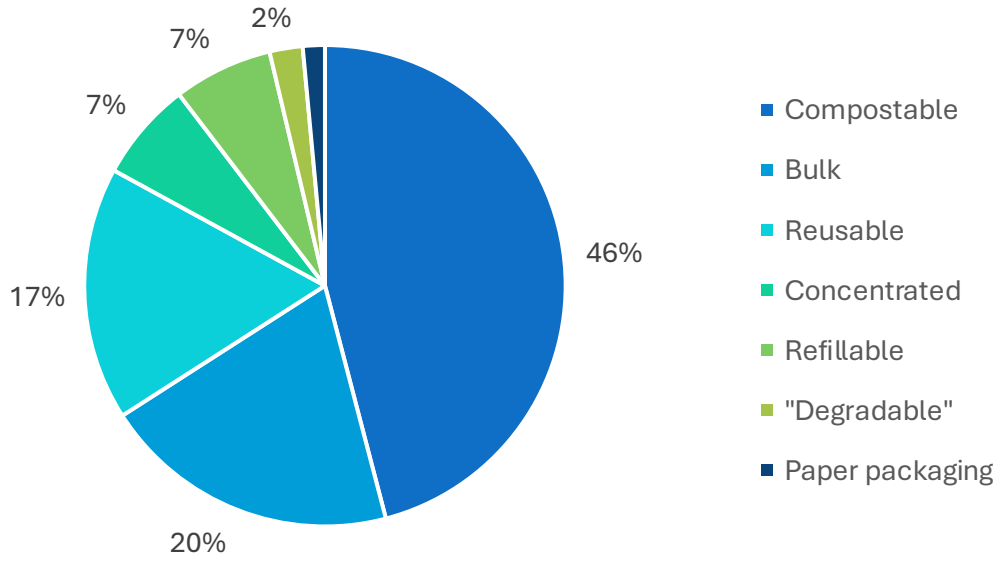


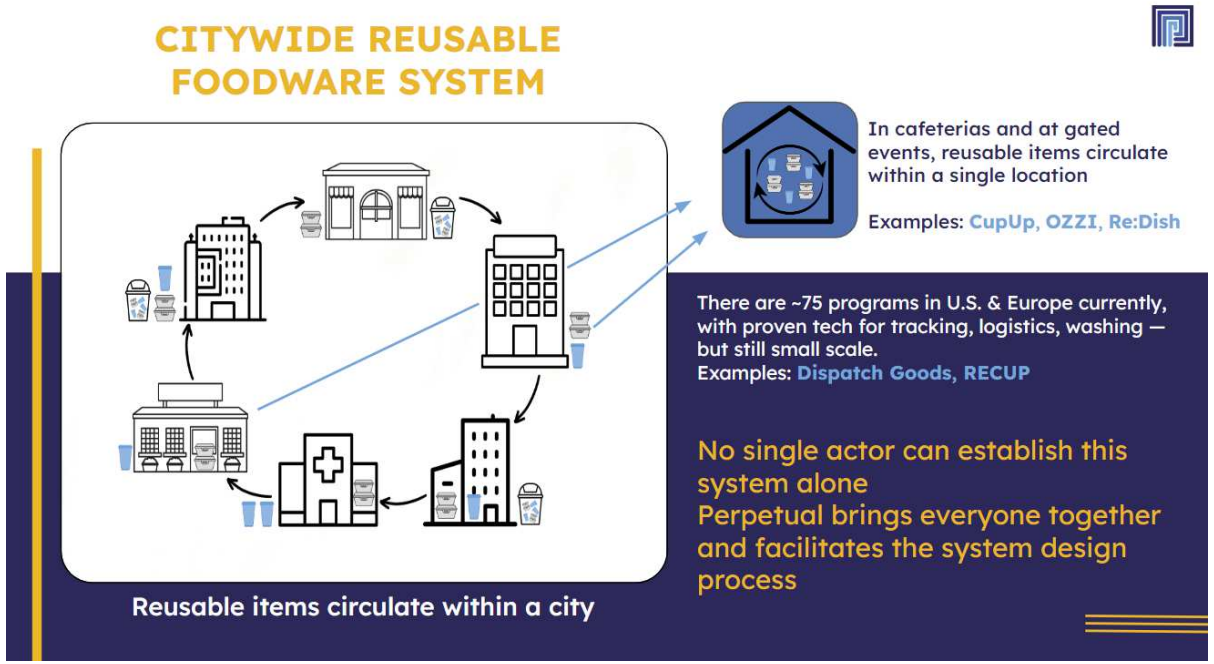

Certification status of alternatives labelled compostable or biodegradable (n=200)

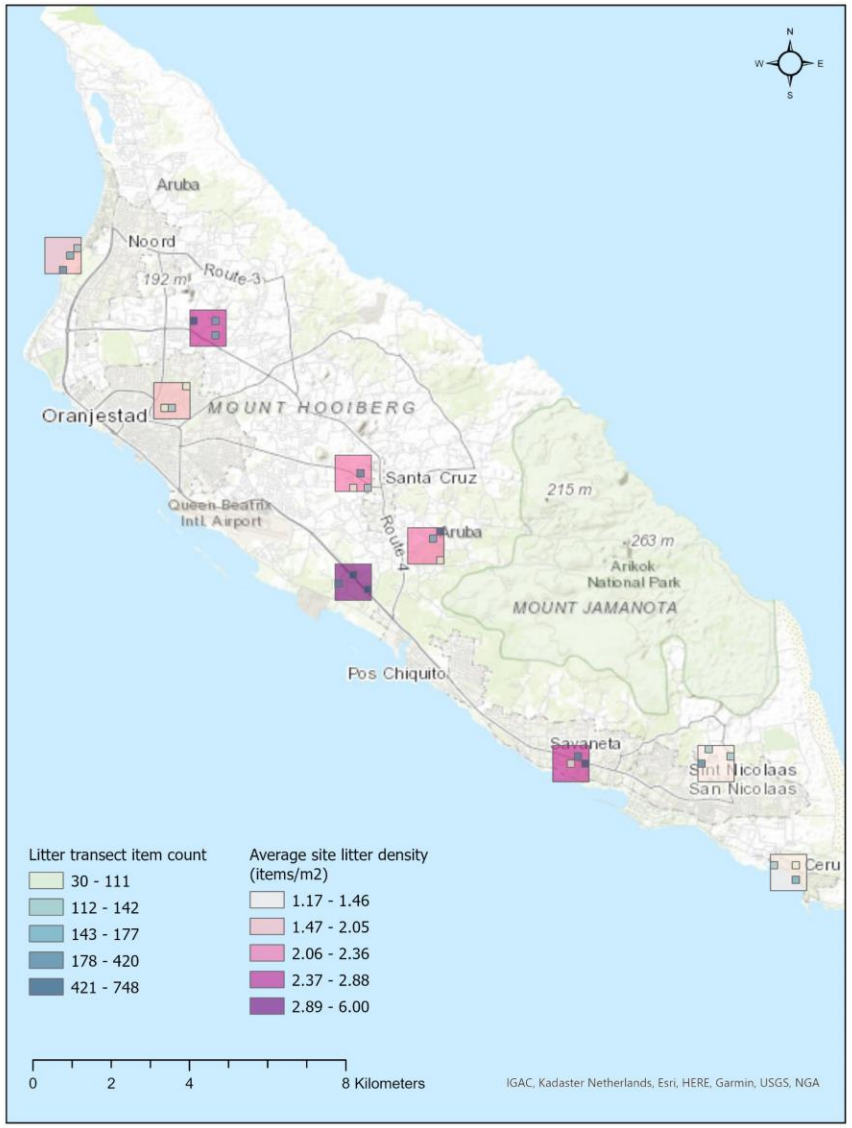


# *Hilo:* **Use**

| Alternative Type | Cost compared to single-use plastic |
|---|---|
| Compostable | 1.62x |
| Bulk | -0.39x |
| Reusable | 91.8x |
| Concentrated | -0.80x |
| Refillable | 1.71x |
| Degradable | -0.60x |
| Paper packaging | 0.29x |



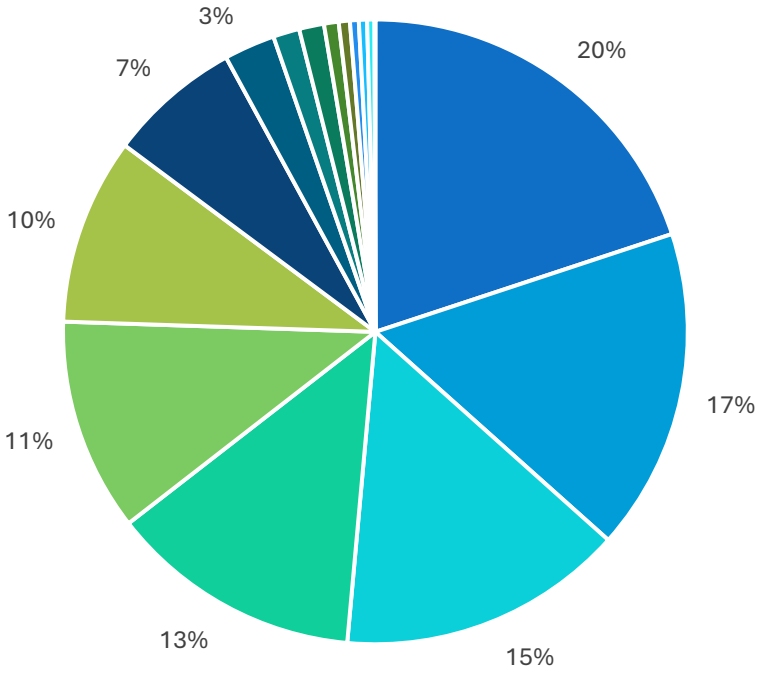





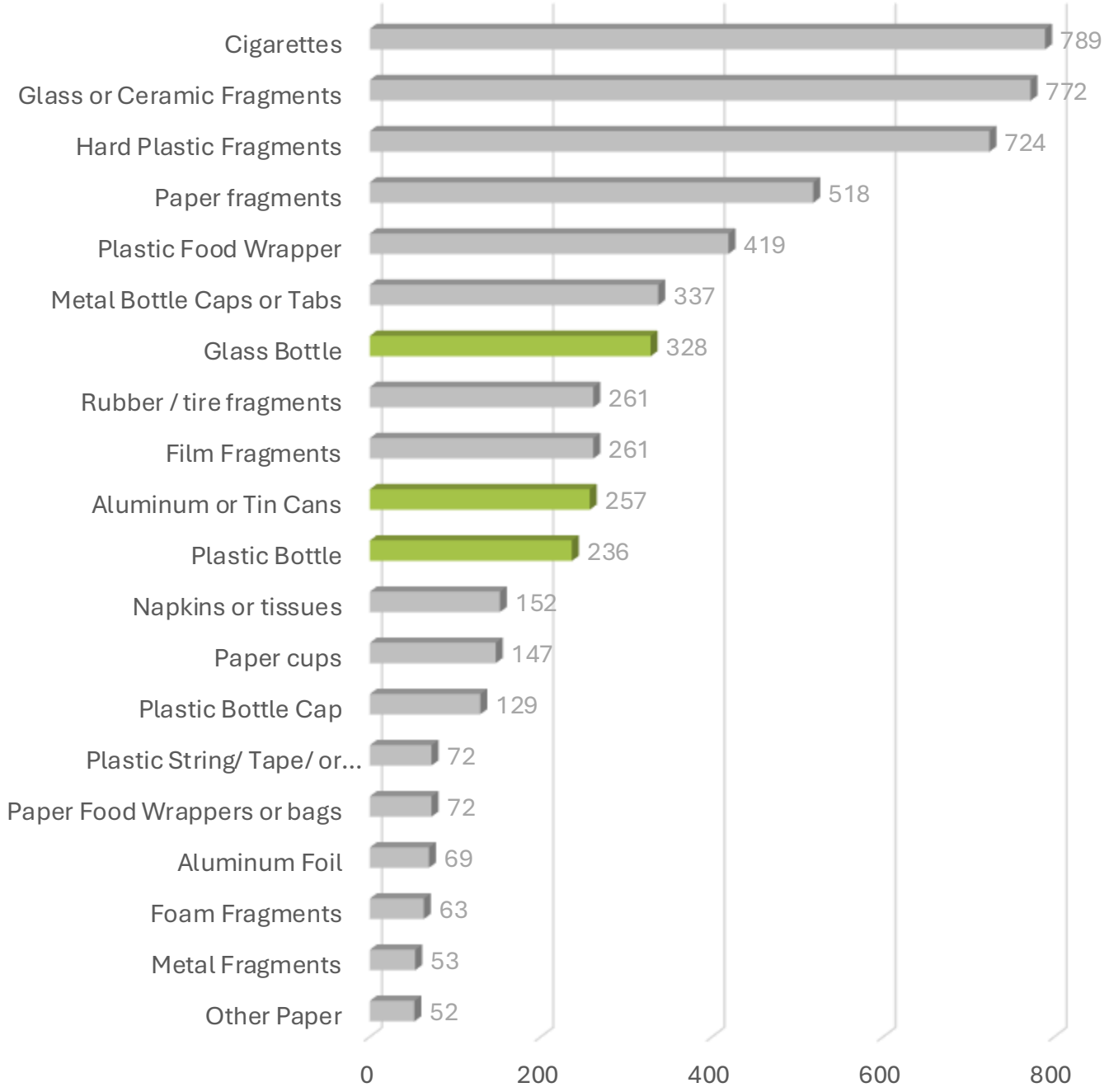
# *Aruba:* **Leakage**

# Litter characterization and top items

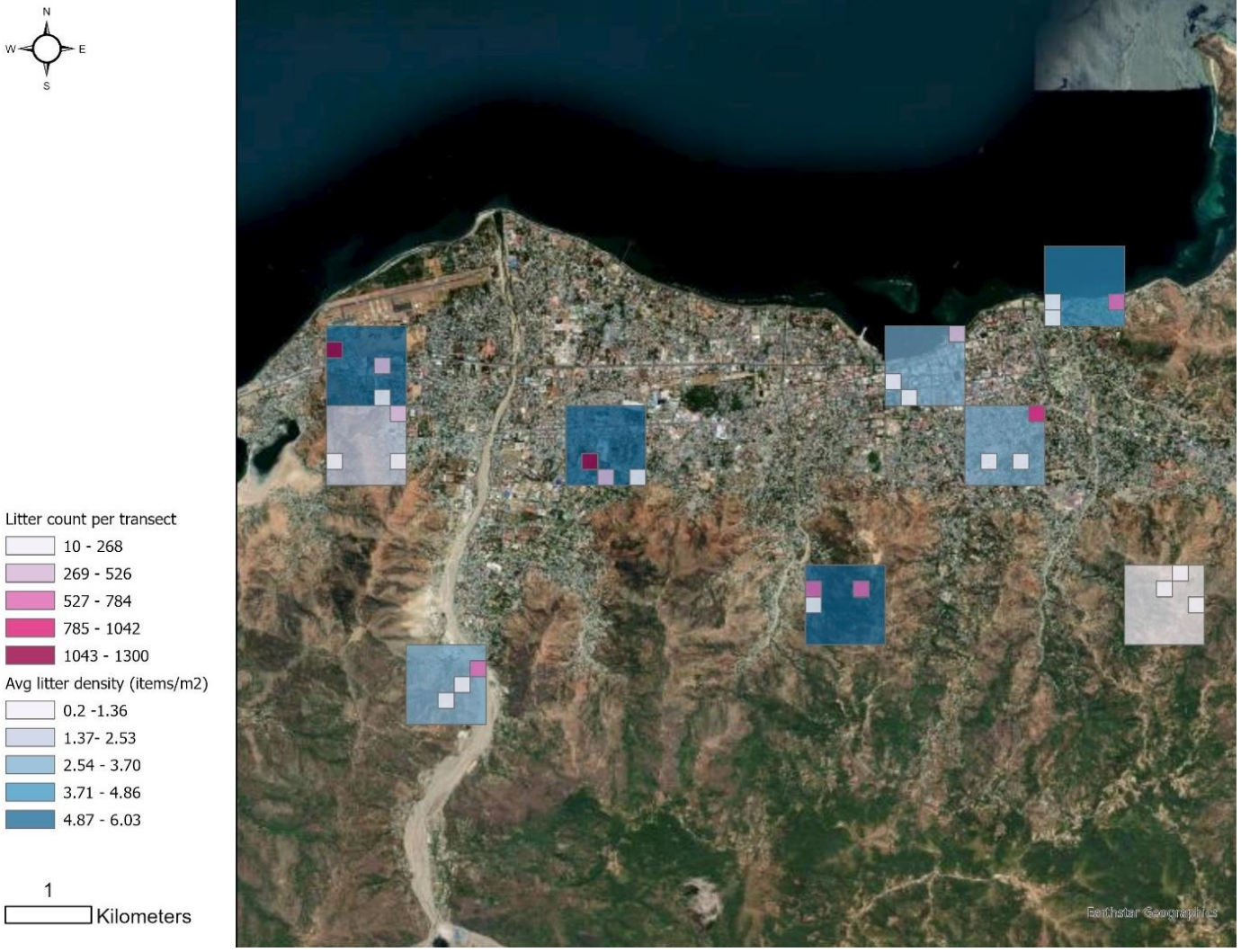
(n = 6,594)




- Plastic Fragments
- Glass
- Food-related Plastic Packaging
- Tobacco Products
- Metal
- Paper
- Food-related Paper Packaging
- Other Plastic
- Cloth
- Construction & Demolition Materials
- Personal Protective Equipment
- Personal Care
- E-Waste
- Other
- Organics
- Fishing Gear

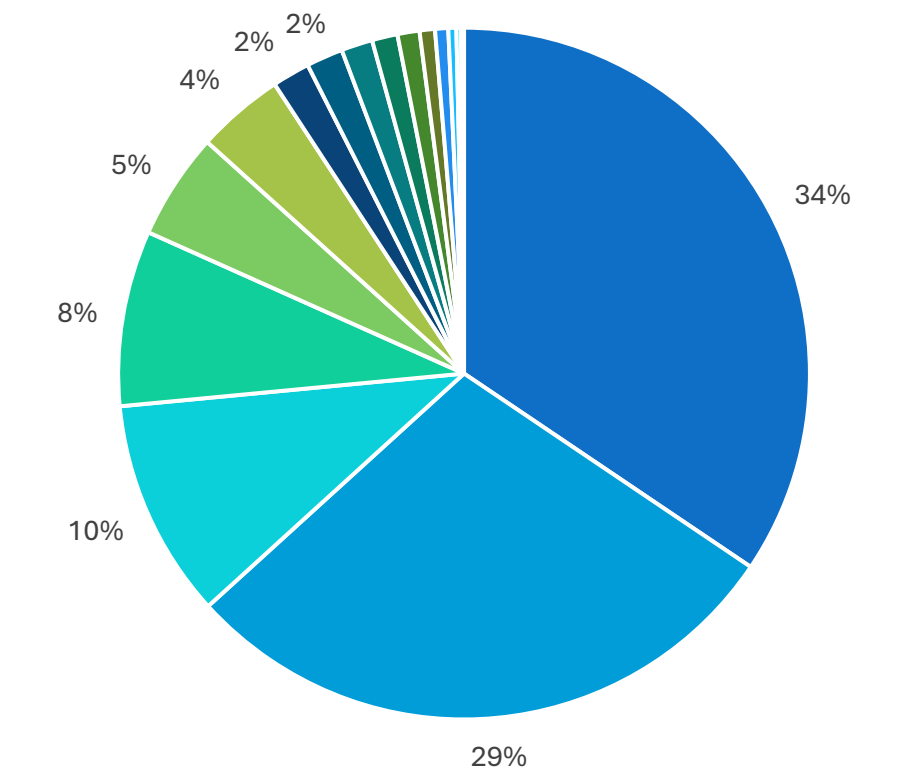


# *Timor Leste:* **Leakage**

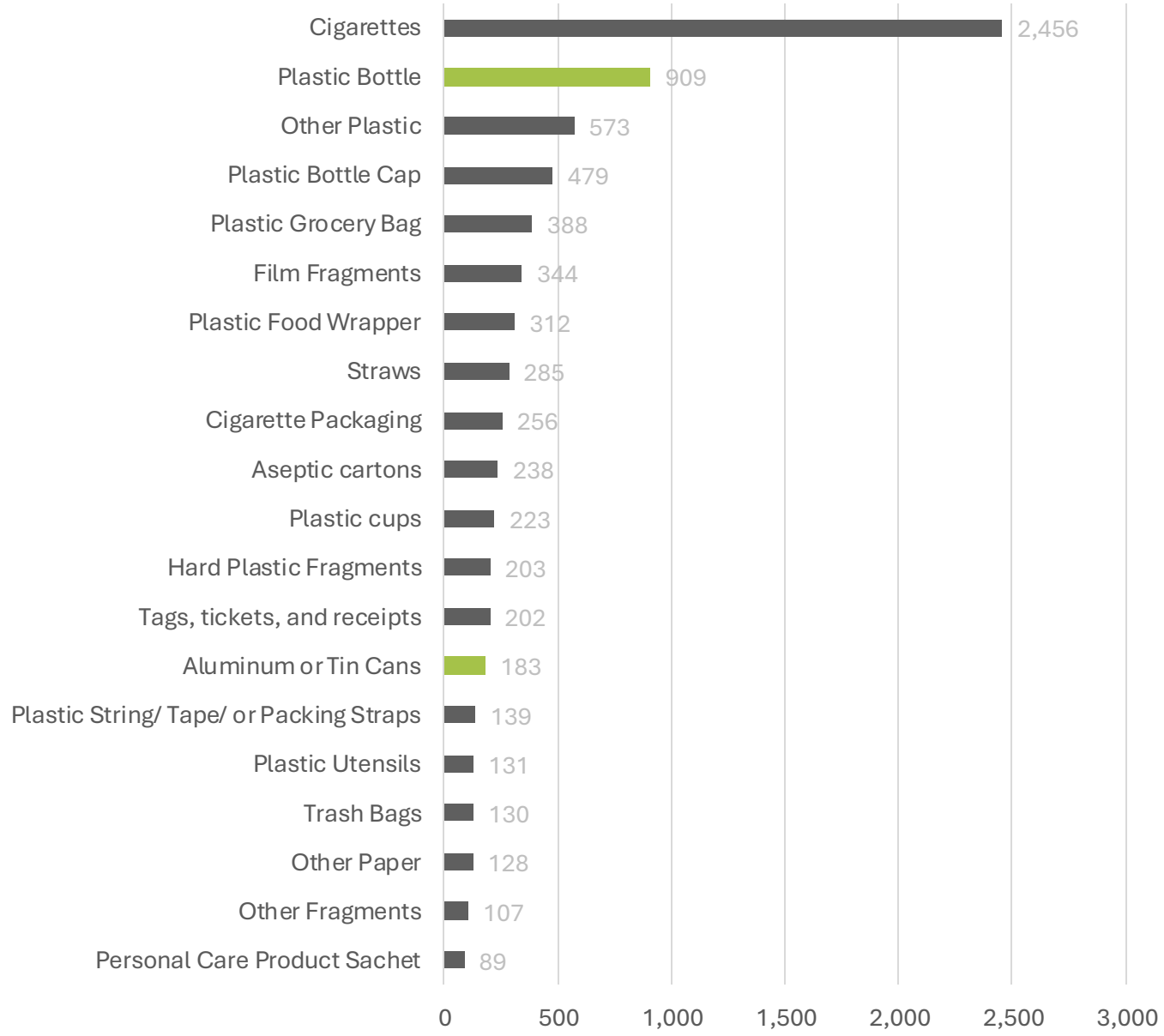


# Litter characterization and top items

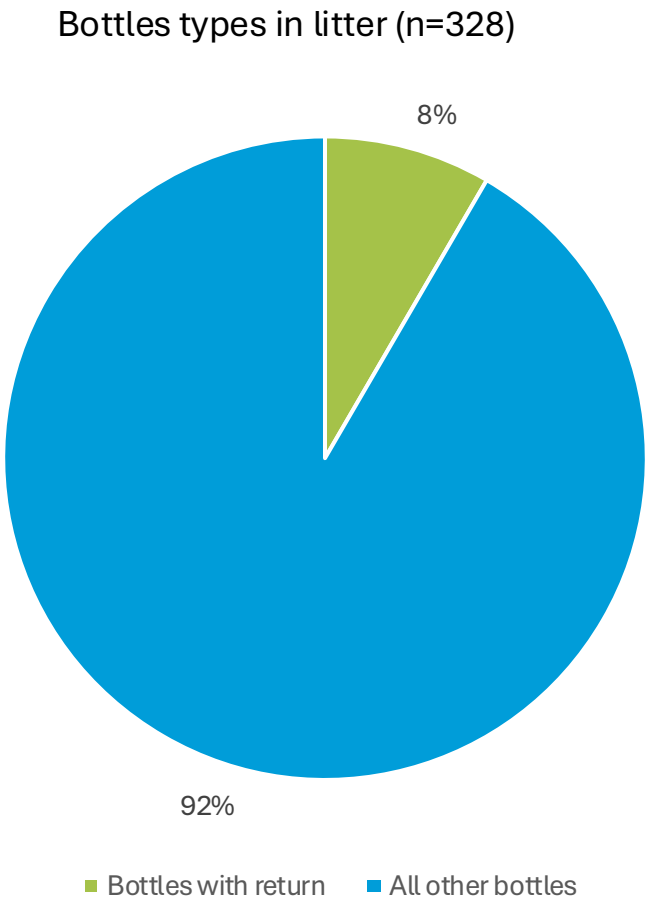
(n = 9,615)

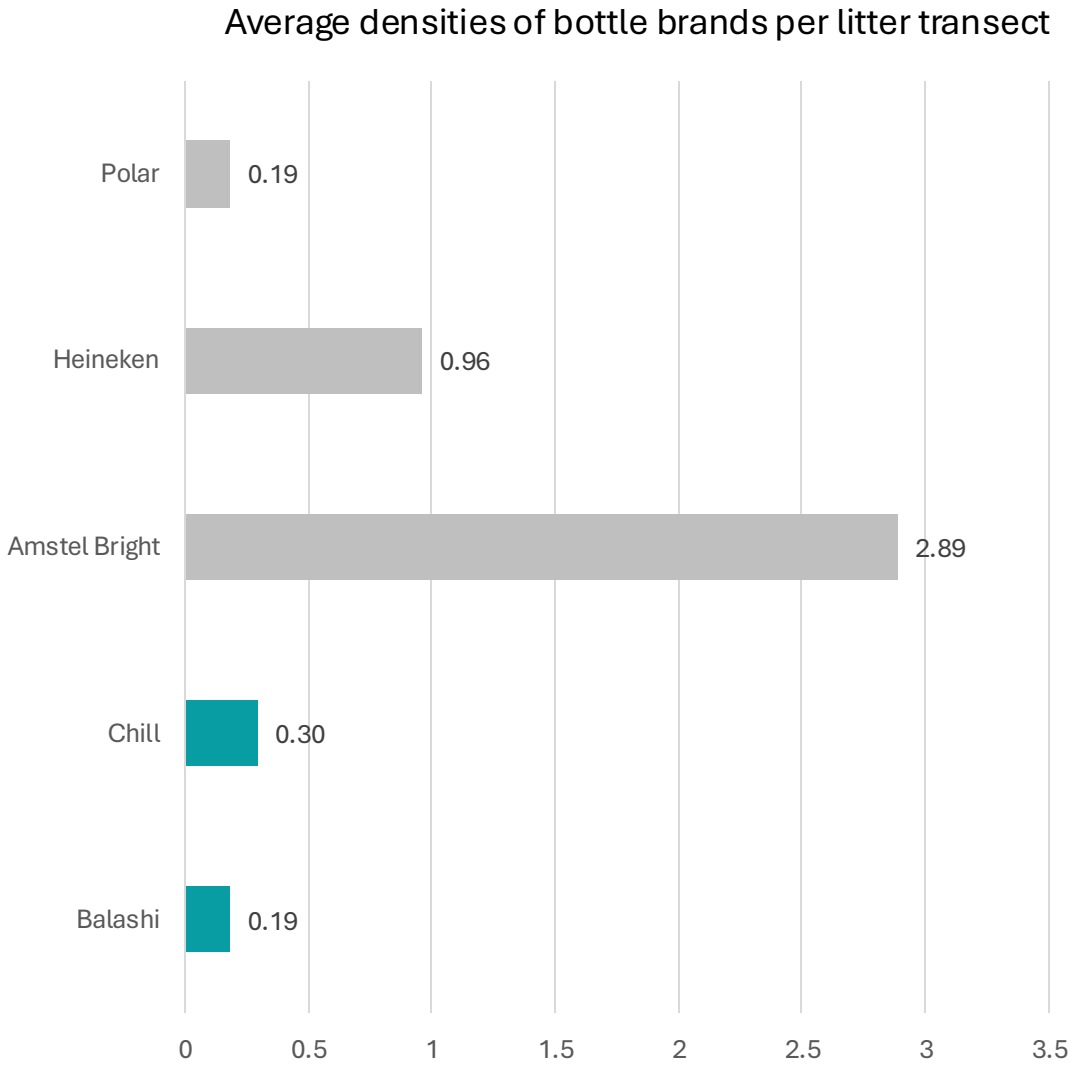



- Food-related plastic packaging
- Tobacco products
- Other plastic
- Plastic fragments
- Paper
- Metal
- Glass
- Personal care
- C&D Materials
- Food-related paper
- Cloth
- Other
- Fishing gear
- E-waste
- PPE
- Organics

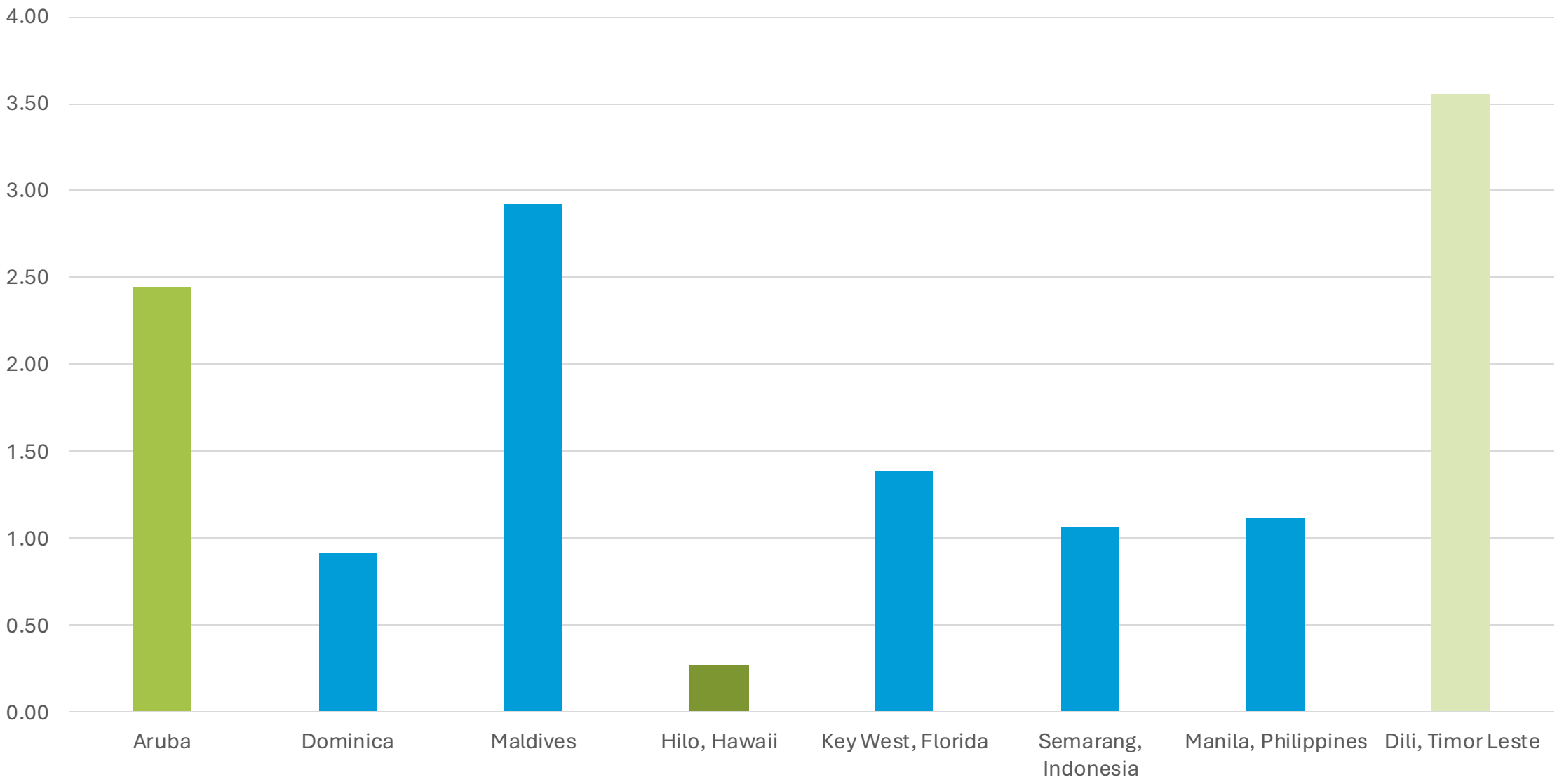


# *Aruba:* **Leakage**



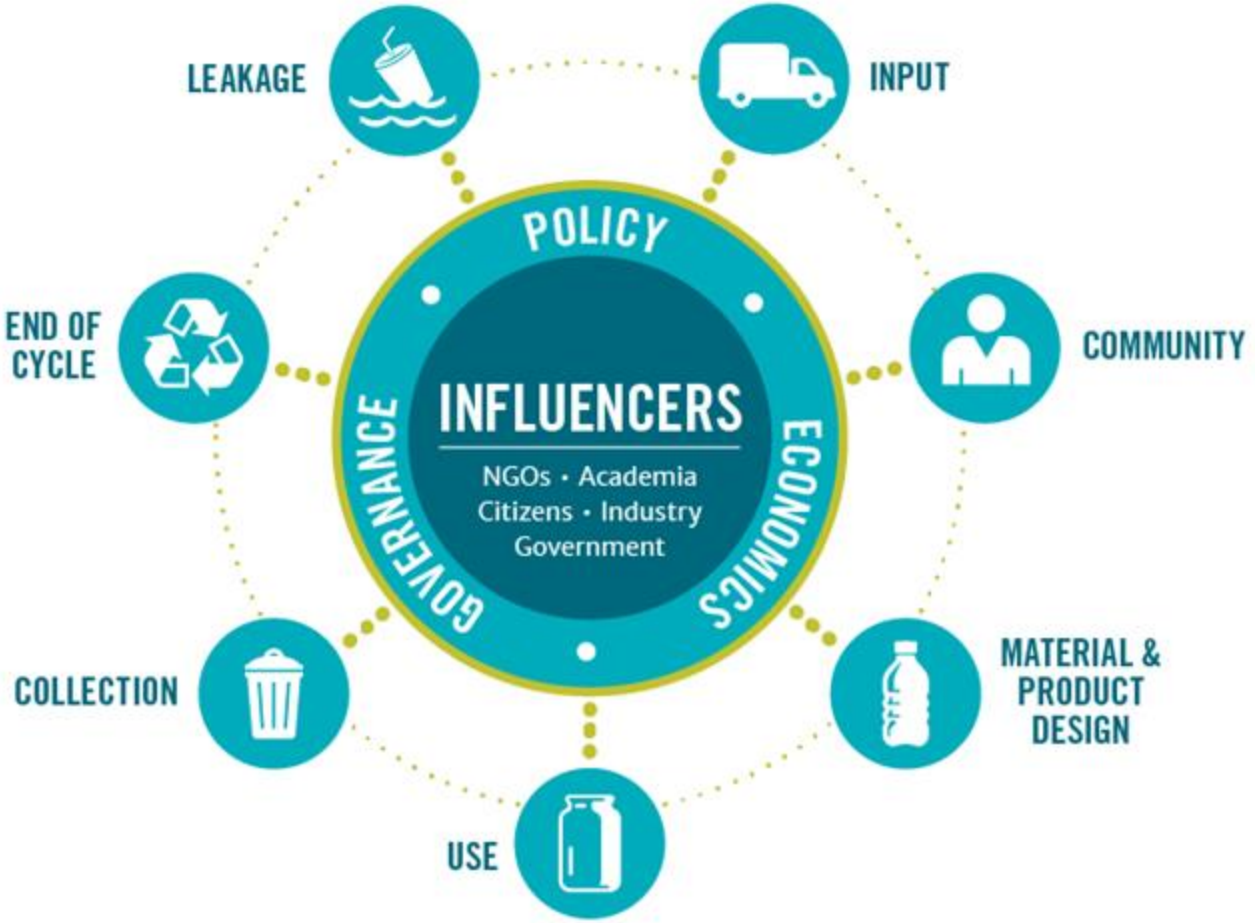
# Average litter density in CAP cities around the world (items/m2)



*Average density of items per transect in litter surveys in island locations.*

| Item | Average items per transect in Hilo, Hawaii (items/100 $m^2$) | Average items per transect in Maldives (items/100 $m^2$) | Average items per transect in Dominica (items/100 $m^2$) | Average items per transect in Dili, Timor Leste (items/100 $m^2$) | Average items per transect in Aruba (items/100 m2) |
|---|---|---|---|---|---|
| Plastic grocery bags | 0.03 | 4.48 | 1.42 | 14.37 | 0.67 |
| Plastic and foam cups or lids | 0.42 | 1.78 | 3.94 | 12.26 | 1.71 |
| Plastic Utensils | 0.22 | 1.81 | 0.90 | 4.85 | 0.85 |
| Straws | 0.19 | 1.07 | 0.34 | 10.56 | 1.63 |
| Plastic and foam containers | 0.33 | 1.85 | 0.16 | 4.30 | 0.22 |
| Plastic beverage bottles | 0.44 | 17.26 | 8.74 | 33.67 | 8.08 |

# Thank you!

**kathryny@uga.edu**

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