Anthropogenic Litter Abundance and Composition in Urban Streams: Influence of Site and Habitat

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Introduction

- Anthropogenic litter (AL) refers to trash, such as plastic, glass, and other materials that find their way into the environment.
- Accumulation of AL is a growing concern at a global scale.
- Rivers are a key site of AL disposal and transport to global oceans.
- Yet, research on AL assemblage, density, and movement within rivers is relatively uncommon.
- Understanding the abundance and distribution of AL is needed to inform efficient clean-up and prevention strategies.
- Our objective was to quantify the abundance and composition of AL in different habitats at multiple sites in an urban watershed.

Hypothesis

We Predict:

1. Greater AL at the downstream sites relative to upstream.
2. AL assemblage will be different among habitats within the streams.
   • Overhanging vegetation, riparian zone, and floating habitats will be dominated by lightweight items (e.g., plastics, styrofoam).
   • Benthic habitats will consist of more heavy material (e.g., glass, rubber).

Study Sites

Tributaries:
- Skokie River
- Middle Fork Savannah

Mid-watershed:
- Glenview Woods
- Downstream
- Bunker Hill

Methods

Field Work

a. We marked 3, 100 m reaches at each of the study sites.
b. All AL was collected from the reaches.
c. We separated material according to habitat found:
   • Overhanging vegetation
   • Riparian zone
   • Floating
   • Benthic (submerged)

Laboratory Processing

a. Categorized, weighed AL
b. Mass, dimension, and shape were measured for macroplastic

Data Analysis (done in R)

a. Worked on code to create stacked bar graphs (ggplot2)
b. Worked on code to analyze community of AL by non-metric multidimensional scaling (NMDS) (vegan)

Discussion

1. There was ultimately more AL downstream than upstream.
   a. AL primarily accumulates at downstream locations, likely due to movement of wind and current.
   b. Seen in figures 4 and 5.
2. The composition of AL differed by site.
   a. Each site differs both in composition of AL and of human activities at each site.
   b. Seen in Figure 6.
   c. As composition of AL differs at each site, clean-up procedures could be adapted to the specific needs of each site.

Conclusions:

- We expected benthic habitats to show the greatest litter density, but this was only true for the most downstream sites.
- At Skokie River and Glenview Woods, the greatest amount of AL was found in the riparian zone (streamside vegetation).

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