Waste Composition in New York State: 2022 Sampling Results

Sameena Manzur
Tania Thomas

Waste Data and Analysis Center
Department of Technology and Society
Stony Brook University
Department of Technology and Society

Stony Brook University – College of Engineering and Applied Sciences
Flagship of the State University of New York
(64 campuses, 1.3 million students

Degrees:
- BS (Tech Systems Management)
- MS (Technological Systems Management) (Online and FTF)
- PhD (Technology, Policy & Innovation)
What do we do?

Sort Garbage into 40 different categories

3 samples per day for a week weighing up to ½ metric tons

<table>
<thead>
<tr>
<th>Major Category</th>
<th>Subcategories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper</td>
<td>ONP</td>
</tr>
<tr>
<td></td>
<td>OCC (not waxed, no pizza boxes, no egg cartons)</td>
</tr>
<tr>
<td></td>
<td>Wax-pizza-egg carton OCC</td>
</tr>
<tr>
<td></td>
<td>Boxboard</td>
</tr>
<tr>
<td></td>
<td>Other recyclable paper</td>
</tr>
<tr>
<td></td>
<td>Other paper</td>
</tr>
<tr>
<td>Glass</td>
<td>Dep. glass containers</td>
</tr>
<tr>
<td></td>
<td>Other glass containers</td>
</tr>
<tr>
<td></td>
<td>Glass fragments</td>
</tr>
<tr>
<td></td>
<td>Other glass</td>
</tr>
<tr>
<td>Ferrous-bimetal</td>
<td>Ferrous containers</td>
</tr>
<tr>
<td></td>
<td>Other ferrous (not recyclable)</td>
</tr>
<tr>
<td>Aluminum</td>
<td>Dep. alum. containers</td>
</tr>
<tr>
<td></td>
<td>Other alum. Containers</td>
</tr>
<tr>
<td></td>
<td>Aluminum foil</td>
</tr>
<tr>
<td></td>
<td>Other aluminum (not recyclable)</td>
</tr>
<tr>
<td>Other non-ferrous metal</td>
<td></td>
</tr>
<tr>
<td>Plastics</td>
<td>Dep. #1 containers</td>
</tr>
<tr>
<td></td>
<td>Other #1 containers</td>
</tr>
<tr>
<td></td>
<td>#2 containers natural</td>
</tr>
<tr>
<td></td>
<td>#2 containers colored</td>
</tr>
<tr>
<td></td>
<td>#5 plastic containers</td>
</tr>
<tr>
<td></td>
<td>Black plastic containers</td>
</tr>
<tr>
<td></td>
<td>Other plastic containers</td>
</tr>
<tr>
<td></td>
<td>Rigid plastic</td>
</tr>
<tr>
<td></td>
<td>Plastic film</td>
</tr>
<tr>
<td></td>
<td>Other plastics</td>
</tr>
<tr>
<td>Rubber &amp; leather</td>
<td></td>
</tr>
<tr>
<td>Textiles</td>
<td></td>
</tr>
<tr>
<td>Wood</td>
<td></td>
</tr>
<tr>
<td>Food</td>
<td></td>
</tr>
<tr>
<td>Yard Waste</td>
<td></td>
</tr>
<tr>
<td>Other organics</td>
<td></td>
</tr>
<tr>
<td>Other inorganics</td>
<td></td>
</tr>
<tr>
<td>Electronic-containing wastes</td>
<td></td>
</tr>
<tr>
<td>HHW</td>
<td></td>
</tr>
<tr>
<td>Fines</td>
<td></td>
</tr>
</tbody>
</table>
Set up and Process
Examples

Other Plastic

Other Paper

Food
Locations of Sampling Events Based on Sample Type
## 2022 NY Solid Waste Data

<table>
<thead>
<tr>
<th>Item</th>
<th>Weight (Kilograms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSW</td>
<td>21,527.5</td>
</tr>
<tr>
<td>Single Stream</td>
<td>4,140.3</td>
</tr>
<tr>
<td>Container Recyclables</td>
<td>2,815.4</td>
</tr>
<tr>
<td>Paper Recyclables</td>
<td>5,766.2</td>
</tr>
<tr>
<td>Special Product Sort</td>
<td>136.9</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>34,386.3</strong></td>
</tr>
</tbody>
</table>
Multivariate Analysis: Heat Maps and Clustering

1. Calculate means for each sampling location
2. Reduce the variables from 40 to 16
3. Calculate Euclidean distances (16-D space)
4. Create heatmaps (red to blue)
5. Do other statistical analyses
6. Interpret patterns
New York State Solid Waste Clusters
PCA for New York State Solid Waste Stream Type
Funding for this research was provided through the New York State Environmental Protection Fund as administered by the New York State Department of Environmental Conservation through a Memorandum of Understanding with Stony Brook University (AM 11643) effective September 11, 2019. The opinions, findings, and/or interpretations of data contained therein are the responsibility of the University and do not necessarily represent the opinions, interpretations or policy of the New York State Department of Environmental Conservation.

Thank You!
Appendix
Single Stream
Paper Stream
Container Stream
### Consolidated categories

<table>
<thead>
<tr>
<th>Consolidated categories</th>
<th>Sort categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCC</td>
<td>OCC</td>
</tr>
<tr>
<td>Other recyclable paper</td>
<td>ONP, boxboard, brown paper, glossy paper, office paper, junk mail, other comm’l printing, shredded paper, other recyclable paper</td>
</tr>
<tr>
<td>Other paper</td>
<td>Compostable paper, non-compostable paper, other paper, gable-top cont.</td>
</tr>
<tr>
<td>Recyclable glass</td>
<td>Dep. glass cont., wine-liquor bottles, other glass cont., glass fragments</td>
</tr>
<tr>
<td>Other glass</td>
<td>Other glass</td>
</tr>
<tr>
<td>Ferrous cont.</td>
<td>Ferrous cont.</td>
</tr>
<tr>
<td>Alum. cont.</td>
<td>Alum. cont., dep. alum. cont., other alum. cont., alum. foil</td>
</tr>
<tr>
<td>Other metals</td>
<td>Other ferrous, other alum., auto batteries, other non-alum., other non-ferrous</td>
</tr>
<tr>
<td>#1/#2 cont.</td>
<td>#1 cont., #1 dep. cont., #1 wine-liquor cont., #1 other cont., #1 clamshells, #2 cont., #2 cont. natural, #2 cont. colored</td>
</tr>
<tr>
<td>Other plastic cont.</td>
<td>(#2, #3, #4, #6, #7 cont.) (#3-#7 cont.), (#4, #5 cont.), #5 cont., #5 cont. &amp; lids, #6 cont., #7 cont., #3 lids, #4 lids, #5 lids, #6 lids, other lids, other plastic cont.</td>
</tr>
<tr>
<td>Other plastics</td>
<td>Black plastics, rigid plastics, retail plastic bags, other plastic film, other plastics</td>
</tr>
<tr>
<td>Textiles</td>
<td>Textiles</td>
</tr>
<tr>
<td>Food</td>
<td>Food</td>
</tr>
<tr>
<td>Yard wastes</td>
<td>Yard wastes</td>
</tr>
<tr>
<td>Other organics</td>
<td>Rubber-leather, wood, other organics, other (USEPA)</td>
</tr>
<tr>
<td>Other inorganics</td>
<td>Other inorganics, rechargeable batteries, HHW, other (NYSDEC)</td>
</tr>
</tbody>
</table>

#### 40 Variable reduction to 16 Variables