Using GIS and spatially linked multivariable statistics as a hypotheses generating tool in forensic geochemistry: An example from the Neponset River Watershed

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Spatial distribution of elements Zn, Pb, Cr, Cu in surface sediment samples of the Neponset River Watershed
Integrating Historical Land Use

<table>
<thead>
<tr>
<th>Industry</th>
<th>Description</th>
<th>Time of operation</th>
<th>Location in watershed</th>
<th>Recorded Effluents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Paul Revere Copper Rolling Mill</td>
<td>Rolled copper products</td>
<td>1801 - 1909</td>
<td>Factory Pond</td>
<td>Cu, Zn</td>
</tr>
<tr>
<td>2  Plymouth Rubber Company</td>
<td>Vinyl rubber products</td>
<td>1909 - 2007</td>
<td>Factory Pond and Lower Forge Pond</td>
<td>Cl, Ca, Al, Cr, Ni</td>
</tr>
<tr>
<td>3  Kinsey Iron and Tool Company</td>
<td>Forgings, tools, rolled iron</td>
<td>1787 - 1907</td>
<td>East Branch at Lower Forge Pond</td>
<td>Fe</td>
</tr>
<tr>
<td>4  Oliver Ames and Sons Shovel Shop</td>
<td>Steel shovels</td>
<td>1847 - 1927</td>
<td>Forge Pond</td>
<td>Fe, Ni, Cr, Ni, Pb</td>
</tr>
<tr>
<td>5  Hollingsworth &amp; Voss Company</td>
<td>Specialty papers</td>
<td>1843 - present</td>
<td>Downstream of Phipps Pond</td>
<td>On site: Cr, Cu, Zn, Hg</td>
</tr>
<tr>
<td>6  Bland &amp; Son</td>
<td>Paper, corset</td>
<td>1795 - present</td>
<td>Downstream of Phipps Pond</td>
<td>On site: Cr, Cu, Zn, Hg</td>
</tr>
<tr>
<td>7  Blackham and Union Privileges (EPA Superfund site)</td>
<td>Iron, nails, corset, wood, iron</td>
<td>1800s - present</td>
<td>Upstream of Clarks Pond</td>
<td>On site: Pb, As, Ni, VOC</td>
</tr>
<tr>
<td>8  Fishborough Company</td>
<td>Industrial controls</td>
<td>1908 - present</td>
<td>Neponset Reservoir</td>
<td>Cd and other metals</td>
</tr>
</tbody>
</table>
Conceptual framework for generating hypotheses
Within-sample correlations

Spatial correlations