Promoting Geospatial Technologies with Socio-Environmental Science Investigations

Shannon Salter\textsuperscript{1}, Alec Bodzin\textsuperscript{2}, Tom Hammond\textsuperscript{2}, Ian Hanson\textsuperscript{1}, William Farina\textsuperscript{2}, Robson Junior\textsuperscript{2}, Qiong Fu\textsuperscript{2}, Kate Popejoy\textsuperscript{3}, David Anastasio\textsuperscript{2}, Breena Holland\textsuperscript{1}, Dork Sahagian\textsuperscript{1}, and Scott Rutzmoser\textsuperscript{1},

\textsuperscript{1}Building 21 High School, Allentown, PA, \textsuperscript{2}Lehigh University, \textsuperscript{3}Popejoy STEM, LLC

2019 ESRI Education Summit
San Diego, CA
July
About Our School

- 4 teachers of 9th grade students - urban public school
- All students economically disadvantaged
- 2/3 Hispanic or Latino
- 21% ELL, 19% IEPs
- Many (~10-20%) are unengaged learners
  - Do not complete tasks
  - Avoid challenging work
Re-visiting sequence of activities

Investigation topics (can be flexibly sequenced):
● Observing: Ecology, built environment (Sci & SS)
● Trees & ecological services (Sci & SS)
● Urban Heat Islands (Sci)
● Zoning (SS)
● Built Environment activity (SS)
● Transportation (sci & SS)
● Carbon sequestration lab (sci)

Project topics
● Tree planting (sci)
● Culminating project (urban planning for social, environmental, & economic sustainability)
Re-visiting sequence of activities

Investigation topics (can be flexibly sequenced):

- Observing: Ecology, built environment (Sci & SS)
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- Built Environment activity (SS)
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Project topics

- Tree planting (Sci)
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Data Gathering Areas

School
Does the tree have needles or leaves?

LEAVES

NEEDLES

What are Needles?

Scientific Name

Acer rubrum

Common Name

Red Maple

BACK TO DIRECTIONS

MORE INFO
### Tree Observations: Kwanzan Cherry

<table>
<thead>
<tr>
<th>Tree Type</th>
<th>Deciduous (leaves)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genus and Species</td>
<td>Prunus kwanzan</td>
</tr>
<tr>
<td>Common Name</td>
<td>Kwanzan Cherry</td>
</tr>
<tr>
<td>Origin</td>
<td>native</td>
</tr>
<tr>
<td>Height meters</td>
<td>6</td>
</tr>
<tr>
<td>Circumference cm</td>
<td>150</td>
</tr>
<tr>
<td>Notes or Observations</td>
<td>Mid sized tree alternative leaves multiple stumps</td>
</tr>
</tbody>
</table>

**Attachments:**

- [Zoom to](#)
- [Get Directions](#)
Using Filters for Data Analysis
Percent Canopy Layer
Personal and Property Crime Layers
Personal and Property crime and % tree canopy
12. a. Complete the class table below. You will need the data from other groups in the class.

<table>
<thead>
<tr>
<th>Area</th>
<th>Property Crime Index (USA Average = 100)</th>
<th>Personal Crime Index (USA Average = 100)</th>
<th>Percent Tree Canopy Cover (Allentown Average = 30%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>218.7 ▲</td>
<td>325.7</td>
<td>17.05% ▼</td>
</tr>
<tr>
<td>2</td>
<td>139</td>
<td>196.3</td>
<td>15.35%</td>
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<tr>
<td>3</td>
<td>73.7</td>
<td>69.3</td>
<td>31.69%</td>
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<tr>
<td>4</td>
<td>45.7</td>
<td>23.7</td>
<td>26.89%</td>
</tr>
<tr>
<td>5</td>
<td>25.3 ▼</td>
<td>22.3</td>
<td>52.94% ▲</td>
</tr>
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</table>
Culminating Project

The city government is creating a new comprehensive plan for future sustainable development and is interested in smart growth.

Students ...

Identify locations for reuse of existing sites or changing existing infrastructure.

Identify locations for new development, features, facilities, parks, or open spaces.

Create a Web GIS map for their area that reflects their proposed changes.

Justify their proposed changes with data from the Web GIS.

Describe how their proposed changes promote Smart Growth principles for their city.

Explain how those changes are environmentally sustainable for their city.

Explain how the city will be more livable for its citizens.
<table>
<thead>
<tr>
<th>Rating</th>
<th>Range</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exemplary</td>
<td>8-9</td>
<td>8 (11.9%)</td>
</tr>
<tr>
<td>Proficient</td>
<td>5-7</td>
<td>31 (46.3%)</td>
</tr>
<tr>
<td>Adequate</td>
<td>2-4</td>
<td>22 (32.8%)</td>
</tr>
<tr>
<td>Needs Improvement</td>
<td>0-1</td>
<td>6 (9.0%)</td>
</tr>
<tr>
<td>Submitted Blank</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Did not Submit</td>
<td></td>
<td>36</td>
</tr>
<tr>
<td>Rating</td>
<td>Range</td>
<td>N (%)</td>
</tr>
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<td>----------------------</td>
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<td>14 (20.9%)</td>
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<td>2-4</td>
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<td>0-1</td>
<td>17 (25.3%)</td>
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<td>10</td>
</tr>
<tr>
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<td>36</td>
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</table>
Authentic Culminating Task

Area 6 Tree Planting

Feasible Site Selection

The points in the black oval are the ones being planted in area 6. The pink points are the Kwanzan Cherry Trees and the blue points are the Flowering Dogwood Trees
Using Filters for Data Analysis
Benefits to the Built Environment

- Trees can create lasting impression on how a community is perceived by visitors and affect the mood and community pride of its residents.
- The feeling of community pride created by trees can help reduce crime.
- By absorbing and deflecting falling rain, trees can reduce the floods.
- Reduces carbon dioxide, dust and other potentially harm gases in the air.

Benefits To The Natural Environment

- Trees can reduce air temperature by blocking sunlight. Further cooling occurs when water evaporates from the leaf surface.
- Trees create an ecosystem to provide habitat and food for birds and other animals.
- Trees absorb carbon dioxide and potentially harmful gases, such as sulfur dioxide, carbon monoxide, from the air and release oxygen.
- Trees cool the air, land and water with shade and moisture thus reduce the heat-island effect of our urban communities.
Authentic Payoff to Place-Based Learning
Questions and Comments

SESI materials are available at:
http://eli.lehigh.edu/sesi
Assessment access:
Login: eliteacher   Password: 87dja92
Papers and this presentation available at:
https://eli.lehigh.edu/publications/research

ArcGIS