Promoting Geospatial Technologies with Socio-Environmental Science Investigations

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DRL-1614216

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 (S**ci**)
- 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)

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Project topics

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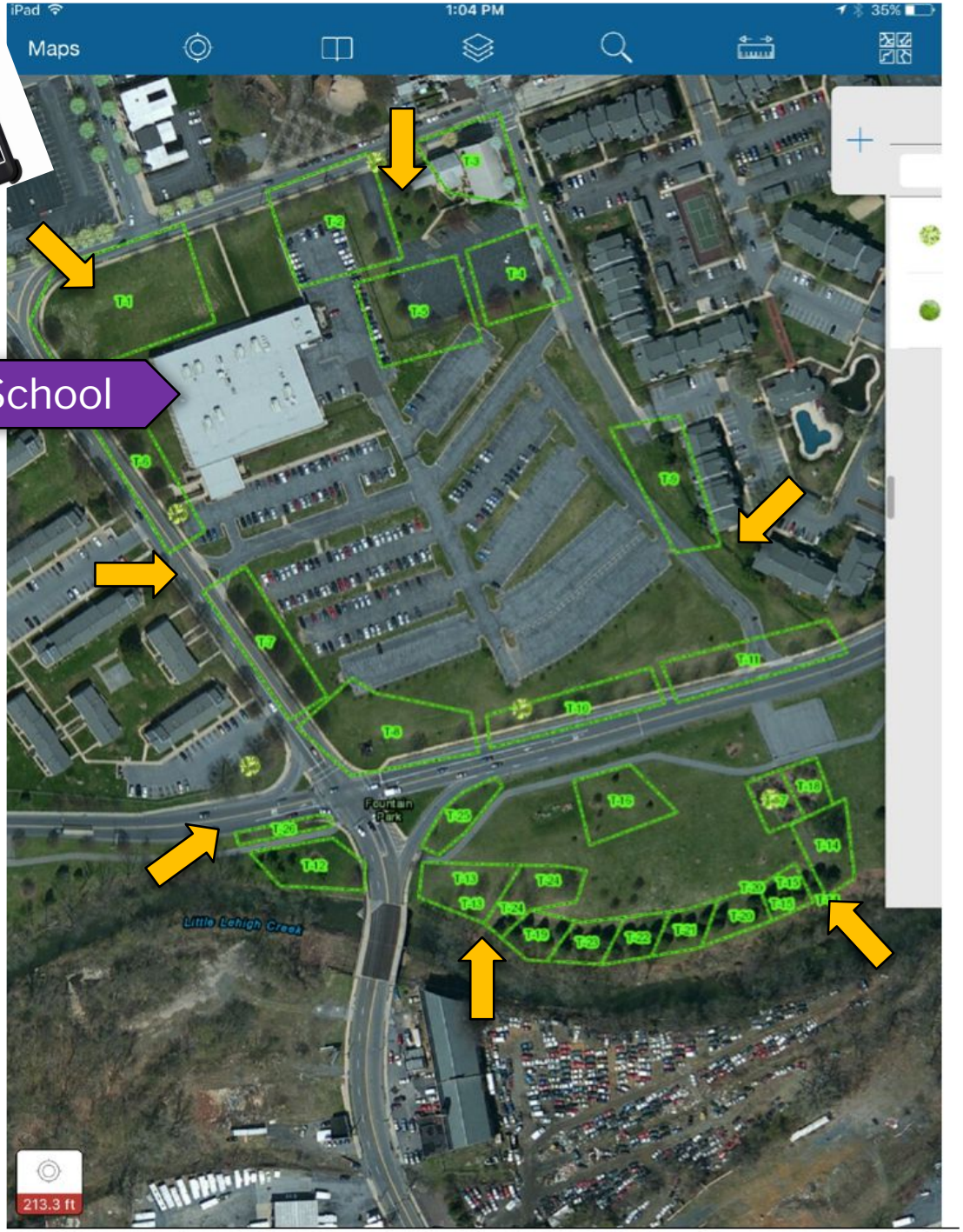
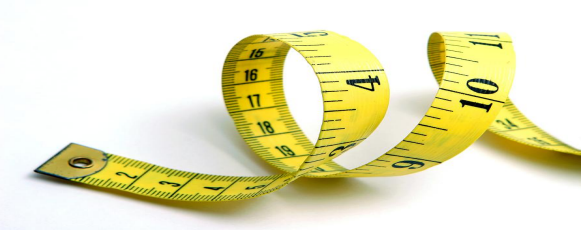
TES Data Gathering Areas



TES Data Gathering Interface



AT&T 5:14 PM 85%

Cancel Submit

Location
No valid Location

98.4 ft

Tree_Observation:

Tree Type
Deciduous (leaves)

Genus

Species

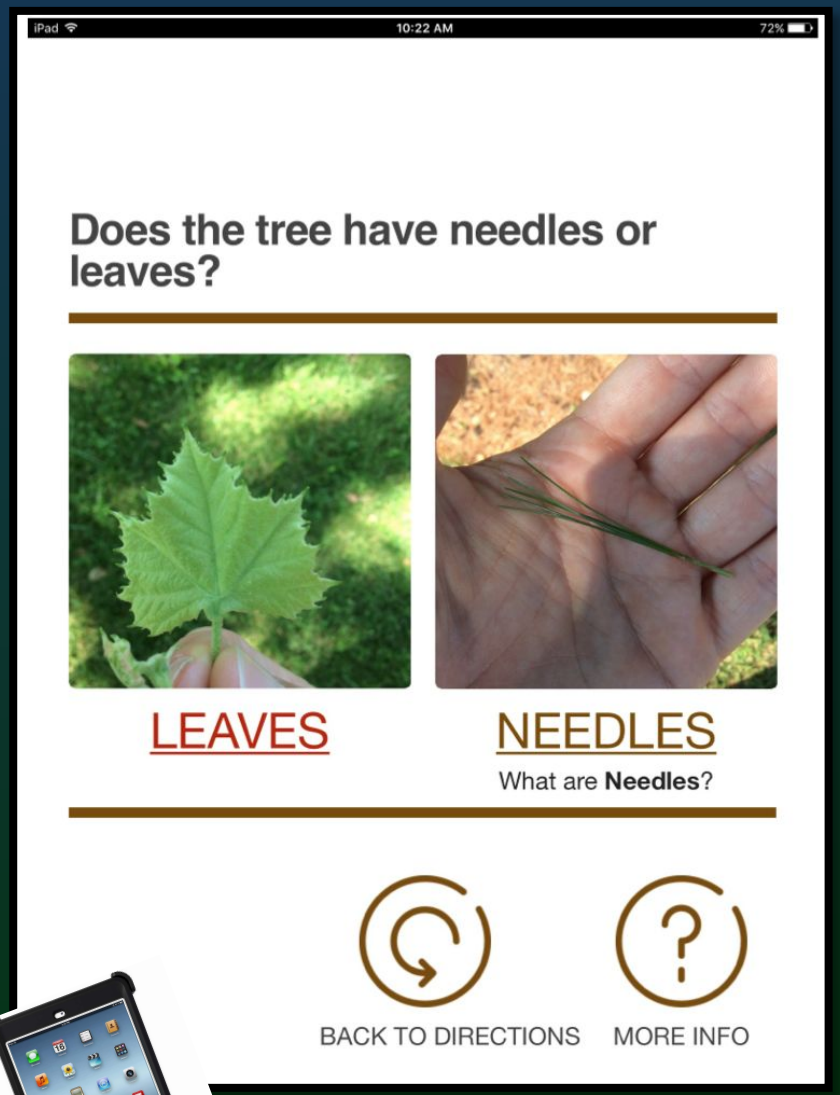
Origin
native

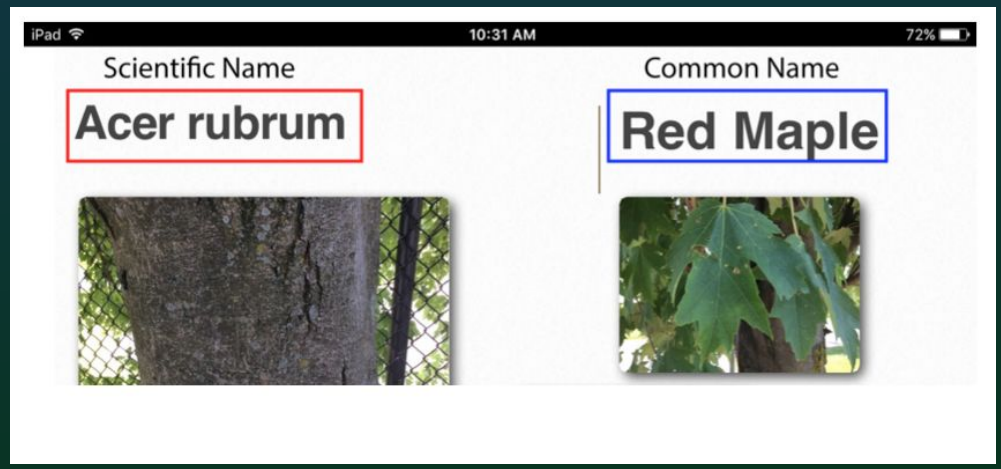
Height meters

Circumference cm

Notes or Observations

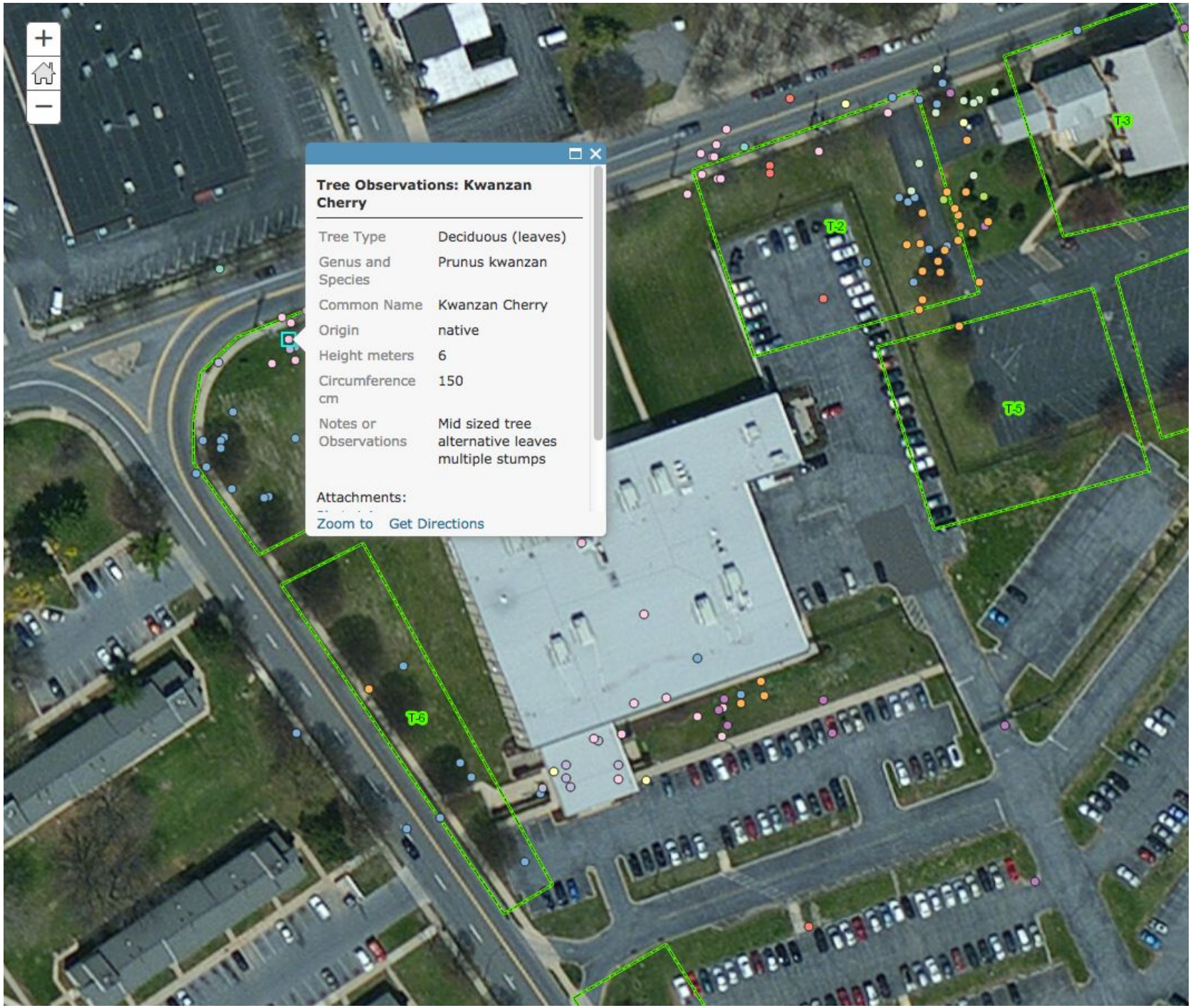
iBook pages


iPad
10:22 AM
72%
Does the tree have needles or leaves?
LEAVES
NEEDLES
What are Needles?
BACK TO DIRECTIONS
MORE INFO


iPad
10:31 AM
72%
Scientific Name
Acer rubrum
Common Name
Red Maple

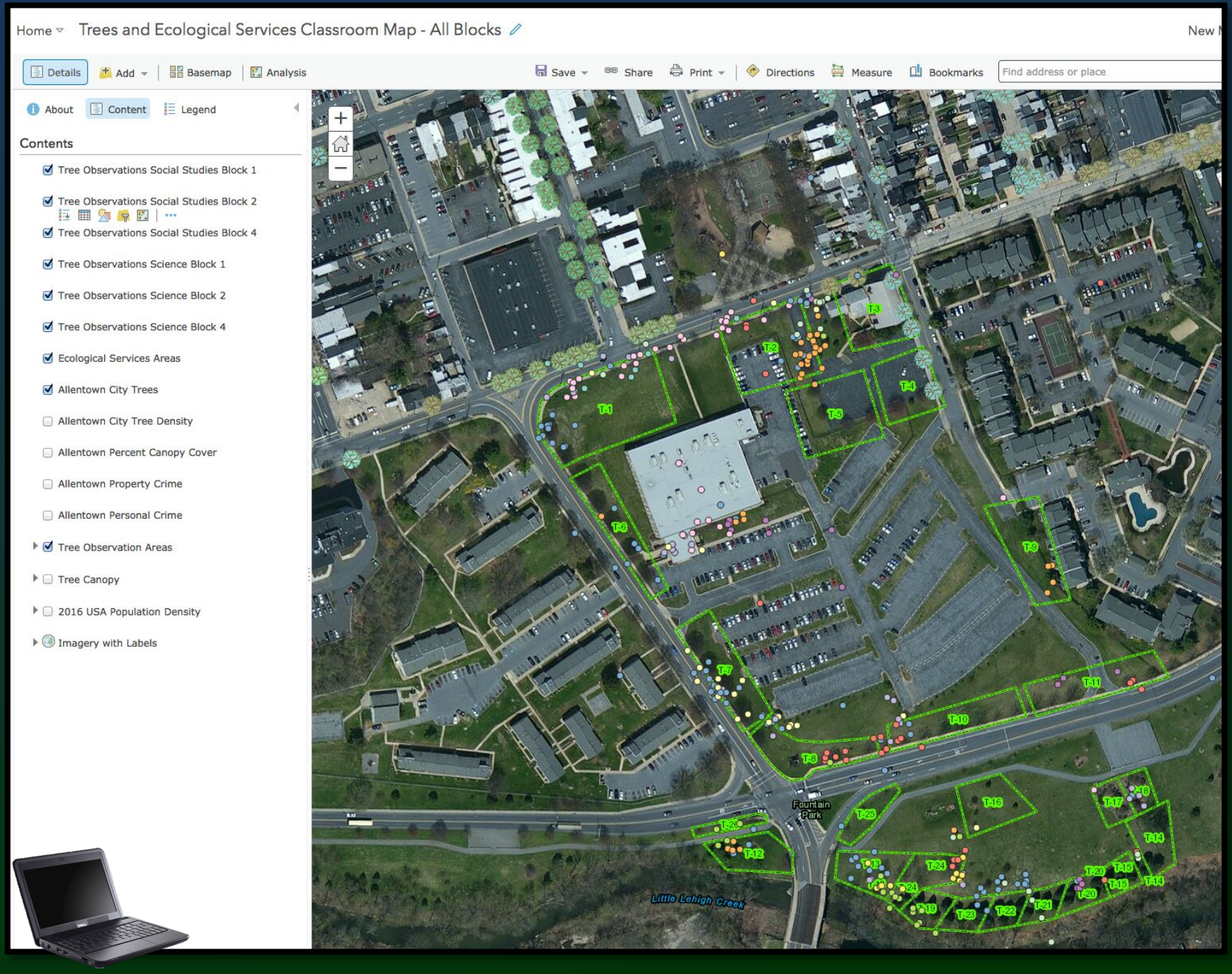
Student Photo

Mentors

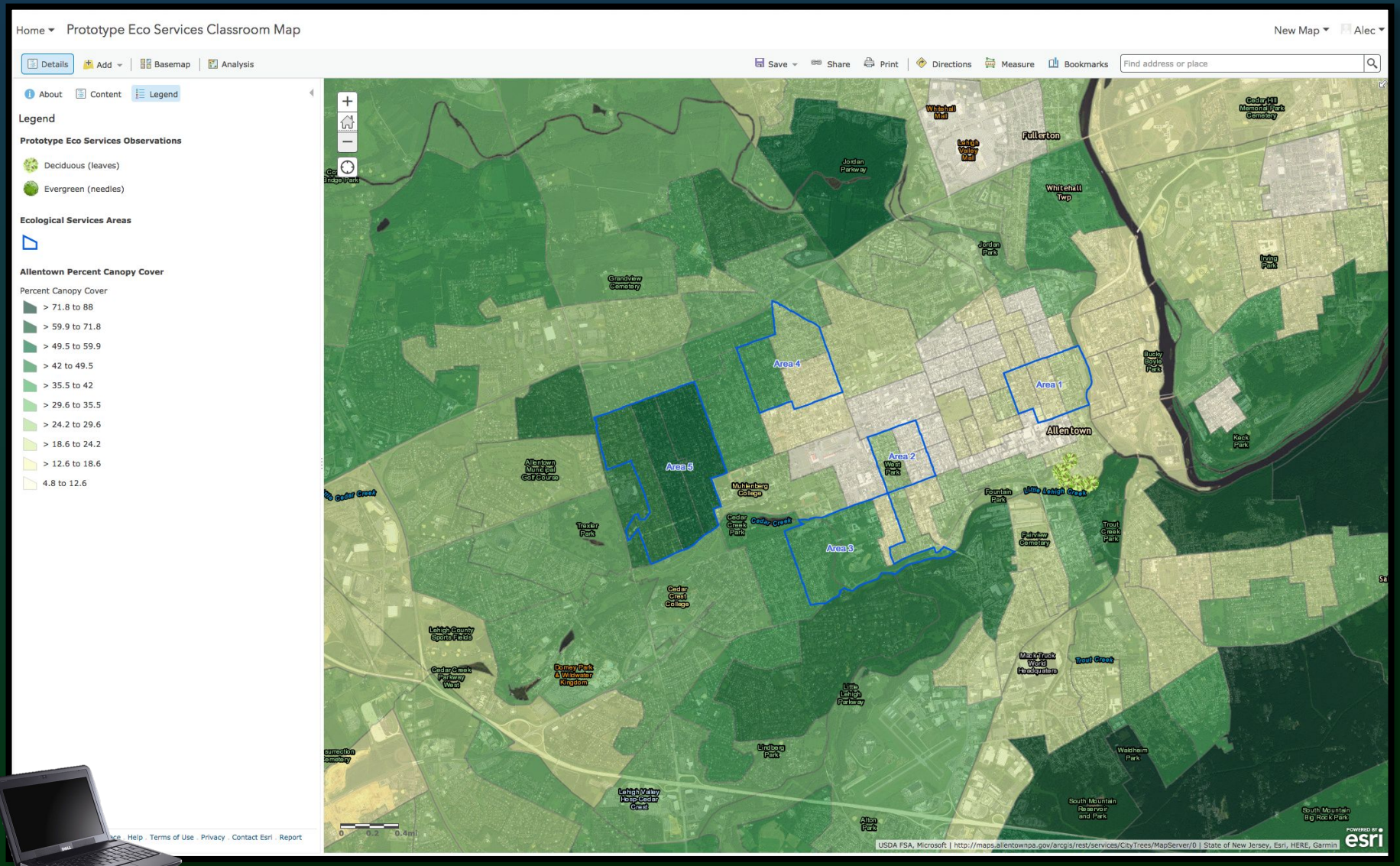


Student Data

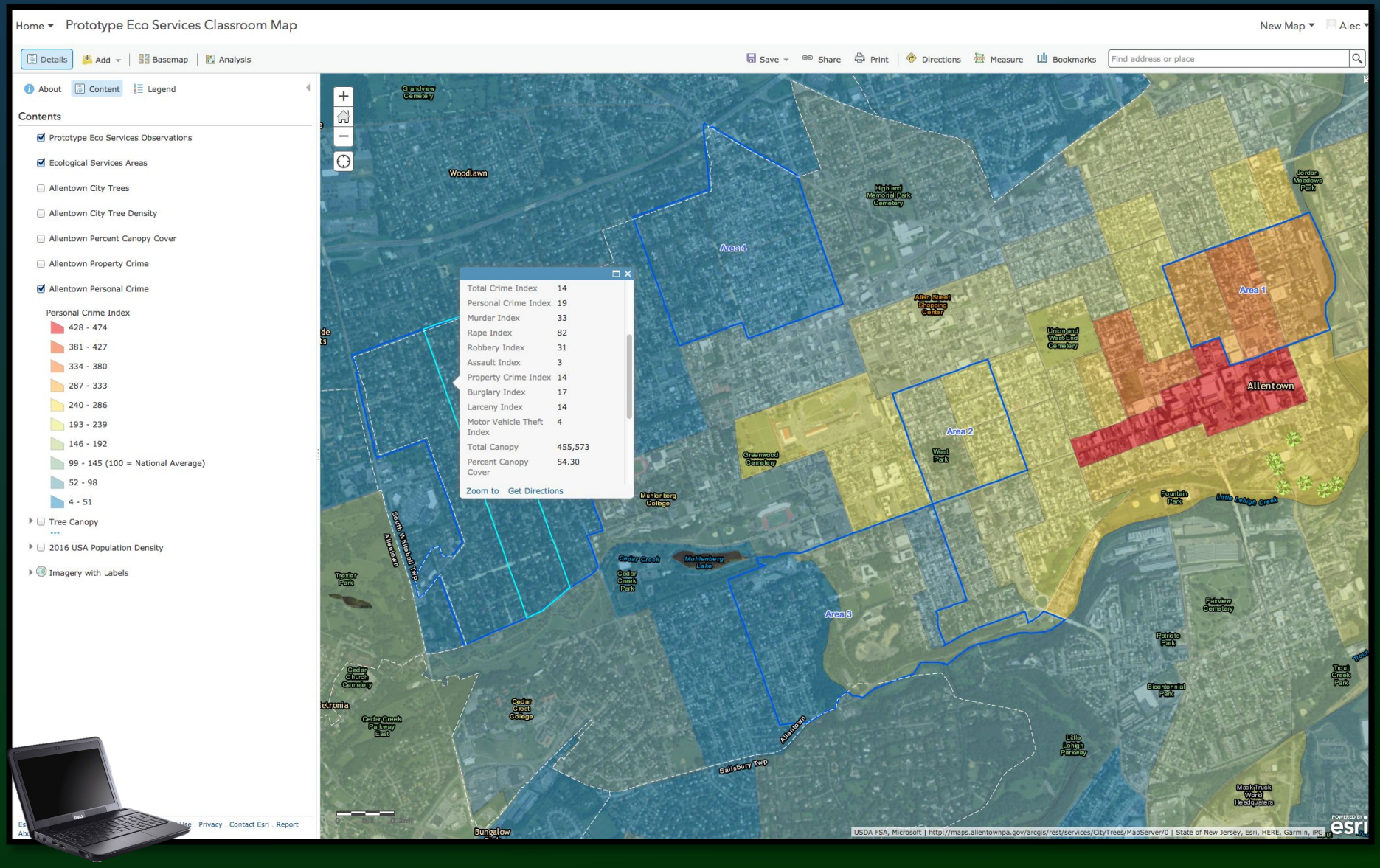
Using Filters for Data Analysis



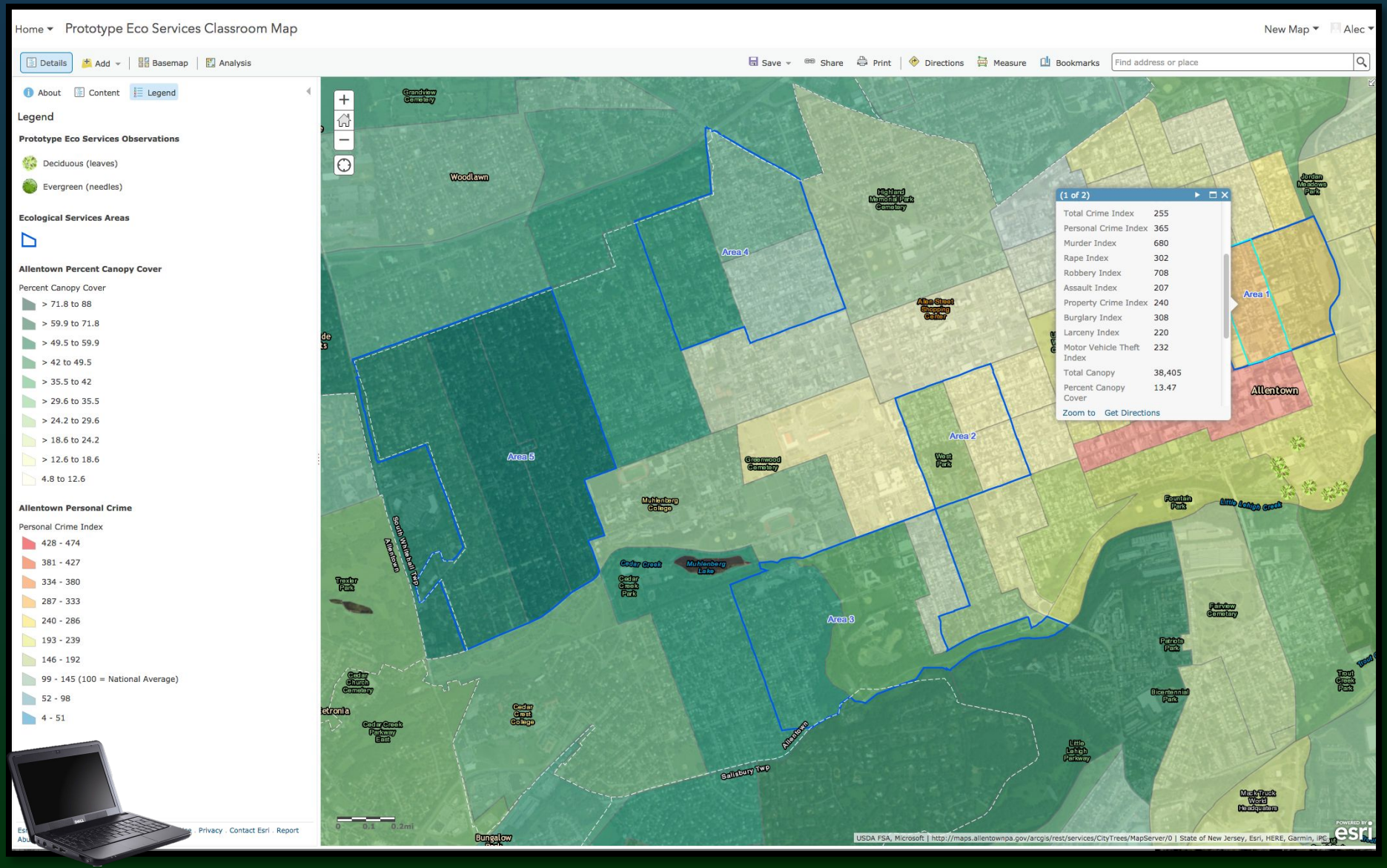
Percent Canopy Layer



Personal and Property Crime Layers



Personal and Property crime and % tree canopy



Data Comparison by Area

12. a. Complete the class table below. You will need the data from other groups in the class.

Area	Property Crime Index (USA Average = 100)	Personal Crime Index (USA Average = 100)	Percent Tree Canopy Cover (Allentown Average = 30%)
1	218.7 ↑	325.7	17.05% ↓
2	139	196.3	15.35%
3	73.7	69.3	31.69%
4	45.7	23.7	26.89%
5	25.3 ↓	22.3	52.94% ↑

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.

Student Summary - Geospatial Data Analysis

Rating	Range	n (%)
Exemplary	8-9	8 (11.9%)
Proficient	5-7	31 (46.3%)
Adequate	2-4	22 (32.8%)
Needs Improvement	0-1	6 (9.0%)
Submitted Blank		10
Did not Submit		36

Student Summary - Geospatial Reasoning

Rating	Range	N (%)
Exemplary	8-9	6 (9.0%)
Proficient	5-7	14 (20.9%)
Adequate	2-4	30 (44.8%)
Needs Improvement	0-1	17 (25.3%)
Submitted Blank		10
Did not Submit		36

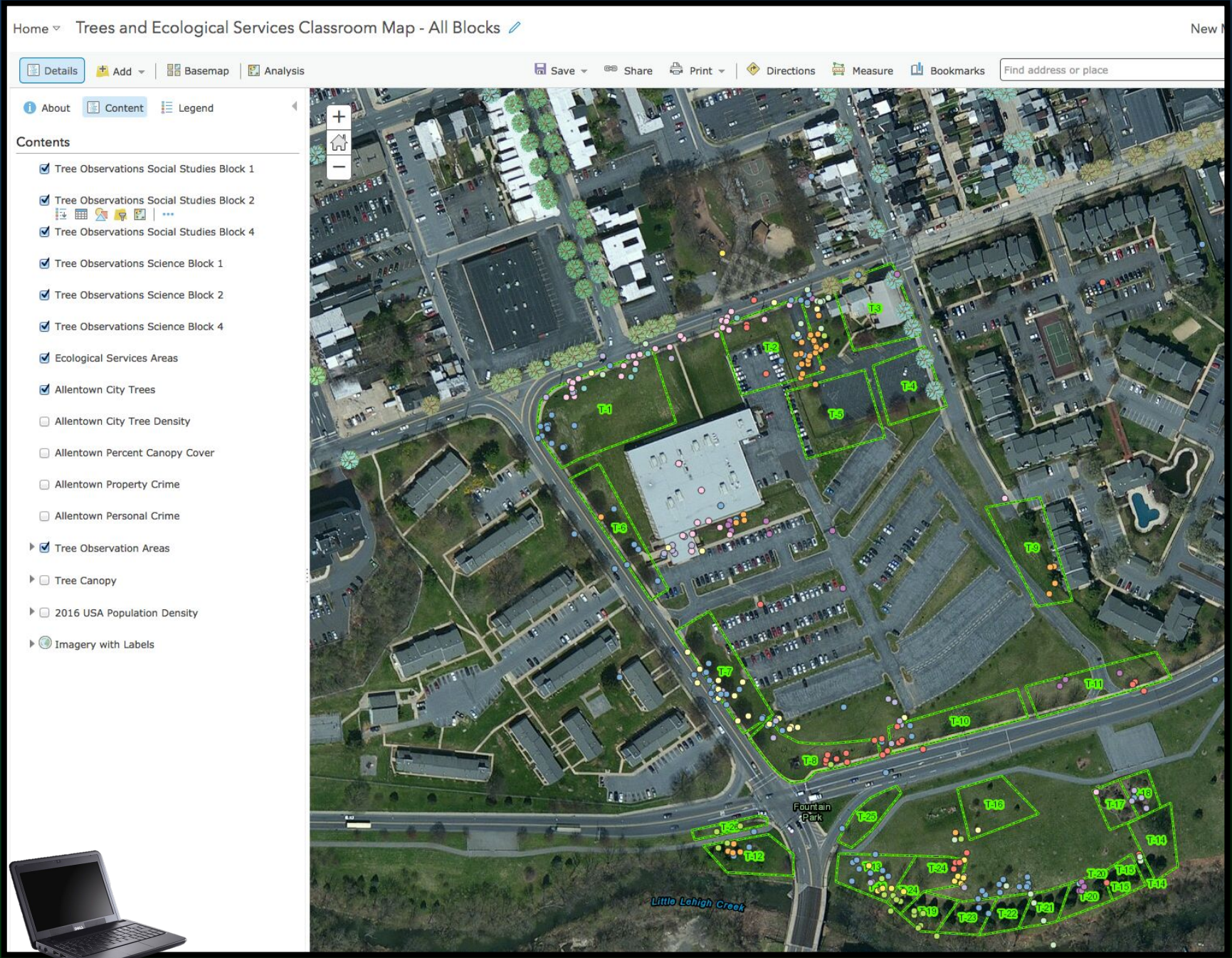
Authentic Culminating Task

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



Authentic Culminating Task

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

SOCIO-ENVIRONMENTAL SCIENCE INVESTIGATIONS

SESI