Using GIS tools to investigate socio-environmental science in the secondary classroom: Exploring the Urban Heat Island effect

Kate Popejoy^a, Thomas C. Hammond^b, Alec M. Bodzin^b, William Farina^b, David Anastasio^c, Breena Holland^d, James Carrigan^c, and Scott Rutzmoser^e,

^aPopejoy STEM LLC, Whitehall, PA, United States; ^bDepartment of Education and Human Services, Lehigh University, Bethlehem, PA, United States; ^cDepartment of Earth and Environmental Sciences, Lehigh University, Bethlehem, PA, United States; ^dDepartment of Political Science, Lehigh University, Bethlehem, PA, United States; ^eCenter for Innovation in Teaching and Learning, Lehigh University, Bethlehem, PA, United States

Experiential Session presented at the 2018 Association for Science Teacher Education, Baltimore, MD.

Program Abstract

Come explore our NSF supported project that has developed a series of novel socioenvironmental science investigations (SESI) using a geospatial curriculum approach. In this session, we present our project and conduct a sample investigation on the Urban Heat Island (UHI) effect. Bring your mobile phone, and be ready to gather geospatial data outdoors.

ArcGIS Online Resources

- Free ArcGIS.com Account
 - o https://www.arcgis.com/home/createaccount.html
 - Free non-commercial accounts have limits (mostly groups and sharing)
- ESRI ArcGIS online (organizational account) is free for K-12 schools
- Request an ArcGIS for Schools Bundle Account
 - <u>http://www.esri.com/industries/education/software-bundle#</u>
- In universities, it is typically included in the educational site license OR partner with a K-12 school
- Organize Your Organization
 - Roles, permissions how users can view and edit and share your layers and maps
 - Groups, typically classes or some collection of users that will share data
 - Users, can be invited from a spreadsheet (students) with users, emails, roles and groups (ESRI provides a template for creating and importing your users)
 - ESRI Documentation
 - <u>https://doc.arcgis.com/en/arcgis-online/administer/manage-members.htm</u>

- Ready to Make Maps, Get started with ESRI Documentation
 - https://doc.arcgis.com/en/arcgis-online/get-started/online-quickexercises.htm
- Collecting data (Collector App) The app is free but requires organization account on arcgis.com.
 - Create map with an editable layer.
 - <u>https://doc.arcgis.com/en/collector/windows/create-maps/create-and-share-a-collector-map.htm</u>
 - Create a feature layer
 - https://doc.arcgis.com/en/arcgis-online/reference/feature-layers.htm
 - Template for Urban Heat Islands
 - http://b21.maps.arcgis.com/home/item.html?id=3a95786eaa264c59
 9beaa1131896a840
 - Built Environment Scavenger Hunt
 - http://b21.maps.arcgis.com/home/item.html?id=70e0ed28654d4e13 b8367dd534634cee
 - Ecosystems Scavenger Hunt Template
 - http://b21.maps.arcgis.com/home/item.html?id=aaa6bb18c17c4eb1 95d9dd8dac288599

Contact information:

Kate Popejoy: <u>PopejoyPhD@gmail.com</u>

Tom Hammond: <u>tch207@lehigh.edu</u>

Alec Bodzin: amb4@lehigh.edu

Bill Farina: wjf312@lehigh.edu

SESI investigations at http://ei.lehigh.edu/eli/sesi (Website in development)

Papers available at <u>http://ei/lehigh.edu/eli/research/pubs.html</u>

Using GIS tools to investigate socio-environmental science in the secondary classroom: Exploring the Urban Heat Island effect

Kate Popejoy, Thomas Hammond, Alec Bodzin, William Farina, David Anastasio, Breena Holland, James Carrigan, & Scott Rutzmoser





Research Setting

- Urban public high school ninth graders in science and social studies classes
- Low SES students (all receive free lunch)
- Two-thirds Hispanic or Latino
- 25-35% ELL students
- Many students are reluctant learners
 - Low motivation
 - Do not complete tasks and assignments
 - Avoid challenging work

ASTE 2018

Year One

- Hybrid professional development model w/participating 9th grade science & social studies teachers
- During fall, team developed prototype investigations
 - Zoning and Me
 - Trees and Ecological Services
 - Urban Heat Islands
- In spring, we implemented these for the first time







	ul AT&T 🗢 15:24 <u>1</u> ∦	* 82% 🔲 +
	Cancel 🔅 📝 🔘	Submit
	Location Lat: 40.66061945° Long: -75.50265860°	
	Temperature Observation:	no-en
	Surface Type	> Males a lestions and
	Surface Shade	Nake selections and
	Surface Condtion	> input data
	Surface Temperature Degree C	>
	Weather Condition	>
	Air Temperature Degree C	>
	Notes	>
STE 2018		
012 2010		



What happens now

- We're going outside! Feel free to leave your stuff, as Tom will be staying here.
- Kate & AI will be going outside with you.
- Go out through lobby, to corner of Conway & Light.
- Use crosswalks to go south and then east, toward the harbor.
- Bill will stay in the lobby to help you sync your data when you get back.
- Plan to be back in the lobby by: **00:00**
- Plan to be back in this room by: 00:00



Putting on your 'teacher hat'

- 1. How do you think this activity would be different in the fall or spring rather than the winter?
- 2. How do you think this activity would be different in a more urban or rural setting?
- 3. What strategies might you employ with ELL students?







Questions? Comments?

SESI Investigations at <u>http://ei.lehigh.edu/eli/sesi</u> (Web site in development)

Papers available at http://ei/lehigh.edu/eli/research/pubs.html

Kate Popejoy: PopejoyPhD@gmail.com

Tom Hammond: <u>tch207@lehigh.edu</u>, Alec Bodzin: <u>amb4@lehigh.edu</u> Bill Farina: <u>wjf312@lehigh.edu</u>