Creating a cross-disciplinary unit for middle school children on the Urban Heat Island.

Elser, M.¹, T. Ganesh², S. Harlan³, G. Hupton¹, D. Medina⁴, and E. Ortiz⁵.

Investigating the Urban Heat Island in the Phoenix area has involved many ASU researchers. Over the past several years, we have had the opportunity to create and implement a 7th grade unit focusing on the Urban Heat Island with input from natural scientists associated with CAP LITER, social scientists associated with the NSF-funded Urban Vulnerability to Climate Change project, and engineering education faculty associated with an NSF-funded Innovative Technology Experiences for Students and Teachers grant. Various components of the unit were tested in after-school programs and in the Junior Ace program of Phoenix College. We present here the parts of the unit.

Exploring The Local Environment (5 lessons)

Overall Theme: How do people interact with and change the natural environment?

Sample Learning Objectives (after completing this unit student will be able to…):

• list three examples of the natural and built environment affecting each other.
• discern patterns in surface temperature on a variety of surfaces around the school grounds.
• design an experiment to compare surface temperatures with temperatures at 3m
• learn to use IR thermometers for determining temperature
• use infrared images for comparing temperature
• define Urban Heat Island

Example lesson: Photovoice Assignment:

- Take 27 pictures showing how temperature relates to the biotic and abiotic parts of the urban ecosystem.
- Research Focus: Variables that affect temperature in their environment, the effect of temperature on you, your friends and neighbors.
- Discuss the photographs in class

Photovoice is a process by which people can identify, represent, and enhance their community through a specific photographic technique (Wang & Burris, 1997).

For one of my dog got shaved: Because it's so hot and he was in the shade to cool off. And it affects him because he is hot. He was happy to get shaved because he would be burning up. This one is one of my favorites because, well this is my dog…ugh!

For this my favorite picture because I like dogs and I love, with them which makes me happy and thirsty. You should drink plenty of water during the day. When you run, walk the dog, play sports, or even work outside, you always need to drink water. It's essential.

This is my next favorite picture because I like dogs and I love, with them which makes me happy and thirsty. You should drink plenty of water during the day. When you run, walk the dog, play sports, or even work outside, you always need to drink water. It's essential.

Future Directions:

Will post modified unit on Ecology Explorers Website:
http://ecologyexplorers.asu.edu

Will post units on Chain Reaction Website:
http://www.chainreactionkids.org

Will present unit to teachers:
Spring 2011 workshop
Summer 2011 workshop

Will use with students:
Summer 2011 Jr. Ace Program
Phoenix College
ASU Summer 2011 Kid’s Camp

Course Schedule: Phoenix College Jr. Ace Program

Exploring Building Materials & Building Design (3 Lessons)

Overall theme: Which types of building material and building design would keep us cooler in the summer?

Sample Learning Objectives (student will be able to…):

• design an experiment to investigate the impact of surface color on surface temperature.
• design an experiment to investigate the impact of different insulation materials on surface temperature.
• design and construct a model house using the Engineering Design Process so the inside temperature is at least 8-10°F lower than the outside temperature on a sunny day in an Urban Heat Island environment.

Students designing and testing their model houses

Responding to Temperature (4 lessons)

Overall Theme: How do living things respond to changing temperatures in the local environment?

Sample Learning Objectives (after completion of the unit students will be able to…)

• compare and contrast different ways that organisms respond to microclimates in their environment.
• design an experiment to document the cooling effect of evaporation
• document that plants release water through evapotranspiration
• differentiate among heat-related health issues (heat stroke, heat exhaustion)
• take pictures documenting UHI in their neighborhood

Example lesson: Temperature Data Summary:

- Make a map of the Phoenix area showing how temperature relates to the biotic and abiotic parts of the urban ecosystem.
- Research Focus: Variables that affect temperature in your environment, the effect of temperature on you, your friends and neighbors.
- Discuss the photographs in class

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