

Picturing Heat

A qualitative study of human interactions with the UHI



Objectives:

Students will be able to:

- explain several ways in which hot temperatures affect them and their community.
- explain several ways in which people affect temperatures in an urban environment.
- communicate what they discovered through the process of taking and reflecting on photos.

Author:

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Time:

3-4 50 min and time for students to collect photos

Grade Level:

6-12

Standards

AZ Science Strands

Inquiry, Nature of Science, Personal and Social Perspectives, Life Science

AZ Soc. Studies Strand

Geography

NGSS - Core Ideas

Climate; Biogeology; Human impacts; Information Processing; Social interactions and group behavior; Information technologies and instrumentation

Practices

Communicating, and more
Specific AZ, Common Core, and NGSS standards on page 3.

Background:

Qualitative research is used in social science and it can be used to study the human social aspects of natural science phenomena. In qualitative research, the investigator studies the meanings, concepts, definitions, characteristics, metaphors, symbols, and descriptions of things. Examples of the types of qualitative research include: interviews, focus groups, ethnography, case studies and participatory. The qualitative research technique employed to examine student experiences with the Urban Heat Island in this lesson is called Photovoice, which is participatory, auto-ethnographic and incorporates focus groups.

Photovoice methodology was developed in 1995 by Caroline C. Wang and her colleagues as a means for women living in rural villages in China to photograph their perceptions of health issues in their community and communicate these to policy-makers on a national scale. As a pedagogical tool, Photovoice can facilitate conversation and reflection about socio-scientific issues in the students' local environment. Students collaborate to discuss the reasons for their photographs and how they will be used. The ultimate objective is to initiate dialogue with others in the community. One of the main educational goals is to empower students. To this end, students must be given the opportunity to express their views as illustrated in their photographs and suggest directions for change. Even when clear solutions are not possible, the project should end on a note of celebration.

There are number of ethical considerations when using Photovoice, particularly with children.

- Privacy - students should understand why they must respect others' privacy when taking photographs. They may obtain written permission from subjects, or take the picture in such a way as to avoid detection and obscure the identity of the individual etc.
- Safety - students should not take any photograph that puts them at risk.
- Misrepresentation - students should use photography as a tool to communicate reality. Discuss the ways in which bias can influence photographs and the difference between personal perception and intentional distortion.
- Ownership - photographs should be considered the property of the photographer and students should have personal copies. Written consent should be obtained from each student to display any pictures outside the project.

References:

Collective Leadership Works Preparing Youth and Adults for Community Change.
www.theinnovationcenter.org

Cook, Kristin and Gayle Buck. Photovoice: a community-based socio-scientific pedagogical tool. Science Scope vol. 3 no. 7 (March 2010) p35-9.

Vocabulary:

Photovoice - a social science method of collecting qualitative data about people's perceptions using photographs and discussion

Qualitative Data - subjective information collected from a study using research methods such as interviews, focus groups, ethnography, case studies and subject participation

Variables - factors that change and can affect a result

Biotic - living or once living organisms

Abiotic - non-living

Urban Ecosystem - the interaction of living and nonliving components of the environment in a city

Advanced Preparation:

Students should have some introduction to temperature in an urban environment. Other lessons in this unit can provide a good foundation, such as identifying built and natural structures, especially with respect to temperature conduction and radiation, measuring abiotic factors of local microclimates, examining infrared images, surveying birds or other animals with respect to different microclimates, simulating the thermoregulation behavior of lizards or other animals, observing evapotranspiration by plants.

Materials:

- Cameras (personal or cell phone digital cameras, disposable cameras)
- Poster boards/Butcher paper
- Consent Table
- Photo Consent Form
- Student Worksheet: Photovoice Project Instructions
- Photodocumentation Sheet

Recommended Procedure:

Engagement:

- 1) Brainstorm/review with students what they know about temperature and the urban environment (built/natural, biotic/abiotic components).
- 2) How do they think animals (both ectotherms and endotherms) respond to temperatures in their environment? Identify some behavioral strategies (moving to cooler locations, being active at night) and physiological adaptations (sweating, panting, etc.).
- 3) Compare the study of non-human organisms to that of

humans. Ask: What methods do we use to investigate how lizards interact with temperature? Brainstorm ways in which we could learn the same kinds of information about people. What benefits and drawbacks present themselves when studying ourselves?

- 4) Introduce some examples of qualitative research (surveys, interviews) that they might be familiar with, for example, taste tests of food products. Discuss with students the value of qualitative research to study people's experiences. .
- 5) Go back to the list generated in #3. If photography wasn't one of the suggestions, then introduce the idea to students. How could taking pictures provide us with information on how people interact with temperature?

Exploration:

- 6) Hand out the assignment sheet and prepare students to become Photovoice researchers.

Go over the research focus and possible research questions. Brainstorm ways in which photographs could document answers to the questions.

- 7) Hand out and discuss the consent table and copies of the consent forms.
- 8) Hand out the photo documentation sheet. You will need to decide how many photographs you want each student to take (10-20 is reasonable).

If time allows, it is useful to have the students take some pictures and do a first discussion, then take the rest of the photos and do a second discussion.

- 9) Distribute cameras. You may wish to include an orientation to camera use and principles of art and design in composing photos.
- 10) Have each student select 2-5 pictures to be shared with their classmates and print them (how to do this will depend on photo format, digital or print, access to color printer or black/white printer, etc).

Explanation:

- 11) Form student groups (4 to 6 students per group):
- 12) Have each student share 2-5 pictures with the group answering the questions (if you have time, you can have each student write a brief statement for each of the selected photos):
 - What is going on in this picture?
 - How does this picture relate to temperature?

- What does this picture mean to you?
- What is the real story this photo tells?
- How does this relate to your life, the lives of people in your community, or both?

13) As a group select 4-6 photos (one from each member) and create a group photoboard that best represents the research focus/questions. Write a brief narrative for the photoboard including what their pictures “showed”

S - What do you SEE here?

H - What’s really HAPPENING here?

O - How does this relate to OUR lives?

W - WHY does this problem, condition or strength exist?

E - How could these images EDUCATE others?

D - What can we DO about the challenges/strengths?

Elaboration:

- 14) Have each group present their photo board.
- 15) As a class, identify main themes from the presentations
- 16) Identify new questions students would like to answer.
- 17) Discuss possible actions that students could take to communicate their findings or initiate changes they see are needed in their community.

Possible discussion prompts:

- How are the pictures similar or different?
- Why do you think these similarities and differences appear among the photos?
- What stories are they telling? Not telling?
- What have you learned about yourself, this group, and the community?
- What questions do you have about yourself, this group, and the community?
- How do these pictures show differences within your community relating to the temperature. What could be done about these differences?
- If there were no limitations, what would the next step be to help your community in this area? What pictures would you take to show this?

Evaluation:

Students will participate in all activities, turn in their notes, present and turn in their poster and complete the Photo-voice evaluation.

Extensions:

With digital photos, students can prepare computer presentations of their work (Many film processors provide or sell compact discs of the images or scan in paper photos).

Exhibit photoboards or individual photos more broadly, such as in the school hallways, at a library or community center.

Based on the main themes and needs identified by the class, initiate an action project to address a social issue in the community (invite officials to a photo exhibit, write letters, meet with policy makers, talk with neighbors etc.)

Standard

Arizona Science Standards

- S1-C1-GR5-PO1
- S1-C1-GR6-PO2
- S1-C1-GR7-8-PO1
- S1-C1-GRHS-PO1
- S1-C2-GR5-HS-PO1, PO5
- S1-C3-GR5-PO5
- S1-C3-GR6-PO2
- S1-C3-GR7-PO1, PO2, PO7
- S1-C3-GR8-PO1, PO2, PO8
- S1-C3-GRHS-PO1
- S1-C4-GR5-PO1, PO3
- S1-C4-GR-PO3, PO5
- S1-C4-GRHS-PO3
- S2-C2-GR6-7-PO3
- S2-C2-GR8-PO1
- S3-C1-GR5-PO1
- S3-C1-GR7-PO1
- S3-C1-GR8-PO1, PO2
- S3-C1-GRHS-PO1-5
- S4-C3-GR7-PO3

Arizona Social Studies Standards

- S4-C2-GR6-7-PO1, PO2
- S4-C2-GR8-PO1
- S4-C2-GR7-PO4
- S4-C2-GR8-PO4, PO5
- S4-C2-GRHS-PO1, PO2, PO3, PO5, PO6, PO7
- S4-C3-GR5-8-connections to science
- S4-C3-GRHS-PO1, PO4
- S4-C4-GR6-PO3, PO4
- S4-C4-GR8-PO4
- S4-C4-GR6-7-PO1

Arizona Social Studies Standards (cont'd)

S4-C4-GR7-PO5-PO10

S4-C4-GR8-PO5-7

S4-C4-GRHS-PO5-PO8

S4-C5-GR5-PO2

S4-C5-GR6-PO1-PO4

S4-C5-GR7-PO2-PO2-PO7

S4-C5-GR8-PO2-PO6

S4-C5-GRHS-PO1-PO7

S4-C6-GRHS-PO2

NGSS Core Ideas

ESS2.D: Weather and climate

ESS2.E: Biogeology

ESS3.C: Human impacts on Earth systems

LS1.D: Information Processing

LS2.D: Social interactions and group behavior

PS4.C: Information technologies and instrumentation

NGSS Practices

Asking questions

Planning and carrying out investigations

Analyzing and interpreting data

Engaging in argument from evidence

Obtaining, evaluating, and communication information

NGSS Crosscutting Concepts

Cause and effect

Energy and matter; Flows, cycles, and conservation

Stability and Change

Common Core/ELA Literacy

RST7: Integrate content from diverse formats

WHTS2: Write to convey ideas and information

WTS7: Research/investigate to answer a focused question

SL1: Participate in collaborations and conversations

SL2: Integrate oral information

SL4: Present effectively to listeners

SL5: Strategic use of visual display to express

<p>Consent <i>Not Needed</i></p>	<p>Obtain <i>Written</i> <i>Consent</i></p>	<p>Obtain <i>Verbal</i> <i>Consent</i></p>
<p>Non recognizable individuals in public (faces and all other identifying features are obscured)</p>	<p>Individuals whose faces or other features can be recognized (in a public or private setting)</p>	<p>All individuals in all settings when possible</p>
<p>Photos taken of public places, objects, or environments without people in them</p>	<p>Parents, guardians, or teachers of children that appear in your photograph.</p>	
<p>Public figures in public (celebrities, politicians at campaign events)</p>	<p>Individuals in any setting where personal, private information is exposed in the photo or caption/narrative.</p>	

Student Worksheet Photo Consent Form



Name of Photographer (student):

Photo Consent Form

I am part of a Photovoice project investigating temperature in urban environments. We are taking photographs of how hot temperatures affect people and their comfort. Then we will discuss them with our class. Please sign this form if you agree to let me take your photograph for this project. Your consent allows us to use the photographs for editorial, advertising, promotional and educational awareness purposes. I waive my right to inspect or approve the finished product.

I agree to have my photo taken for this Photovoice project:

Name	Signature	Date

If person being photographed is a minor:

Parent's Name	Signature	Date

Student Worksheet

Picturing Heat Project Instructions



Pictures tell a story:

Photographs are sometimes used by scientists as a way to collect data. Pictures can tell scientists something about the environment and also something about the people taking the pictures. We will be using a data collection technique developed by social scientists called "Photovoice" to document the Urban Heat Island in your environment.

Your Research Focus:

The research focus for your pictures is: Variables that affect temperature in your environment, and the effect of temperature on you, your friends and neighbors.

Research questions your photos might help answer:

- How do the biotic parts of the environment affect the temperature?
- How do abiotic parts of the environment affect the temperature?
- How does temperature affect the people, plants, or animals that live and grow in your neighborhood?
- How do people, plants, or animals respond to (deal with) extremely hot temperatures?

You may take pictures outdoors, indoors, around your home, yard or other places in your neighborhood that are important or special to you.

Procedure:

1. Brainstorm possible picture ideas that would answer the research questions
2. Rules: Pictures should be appropriate based on school code of conduct. If taking pictures of a person, they must sign a consent form.
3. Take 10-20 pictures (your teacher will tell you how many)
4. Record information about the pictures on the photo data log
5. Take notes for every picture based on temperature effects.
6. Turn in your photo data log and cameras to download/develop the pictures. Select 2-5 pictures you would like to share with your classmates

Student Worksheet

Group Project Instructions



Group Discussion:

- Pick 2-5 pictures to share with your group answering these questions:
 - What is going on in this pictures?
 - How does this picture relate to temperature?
 - What does this picture mean to you?
 - What is the real story this photo tells?
 - How does this relate to your life, the lives of people in your community, or both?
- As a group select 4-6 photos (at least one from each member) and create a group photoboard that best represents the research focus/questions. Write a brief narrative for the board including what your pictures “showed”
 - S** - What do you SEE here?
 - H** - What's really HAPPENING here?
 - O**- How does this relate to OUR lives?
 - W** - WHY does this problem, condition or strength exist?
 - E** - How could these images EDUCATE others?
 - D** - What can we DO about the challenges/strengths?
- Prepare 5 minute presentation to tell others about your group's photoboard.
- With your teacher and classmates identify some common themes among the pictures.

Student Worksheet

Photovoice Project Notes



Take pictures showing the effects of hot temperatures on your environment (indoor/outdoor/natural/built), you or your neighbors.

Rules: Pictures should be appropriate based on school code of conduct. If taking pictures of a person, they must sign a consent form. Take notes for every picture based on temperature effects.

Picture	General Information	How does the photo show the effects of temperature? Why did you take this picture?	Consent Required Yes/No
1	Date: Time: Specific Location: Subject:		
2	Date: Time: Specific Location: Subject:		
3	Date: Time: Specific Location: Subject:		
4	Date: Time: Specific Location: Subject:		
5	Date: Time: Specific Location: Subject:		

Student Worksheet

Photovoice Project Notes



Picture	General Information	How does the photo show the effects of temperature? Why did you take this picture?	Consent Required Yes/No
6	Date: Time: Specific Location: Subject:		
7	Date: Time: Specific Location: Subject:		
8	Date: Time: Specific Location: Subject:		
9	Date: Time: Specific Location: Subject:		
10	Date: Time: Specific Location: Subject:		
11	Date: Time: Specific Location: Subject:		

Student Worksheet

Photo Essay



Write a brief description of 2 photos that you want to share with your classmates:

Picture 1:

- What is going on in this picture?
- How does this picture relate to temperature?
- What does this picture mean to you?
- What is the real story this photo tells?
- How does this relate to your life, the lives of people in your community, or both?

Picture 2:

- What is going on in this picture?
- How does this picture relate to temperature?
- What does this picture mean to you?
- What is the real story this photo tells?
- How does this relate to your life, the lives of people in your community, or both?