

Exploring Microclimates In Your Schoolyard



Objectives:

The student will be able to:

- compare the land cover and temperatures in different microclimates to begin to explain why organisms live where they do.
- record temperature readings and detailed observations while exploring microclimates.

Author:

Ecology Explorers Education team adapted FOBI activity "Terrestrial HI- LO Hunt"

Time:

45-50 minute

Grade Level:

6-12

Standards:

AZ Science Strands

Inquiry, Investigation, Analysis, Communication, Nature of Science, Energy in the Earth System

NGSS-Core Ideas

Earth Systems; Weather and Climate; Biogeology; Human Impacts on Earth Systems; Ecosystem Dynamics, Functioning, and Resilience; Biodiversity & Humans; Energy Transfer

Practices:

Investigations, Analyzing and interpreting data, Constructing explanations

Common Core, and NGSS standards on page 2.

Background:

The contour of the land, the presence or absence of plants, moisture and time of day may result in many climates (**microclimates**) within one ecosystem, or in this case – your schoolyard! Comparing the land cover and temperatures in different microclimates can help students to become aware of why organisms live where they do.

Why study microclimates?

- Temperature has an impact on the kinds of plants and animals that can live in a particular place
- Varying types of land cover can affect temperature

What kinds of scientific investigations can be developed from this activity?

Students can compare data gathered by others with different land cover, different times of the day, and other variables that interest students. From their observations, they may begin to see patterns that link temperature with land cover and determine what this means for the plants and animals within their ecosystem, or schoolyard.

Advanced Preparation:

None

Materials:

- Thermometer (one per plot;)

**Teacher note about thermometers: Calibrate the thermometers. Place all the thermometers into a beaker of ice water for 5 minutes. The thermometers should read between 0°C to 0.5°C. Choose one thermometer that is correct and label it the "thermometer of excellence" (TOE). Make a note of how each thermometer differs from the TOE and record on your data sheet. When you compare your data you will need to add or subtract this amount from your thermometer readings.)

- Scale map of schoolyard (if available)
- Data Recording Sheet

Recommended Procedure:

Engagement

- 1) Discuss with your students that they are going to explore microclimates. You might ask what they think a microclimate is, why study these, and how might they go about exploring them.

Exploration

- 2) Explain and model the next steps before sending students on their exploration.
- 3) Define the boundaries of your study. This may include your entire schoolyard or one small area of the schoolyard. Students will look for the hottest and coolest locations within these boundaries. At each location they will need to record the following findings on their data sheet:

- air temperature (everyone should let their thermometer sit for 5 minutes),
 - observations of animals and plants in their plot and any other unique features. Examples include signs of animal life, plants (if students do not know the names of the plants they can describe them), holes, disturbances, etc....
 - mark the location where they took the temperature with rocks, twigs, etc...or write down defining feature to be able to identify the location again
- 4)Send students out to explore. Give them about twenty minutes to do the activity. The time depends on their interest and engagement in the activity.

Explanation and Expansion

5)Once students have finished their plots it's time to share and compare data. Find out the hottest and coolest location found by the students. Go to each of these locations and use the questions below as a discussion guideline. It is OK if you are not sure of the answers yourself. This can be a great start to further investigations in your schoolyard.

- What might be making this the hottest or coolest spot?
- How does this spot compare to your hottest (or coolest) spot?
- What plants and animals do you notice living here? ▪Did you notice any differences between the plants and animals that live in the other locations? What were the differences?
- How might the highs and lows change during the day? The year? How might these changes affect the plants and animals?

- 6) Have teams of students compare their data using the above questions as a guideline.
- 7) Each team can report their findings and create a class data sheet to look for patterns and make more comparisons.
- 8) Have students mark their findings on a map of the schoolyard.
- 9) Complete the investigation by having students reflect on the activity by writing about their observations during the activity. What did they learn about microclimates? How do they know this? What further questions do they have about microclimates? (Choose some or all of the previous discussion questions to re-reflect

upon.)

Evaluation:

- Student completes data sheet with detailed observations and accurate temperature readings.
- Student's written reflection displays understanding the concept that by comparing the land cover and temperatures in different microclimates one can begin to explain why organisms live where they do.

Extensions:

- Students can then go on to do more observations by creating plots at various locations and look for any interesting patterns. The plots can vary in size from a meter square to a twenty meter square.
- Record temperatures at various times of the day and the year.
- Go back and visit plots to look for changes in plants and animals (or signs of animals).
- Have students design investigations based on questions they asked during the activity or in their reflections.

Arizona Standards:

Science

Inquiry Process:

S1-C3-GR4-8-PO1 S1-C3-GR4-PO2 S1-C3-GR3-PO5

Personal & Social Perspectives: S3-C1-GRHS-PO4

Life Sciences: S4-C3-GR3-PO1 S4-C3-GR3-PO4, S4-C4-GR3-PO1 S4-C4-GRHS-PO4

Earth & Space: S6-C2-GRHS-PO9 S6-C2-GRHS-PO14

NGSS Core Ideas

ESS2.A: Earth materials and systems

ESS2.D: Weather and climate

ESS2.E: Biogeology

ESS3.C: Human impacts on Earth systems

LS2.C: Ecosystem dynamics, functioning, and resilience

LS4.D: Biodiversity & Humans

PS3.B: Conservation of energy and energy transfer

NGSS Practices

Investigations

Analyzing and interpreting data

Constructing explanations

NGSS Crosscutting Concepts

Patterns

Cause and effect

Scale, proportion and quantity

Energy

Literacy (Common Core/ELA Literacy)

RST7: Integrate content from diverse formats

WHST2: Write to convey ideas and information

WHST7: Research/investigate to answer question

SL1: Participate in collaborations and conversations

SL2: Integrate oral information

SL4: Present effectively to listeners

Mathematics (Common Core)

Domains:

Number and Quantity

Measurement and Data

Math Practices:

2: Reason abstractly and quantitatively

Social Studies

Geography:

SS4-C1-GR5-PO6 SS4-C1-GR6-8-PO1 SS4-C1-GRHS-

PO1

Student Worksheet

Exploring Microclimates



Name (s)

Can you find the location in your schoolyard that has the highest and lowest temperatures ?

Description of Location A:

Drawing of Location A:

Include the plants and animals, land features, shade, holes, etc.....

_____ °C

Temperature

We will be able to identify this site again because of the:

Description of Location B:

Drawing of Location B:

Include the plants and animals, land features, shade, holes, etc.....

Temperature

_____ °C

We will be able to identify this site again because of the: