

Microclimates of Our School

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Overview:

Students gather data on the school grounds to establish the presence of different microclimates. They also describe and analyze the environments they have found (vegetation, aspect, ground cover, etc). They decide how microclimates impact their comfort and how they can alter or utilize microclimates in planning for comfortable surroundings.

National Geography Standards:

7-The physical processes that shape the patterns of earth's surface

12-The processes, patterns, and functions of human settlement

15-How physical systems affect human systems

National Geographic Skills:

Acquiring, organizing, and analyzing geographic information

State Content Standards:

Geography Grade 5 Benchmark-Addressed by describing ways people adapt to and have been influenced by their physical environment

Earth Science Grade 5 Benchmark-Describe patterns of seasonal weather and climate

Grade Levels: 4-6

Objectives: The students will...

- record and organize data and describe their sites,
- analyze and compare microclimates and what elements create them,
- propose modifications to the school microclimates to improve comfort and energy use.

Materials:

Compass, thermo-hygrometer, field sheets, clock, large chart to place site summaries for comparison, Weslandia by Paul Fleischman, Beaufort wind scale or student-made anemometers, measuring tape for site map on graph paper (if desired for more exact map- recommended for older students)

Procedure:

- Read Weslandia. Discuss the microclimate that was created in the story. Ask if there are microclimates at the school. Are there some favorite places due to comfort? Could we research and find ways to expand our comfort zones?
- Identify 6-7 very different environments. Insure a north-facing region, south-facing region, open grassy field, open asphalt, tree-shaded open area, tree-shaded area with buildings, etc.
- Discuss what data need to be collected to verify the existence of microclimates. Form groups to gather data on each microclimate. Review proper usage of instruments and procedures.
- Using field sheets collect data for several days or even weeks maintaining the same times of day for all sites on any given day (2pm is best for maximum temperature).
- Students describe location and take a Polaroid picture. Make a sketch of the immediate location noting the compass direction, buildings, and placement of trees. (A more exact map of location on graph paper is an option.)

- Each group places data for their site on a large chart using average readings. Put Polaroid picture by data for easy identification.
- Compare and analyze sites. Which data are important in creating the differences? Which location is the hottest? Why? Coolest? Why? Consider ground cover, vegetation, exposure to sun, rough surface versus smooth, dark surface versus light, exposure to wind, proximity to water, building type, etc.
- Which is most desirable for human comfort? What is the impact on humans when microclimates are ignored? What is the impact environmentally? (Greater heating and cooling needs require more power.)
- Write one to two paragraphs on ideas for improving the school grounds and/or building so that comfort is improved (and energy consumption reduced). Will we have to observe the area over different seasons? Try to think of small, reasonable changes that could be presented to the PTA such as planting a tree in a strategic location, adding air movement, adding a small extension to a roof, changing the surface of a small area. As an alternative, if reasonable improvements are unlikely to help, what obvious mistakes were made in the design of the building or grounds? Alternative written assignment: Are there particularly unpleasant rooms in this building that are impacted by a microclimate outside? What causes the discomfort? How does this affect your learning? Give examples of what you and others experience. Do you need data? (This also can be presented to the PTA.)

Modifications:

Assign groups to areas that are more or less difficult to map as needed (e.g. one map will be of grass only). Use graph paper and measure the site for more exact maps. Extend the time of data gathering or use one day's data.

Assessment:

- Groups legibly and fully complete their data sheets.
- They show careful observation of and insight into the components of the site in analyzing at least three components of the site that account for the climate. The sketch [or map] on plain paper [or graph paper (1 foot = 1 space)] has a compass rose, arrows indicating direction of wind and sun (or notation that no wind or sun affected the area directly). The main natural and manmade components that affect the site are drawn or indicated as nearby.
- Students written assignment shows an understanding of the elements that can impact a habitat's climate and observes the conventions of English.

Extension:

Read C. Donald Ahrens, Essentials of Meteorology, "Local Seasonal Variations," pp.48-49, for a brief discussion of microclimates and housing. Students design their dream property (house and plants), engineering the microclimate to be environmentally friendly, i.e. using the least energy to maintain comfort. Discuss the sun's location at the solstices at this latitude, the placement of windows for passive solar heating. How wide should eaves be to shade in summer and not in winter? How does vegetation change seasonally? Evergreens to the south of a house block both summer and winter sun. Is there a need for summer shade from deciduous trees to the south and west of a house?

Students could also assess their own homes for microclimate usage. What small improvements could be made to cool in summer and heat and/or add lighting in winter?