Lichens as Air Quality Indicators: A beginning lichen identification study (2003)

Grade level:
6-8

Content Area:
Integrated science, life science, earth science

Time:
2 weeks

Standards:
Science as Inquiry, populations and ecosystems, nature of science, diversity & adaptations of organisms

Background knowledge/skills:
Measuring, microscope, variables, tree identification, keeping field notes, GPS

Materials:
(per student team)
- compass
- measuring tape
- GPS
- string
- basic lichen ID book
- 100 circle grid on transparency
- vis-s-vie marker

Procedures:

1. Indicate to students that a coal powered plant in a local city has released chemicals in the air that may or may not contribute to local pollution. The community is very concerned about their air quality and wants to conduct some tests. You as a lichen specialist have been hired to conduct these tests and report your findings. The first step is to identify lichens on local trees and determine which lichens are the best bio-indicators of air quality. You will be sampling the % of various types.
2. Students select appropriate trees to study by researching background information on lichens as bioindicators and investigating tree species.
3. As small teams students select set of similar size trees
4. Determing latitude and longitude using GPS and record in field notes.
5. Students use compass to determing geographical orientation of tress N,S,E,W.
6. Students measure from bottom of tree to mark 1 ft. study area. This needs to be predetermined by student and done consistently throughout the study.

   Suggested protocol:

   a) At predetermined height students measure two location on tree and wrap string around tree.

   b) Determining center point on study area for west side of tree students place 100-circle grid on tree - tape in place [may need other sticky type substance].

   c) Using 100-circle grid, students identify types of lichens based on criteria such as green crusty, yellow leafy, orange shrubby....

d) In field notebook record findings.

e) Calculate % cover for each type of lichen.

7. Repeat for S.E.W tree quadrant
8. Learning objectives:

1) students will collect lichen data on 100-cirlce grid,
2) students will measure and establish research parameters,
3) student will calculate % of lichen types,
4) students will communicate findings as a research report.

Assessment:
As teacher, I will create a rubric that includes student requirements for creating their research site, such as measurements, 100 circle grid, % of lichen findings, and research report as the assessment.

Enrichment/Reflection:
From this point students will continue their study by moving toward new questions about lichens as air quality indicators and the micro-invertebrates that live within the lichens.

Resources:
Forested area to study, Univ. of CT professor who works with lichens as bioindicators or air quality, administrative support, appropriate equipment

Barriers:
Students tend to be cynical when given a question or problem to solve if perceived as "fluff"

Responses:
Prior to introducing this problem, have smaller PBL/I's for students to investigate so they become used to the "real world" applications.

Color identification system