Energy In Ecosystems: How the Abiotic Affects the Biotic *2022

Grade: 5th
Setting: Pineridge or other natural area with a variety of habitat/landscapes
Theme (Bottom Line): Abiotic elements (sunlight, soil, moisture, temp and wind) work together to affect the Biotic (living) elements, such as plants and animals, within a variety of ecosystems creating differences in landscape that ultimately affect biodiversity of species.
Description: Students learn about the differences in habitat within a variety of ecosystems based on the transfer of energy from the non-living to living components and vice versa.
Recommended Time- 30 minutes
Recommended Group Size: 15
State Standards: **Earth and Space Science Grade 5.3.3-** Earth's major systems interact in multiple ways to affect Earth's surface materials and processes.

Materials list:

- Clipboards
- Worksheet (laminated)
- Blank sheets for drawing (laminated)
- Dry erase markers/wipes
- Flags (8) for marking off ecosystems
- Nutrient Cycle Poster
- Wind Meters (3)
- Temperature Gauges (3)

Getting Ready:

- Know terms such as Geosphere, Biosphere, Atmosphere, and Hydrosphere:
    - Geosphere: System of solid earth (land)
    - Biosphere: System of living organisms (only biotic sphere we will discuss during the lesson, all others are abiotic)
    - Atmosphere: System of gases surrounding the earth's surface
    - Hydrosphere: System of water around earth's surface including lakes, rivers, clouds, and rain
- Know terms such as Abiotic (non-living components of earth) and Biotic (living components of Earth)

Welcome students and introduce yourself and any other volunteer. Encourage Adults to participate by giving them each a task. Remind them of the difference between a Natural Area and a Park. Explain the theme of the lesson and begin.

ENGAGE (Introduction)- 5 mins.

Get the students focused with these leading questions.

- We know you have been studying the different "spheres" (bio, hydro, geo, and atmo), which of these is considered Abiotic vs. Biotic? You may need to give brief descriptions of each of these if the kids haven't learned this yet. The point is to get them to understand what is living vs. non-living in the environment.
- Look around, what abiotic (non-living) things do you see here in our space?
- What biotic (living) things do you see in our space?

Explain that within various ecosystems, the abiotic and biotic components interact to create the right habitat for life to thrive. Today we will look at several different ecosystems within this Natural Area to see how the abiotic (sun, soil, wind, temp, and water) components work to affect the biotic (plants and animals) through the transfer of energy, and compare the two ecosystems to spot key differences.

EXPLORE: 5-10 mins.

For this initial exploration, students are partnered with another classmate (or 2) a clipboard, and an Ecosystem Survey worksheet. Students are led to adjoining ecosystem plots that will have flags around them (4 at each corner). Students will use their observation skills to note abiotic and biotic elements of each to fill out the survey with their partner. Wind meters and temperature gauges will be available to note abiotic conditions, but will need to be shared between groups.

EXPLAIN: 5-10 mins.

Gather students back up to discuss their findings. Go over the worksheet with them and get feedback from each group on the questions. A few topics to go over now:

- What did you notice about each ecosystem and how the various abiotic elements affect the biotic elements? (More sunlight might mean fewer plants if it is too hot and dry, or it could mean lots of photosynthesis is taking place. Areas near the pond might have different plants or animals that rely on the hydrosphere for survival. Etc.)
- Discuss the importance of energy flow from sunlight, wind, and water to the plants/animals (and how that energy is used) and then how once those living creatures die and decompose, they release the energy back into the soil and atmosphere to influence the abiotic processes (nutrient cycle).

ELABORATE: 5 mins.

Show students the poster of the Nutrient Cycle and discuss how this poster represents the transfer of energy within a system and relates to their findings in the Natural Area they were investigating. Why are these components important within an ecosystem? What happens if we remove some of these elements from the nutrient cycle?

EVALUATE: 5 min.

- Have students remind you of the difference between abiotic and biotic components in an ecosystem.
- What ecosystem would you prefer to live in and why?
- How is the sun important in the transfer of energy and what would happen if the sun no longer produced the heat/energy that it does now? What would happen to life on earth?