Build the CZ Elementary Program (30-45 minutes)

NGSS Standards:

K-ESS3-1 Earth and Human Activity

Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.

2-ESS1-1 Earth's Place in the Universe

Use information from several sources to provide evidence that Earth events can occur quickly or slowly.

Learning Goals:

- Students will learn the phrase “critical zone” & understand its boundaries
- Students will be able to identify weathering as a driver of soil formation & therefore plant growth

Materials (if doing a full class CZ)

- 1 clear bin
- 1-2 bedrock rocks (large rocks that can fill the bottom of the clear bins)
- A full layer of saprolite rocks (essentially pebbles)
- Sand
- Potting soil
- 2 little seedlings

OR Materials (if doing one CZ per student)

- 1 mason jar per student
- 1-2 bedrock rocks (rocks that can fill the bottom of the mason jar)
- Approx. 20 pebbles per student
- Sand
- Potting soil
- 1 seedling per student

Main Activity:

1. Introduce yourself!
2. Introduce the critical zone briefly and explain that we’re going to build our own version of the critical zone that will support life.

    a. Make sure to break down the words CRITICAL and ZONE - to help students build up the definition.
3. Explain each layer of the critical zone, getting as in depth as you want. Examples:
    a. Bedrock - what can bedrock be made of? How deep is bedrock? Does everywhere on the planet have bedrock?
    b. Saprolite - how quickly does bedrock weather into saprolite? Is saprolite always made out of the same thing as the bedrock? Where does the word saprolite come from?
    c. Soil - what types of soil are there? How do you know what soil type is which? Is sand soil?
    d. Vegetation - what do plants need to survive?
4. Once you've explained that part of the critical zone, add it to the container and "build" the CZ step by step. Explain to students that they can take care of their critical zone after this
5. Finish by explaining why weathering is important to you (if time!)

Based on a figure from Chorover et al., 2007

Additional Game (10-15 minutes) :

1. Create a large space in the middle of the room.
2. Explain to the students that they're going to be learning about weathering and why weathering is important for plants to get what they need. (ask: what do plants need? And once the kids say nutrients, ask them where they get nutrients from? Answer: soil)
3. Explain to them that soil becomes soil through the weathering of rocks beneath our feet called bedrock, and that plants wouldn't get their nutrients through the soil if it weren't for this process.
4. Explain that we're going to **model** this process through a game!
5. Assign one student to be the "nutrient" and another to be the "tree root". Everyone else is unweathered rock.
6. (if allowed by teacher), have the rock students surround the nutrient student, face outwards, and link arms. If students aren't allowed to link arms, have them stand super close together
7. Instruct the tree root student to move ***SLOWLY*** towards the nutrient and try to put two hands on their shoulders. (they should not be able to do so)
8. OK! Now it's time to weather the bedrock into saprolite. Have the students hold hands instead of link arms. Explain to them that water and other things have broken down the bedrock into smaller bits of rock (which you can introduce as saprolite or not)

9. Have the tree root again try to reach the nutrient student. They should theoretically be able to get closer, or maybe will even get one hand on the nutrient, but shouldn't be able to get both hands.
10. It's time to weather AGAIN! This time, explain to the students that they're going to become soil, and have them loosely surround the nutrient, but not touching or in a circle.
11. Have the tree root again try to reach the nutrient - they should be able to now.
12. Ask the question: why did we do this? What was I trying to teach you? Discuss as long as the students want to.