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Creative Earthlings

Inspiring Students to Study
the Earth and Create a
Better Future

CreativeEarthlings.co
Brooklyn, NY

Soil: The Earth's Dynamic Skin Program Lesson Plan

1. Objectives

1. Learn Introduction to Soil Science, soil characterization, soil uses, soil's role in society
2. Observe and identify different characteristics of soil including, color, structure, consistence, texture-by-feel, roots, rocks, carbonates, (temperature and pH added in four-hour workshop)
3. Learn introduction to satellite remote sensing with NASA Earth Observatory satellite imagery.
4. Develop qualitative observational skills with soil as the medium.
5. Develop understanding of the differences between geophysical and geopolitical boundaries
6. Learn to work in collaborative teams to observe and collect data on soil characteristics

2. Subject Matter

1. Topic: Soil formation, characterization, uses, and role in ecosystem and biosphere
2. Materials: PowerPoint Presentation, various products that derive from soil (including brick, African Mud Cloth, ceramics, and others), soil samples, soil color books, spray mist bottles, vinegar, pH paper/meter, trowels, data sheets, characterization field guides, soil thermometers

3. Procedure

1. Overview of Earth Satellite Image.
 1. Explore difference between observation and remote sensing.
 2. Explore ratios and percentages of land, water, clouds, et al in Earth satellite image
2. Explore why scientists or anyone might study soil
3. Explore the soil's purpose and effect on the planet.
4. Explore soil uses by humans, society, animals, and plants
 1. Food/crop production
 2. Clothing
 3. Ceramics/Glass
 4. Trees/plants
 5. Makeup/medicine (Neosporin, Kaopectate, Bare Escentuals)
 6. Art (sand painting, African Mud Cloth)
 7. Construction and habitat (brick homes, mud homes, Earthship homes)
 8. Waste decomposition
 9. Water filtration (including Just Passing Through water filtration activity)
5. Explore soil formation physics
 1. Parent material, topography, biota, climate, time
 1. Maryland soil
 2. NASA satellite imagery
 1. Africa, Amazon Rainforest, transoceanic wind patterns, and soil formation
 2. Introduction to the soil's role in photosynthesis, CO₂ Fixation, plant and animal respiration.
 3. Geography and geopolitical aspects of soil formation
 4. Soil nutrients
6. Explore and identify soil characteristics and the ideal arable soil
 1. Soil ped structure with characteristics and procedure (granular, blocky, platy, etc.)
 2. Soil color (hue, value, chroma, their meanings and soil's unique Munsell Color Wheel designation)
 3. Soil texture-by-feel (clay, clay loam, sandy clay loam, silty clay loam, etc.)
 4. Roots, rocks, carbonates
7. Explore data collection using sound scientific principles
 1. Observational skill building and methodology via "Look, Look, Press, Squeeze" soil analysis method
 1. (look at ped structure, look at ped color, press to establish friability, squeeze to determine relative amounts of sand, silt, and clay in soil sample)
 2. Working in collaborative teams of scientists

3. Soil characterization data sheet
4. Soil slope and aspect
 1. Introduction to compass use (angles, percentages, orientation, circumference, right angles)
 2. Introduction to clinometer for soil slope/topography (introduction to angles, measuring angle of inclination at soil sampling site)
8. Outdoor Field Component
 1. Working in groups, like scientists, students use field guides, trowels, spray mist bottles,color books, and data sheets to observe and record soil field characteristics.
4. Next Generation Science Standards
 1. Earth and Human Activity
 2. Earth's Systems (eg 5-ESS2-1, HS-ESS2-2, HS-ESS2-5)
 1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
 2. Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems. (In addition, the students take the data they will analyze.)
 3. Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes. (can run concurrently with Water, Water, Everywhere program)
 3. Matter and Its Interactions
 4. Matter and Its Interactions, Energy, and Dynamics
 5. Matter and Energy in Organisms and Ecosystems
 6. Biological Evolution: Unity and Diversity
 7. Earth's Place in the Universe
 8. Ecosystems: Interactions, Energy, and Dynamics (eg, 5-L2-1)
 1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.
 9. Interdependent Relationships in Ecosystems: Environmental Impacts on Organisms