Georgia Performance Standards Framework for Earth Science – Grade 6

Unit: Human Impact
Differentiated (Tiered) Task
How Does Human Activity Impact Soil Erosion?

Standards (Content and Characteristics):

S6E5 Students will investigate the scientific view of how the earth’s surface is formed.
   i. Explain the effects of human activity on the erosion of the earth’s surface.
   j. Describe methods for conserving natural resources such as water, soil, and air.

S6CS1. Students will explore the importance of curiosity, honesty, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works.
   a. Understand the importance of—and keep—honest, clear, and accurate records in science.
   b. Understand that hypotheses are valuable if they lead to fruitful investigations, even if the hypotheses turn out not to be completely accurate descriptions.

S6CS2. Students will use standard safety practices for all classroom laboratory and field investigations.
   a. Follow correct procedures for use of scientific apparatus.
   b. Demonstrate appropriate techniques in all laboratory situations.
   c. Follow correct protocol for identifying and reporting safety problems and violations.

S6CS5. Students will use the ideas of system, model, change, and scale in exploring scientific and technological matters.
   a. Observe and explain how parts are related to other parts in systems such as weather systems, solar systems, and ocean systems including how the output from one part of a system (in the form of material, energy, or information) can become the input to other parts. (For example: El Nin­o’s effect on weather)
   b. Identify several different models (such as physical replicas, pictures, and analogies) that could be used to represent the same thing, and evaluate their usefulness, taking into account such things as the model’s purpose and complexity.

S6CS6. Students will communicate scientific ideas and activities clearly.
   a. Write clear, step-by-step instructions for conducting scientific investigations, operating a piece of equipment, or following a procedure.
   b. Understand and describe how writing for scientific purposes is different than writing for literary purposes.
c. Organize scientific information using appropriate tables, charts, and graphs, and identify relationships they reveal.

S6CS8. Students will investigate the characteristics of scientific knowledge and how it is achieved.

Students will apply the following to scientific concepts:

a. When similar investigations give different results, the scientific challenge is to judge whether the differences are trivial or significant, which often requires further study. Even with similar results, scientists may wait until an investigation has been repeated many times before accepting the results as meaningful.

b. When new experimental results are inconsistent with an existing, well-established theory, scientists may require further experimentation to decide whether the results are flawed or the theory requires modification.

c. As prevailing theories are challenged by new information, scientific knowledge may change and grow.

S6CS9. Students will investigate the features of the process of scientific inquiry.

Students will apply the following to inquiry learning practices:

a. Scientific investigations are conducted for different reasons. They usually involve collecting evidence, reasoning, devising hypotheses, and formulating explanations.

b. Scientists often collaborate to design research. To prevent bias, scientists conduct independent studies of the same questions.

c. Accurate record keeping, data sharing, and replication of results are essential for maintaining an investigator’s credibility with other scientists and society.

d. Scientists use technology and mathematics to enhance the process of scientific inquiry.

S6CS10. Students will enhance reading in all curriculum areas by:

a. Reading in All Curriculum Areas

c. Building vocabulary knowledge

d. Establishing context

Enduring Understanding:

- Human activities can have a positive or a negative impact on the surface of the Earth.
- Human activities can cause or accelerate erosion.

Essential Question(s):

- How does planting on the side of a hill prevent erosion?
- How can land uses be modified so as to minimize erosion?
Pre-Assessment: Chalk Talk
Teacher posts two large sheets of paper on opposite walls. Both contain the word “erosion” in the middle. Students write one statement or word that relate to erosion on poster. To ensure all students participate and to use the information for later grouping, students should place their initials by their comments.

<table>
<thead>
<tr>
<th>Outcome/Performance Level Indicator</th>
<th>BASIC</th>
<th>INTERMEDIATE</th>
<th>ADVANCED</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance Task:</strong> (Detailed Description)</td>
<td>Investigate and describe the effects of human activity on the erosion of the earth’s surface</td>
<td>Investigate, describe, and explain the effects of human activity on the erosion of the earth’s surface</td>
<td>Investigate, describe, explain, and infer the effects of human activity on the erosion of the earth’s surface</td>
</tr>
<tr>
<td>Groups of students will receive two identical aluminum trays: one containing soil to a height of 5 cm and one containing sod.*</td>
<td>Groups of students will receive two identical aluminum trays, a bag of soil, and a section of sod. Lab Instructions: 1. Set both trays flat on the counter. 2. Measure 500 mL in graduated cylinder. 4. Set timer for 3 minutes. 5. Place a container under the tray with soil (container should be big enough to catch the water from the tray). 6. Begin timer at the same time that you start pouring water to the highest end of tray. 6. Pour water collected in container into the graduated cylinder. 7. Record the volume of water.</td>
<td>Groups of students are given a two-part problem: 1. How does vegetation and gravity affect soil erosion? You should make a hypothesis and design an experiment to test the effect of the two variables in soil erosion and carry out your experiment. Follow the scientific method form provided by your teacher and receive approval of your experimental design prior to starting the experiments. 2. Graph your results using an electronic source and present it to the class. 3. Describe the impact of human activity in soil erosion and write a proposal to solve this problem.</td>
<td></td>
</tr>
</tbody>
</table>
8. Repeat procedure for the tray with sod.
9. Repeat steps 2 through 7, except, set both trays at an angle by placing one side on a 10-cm wooden block.

**Teacher role?**
- Prepare each lab station to contain two aluminum trays (one with soil, one with sod), a wooden block 10 cm high, a 500 mL graduated cylinder, a plastic tray, a timer, and a set of instructions.
- Make sure that the soil thicknesses are the same on both trays.
- Check that students wear lab aprons and follow lab safety procedures.

**Student role?**
- Follow teacher instructions.

**Resources**
- Class textbooks and library books
- United Streaming video or other AV materials at the local schools
- Digital cameras to photograph erosion in and around the school yard. Permit students to use digital photography at home and bring in the images for classroom use. Remind students of proper photography etiquette. (Your system may require photo release forms to be signed prior to the use of photography in your classroom)
- Digital images of the experiment will be incorporated into the final lab report
- Computer and software for graphing.
**Homework/Extension**

| Write a summary of your experiment and discuss the effect of vegetation (sod) and gravity (angle) in soil erosion. Explain how this activity is like cutting down all the trees in the rainforest or cutting all the plant life from the side of a creek or stream. | Make a list of places in your hometown that have been and continue to undergo erosion. Identify the causes for the erosion in each place. Identify ways humans have impacted the rate or type of erosion. | Write a summary including the causes of soil erosion and devise ways to slow down erosion caused by human activity. Identify how human’s impact erosion in your area and describe ways to prevent future destruction. |

**Instructional Tasks Accommodations for ELL Students**
- Provide instructions in simple language, face students while explaining lab procedures, demonstrate the steps of the procedure.
- Provide a chart for data recording (Table 1) on white board.
- ELL students will be paired with students with strong language skills and lab skills.

**Instructional Tasks Accommodations for Students with Specific Disabilities**
- Provide a blank chart for recording results and will pair these students with an average learner.
- Students will answer specific questions after completing the lab rather than writing a summary of the experiment.*

**Instructional Tasks Accommodations for Gifted Students**
- Students will describe the procedure they wrote and present their graph using a multi-media presentation.
- Students will collect pictures from the internet showing the effects of human activity in soil erosion.

**Materials:**
Aluminum trays of same size (2 per group of 3 students), soil and sod (enough to fill trays to about 5 cm high), water, graduated cylinder (500 mL capacity), lab apron, wooden blocks of different sizes, and timer.

*Questions for Students with Disabilities:*

1. The tray that I collected the most water was _________________________________ (soil tray, sod tray) on ________________________________ surface. (flat, inclined)

2. Did the tray with soil only on the inclined surface have more or less water than the soil tray on the flat surface?
3. Did the tray with sod on the inclined surface have more or less water than the sod tray on the flat surface?

4. Which is better for slowing down soil erosion, bare soil or soil with vegetation?

5. Based on your answer for question, how would you slow down erosion of a sloped area where you would like to build your house?

Table 1. Lab Results Chart

<table>
<thead>
<tr>
<th></th>
<th>Amount of Water Collected from Trays (V1) in mL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tray 1 (Soil only)</td>
</tr>
<tr>
<td>Tray on Flat Surface</td>
<td></td>
</tr>
<tr>
<td>Tray on Inclined Surface (10 cm high)</td>
<td></td>
</tr>
<tr>
<td>Tray on Inclined Surface (____ cm high)</td>
<td></td>
</tr>
<tr>
<td>Amount of Water Absorbed by Soil (500 mL – V1) in mL</td>
<td></td>
</tr>
</tbody>
</table>