the CEED

THE CENTER FOR ENERGY EFFICIENT DESIGN

Clean Water Everywhere!

Grade Level	4	**Subject**	Virginia's Natural Resources

Objective(s):

TSW create and interpret a model of a watershed.
Evaluate the statement: —We all live downstream.‖

SOL Addressed:

4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which
a) distinctions are made among observations, conclusions, inferences, and predictions;
e) predictions and inferences are made, and conclusions are drawn based on data from a variety of sources;
h) hypotheses are developed as cause and effect relationships;
l) models are constructed to clarify explanations, demonstrate relationships, and solve needs; and
m) current applications are used to reinforce science concepts.

4.9 The student will investigate and understand important Virginia natural resources. Key concepts include
a) watersheds and water resources;
b) animals and plants;
c) minerals, rocks, ores, and energy sources; and
d) forests, soil, and land.

Next Generation Science Standards:

2-ESS2-1. Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land

2-ESS2-2. Develop a model to represent the shapes and kinds of land and bodies of water in an area.

ESS3.C: Human Impacts on Earth Systems

- Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)

Materials Needed Per Class of 30 **and** **Prior Knowledge**	Watershed activity kit Food Coloring—1 color per group Soil—2 cups per group Confetti paper—1 small bag per group Water bottle Access to CEED dashboard Materials listed are for a class of 30 working in groups of 4-5.

<table>
<tr><td></td><td colspan="2">Prior Knowledge:
Different types of pollution.
Knowledge of a watershed and the importance to the environment.</td></tr>
<tr><td>Ways to differentiate this lesson plan</td><td colspan="2">EXTENSION for Higher Level Learner
Create another watershed model at home and make changes to make it more ecologically friendly—ie: putting in “grass” or “fences” to help keep the environment clean
MODIFICATIONS
Already have the models built.
Group students together in order to highlight student strengths.</td></tr>
<tr><td>Introduction/ Anticipatory Set</td><td>Anticipatory Set: What do all people need to survive? Why is it important to take care of our environment? Does everyone live in a watershed?

Questions to ask students:
What are some things that people do that negatively impact the environment?
What does this do to our water supply?
If we litter, does it only affect the area that we litter at?</td><td>Introduction:
Today we will begin studying how we impact the environment. We have learned that watersheds create habitats and help purify the water.</td></tr>
<tr><td>Guided Practice</td><td colspan="2">TTW introduce the student to the CEED dashboard.
TTW show students how to get to the dashboard.
TTW show the student how to navigate the dashboard—solar, wind, HVAC, water, weather, extras. Focus on the amount of rainwater the CEED building collects and what they use it for.
Facilitator Questions for the Activity:
What type of graph is used to show the amount of rainwater collected?
How much rainwater was collected on _____? (Pick a day, week, etc. to discuss the amount of rainwater collected)
What type of unit of measurement is used to show how much rainwater is in storage?
Compare the amount of rainwater on reserve and the amount of rainwater that is used daily/weekly.</td></tr>
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Independent Practice	**Part 1** TSW use the CEED site to discuss the importance of collecting rain water and the benefits of using this to run the CEED building. How is the CEED building an ecologically friendly building? **Part 2** TTW present the students with the BIG QUESTION and the students will work as a team to come up a solution. BIG QUESTION: What are the impacts of pollution to the environment and how does one community's pollution affect other areas? 1. TSW be given a watershed model to construct in groups. 2. TSW use soil, confetti, and food coloring to pollute the land. 3. TSW use spray bottles to "make it rain" and observe what happens. 4. Students will describe the effects of pollution on the environment using a T-chart that will be created in groups. Questions to ask students that need a little direction: What are the different types of pollution? What could we do to prevent sediment pollution? What happens when we throw garbage on the ground? How does pollution hurt environment?
Closure (Summary of Lesson)	Open discussion on what pollution does to the environment and how this can be prevented.
CEED Building Application/ Sensor Data	• TTW show students how to get to the dashboard. • TTW show the student how to navigate the dashboard—solar, wind, HVAC, water, weather, extras. Focus on the amount of rainwater the CEED building collects and what they use it for.
Assessment	TSW evaluate the statement…"We all live downstream…" TSW write at paragraph discussing how communities can help stop pollution and clean up existing pollution. TTW informally assess student learning during the experiment.

INQUIRY LEARNING RESEARCH PROCESS GUIDELINES

The following table is just one guideline to use for developing your own inquiry materials. The seven steps in the Learning Research Process include not only how people learn but also how research is conducted. The heart of the design, the three-stage learning cycle of exploration, concept invention or formation, and application is embedded in the middle. In addition to these three stages, this design takes into account that learners need to be motivated to spend the time required for understanding complex subjects and that learners need to build this new knowledge onto prior knowledge. These are similar to the 5E and 7E learning models.

The Learning-Research Process

Steps in the Learning-Research Process	7E Equivalent	Component of the Activity
1. Identify a need to learn.	Engage	An issue that excites and interests is presented. An answer to the question *Why?* is given. Learning objectives and success criteria are defined.
2. Connect to prior understandings.	Elicit	A question or issue is raised, and student explanations or predictions are sought. Prerequisite material and understanding is identified.
3. Explore	Explore	A model or task is provided, and resource material is identified. Students explore the model or task in response to critical-thinking questions.
4. Concept invention, introduction, and formation	Explain	Critical-thinking questions lead to the identification of concepts, and understanding is developed.
5. Practice applying knowledge.		Skill exercises involved straightforward application of the knowledge.
6. Apply knowledge in new contexts.	Elaborate and Extend	Problems and extended problems require synthesis and transference of concepts.
7. Reflect on the process	Evaluate	Problem solutions and answers to questions are validated and integrated with concepts. Learning and performance are assess

Hanson, D. (2006). POGIL Instructor's Guide to Process-Oriented Guided-Inquiry Learning. Lisle, IL: Pacific Crest