ENVIRONMENTAL SCIENCE CENTER

Student Stormwater Filtering Projects

Science Practice	Cross-Cutting Concept	Disciplinary Core Idea
Asking Questions and Defining Problems: (3-5) Ask questions about what would happen if a variable was changed. (Middle) Ask questions to clarify and/or refine a model or an engineering problem. ***Developing and Using Models:*** (3-5) Develop a model using an analogy, example, or abstract representation to describe a design solution (6-8) Develop and/or use a model to generate data to test ideas about phenomena in natural or designed systems, including those representing inputs and outputs, and those at unobservable scales. ***Planning and Carrying Out Investigations:*** (3-5) Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (3-5) Make predictions about what would happen if a variable changes. (6-8) Collect data about the performance of a proposed object, tool, process or system under a range of conditions. ***Constructing Explanations and Designing Solutions:*** (3-5) Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation or design a solution to a problem. (3-5) Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. (Middle) Apply scientific ideas, principles, and/or evidence to construct, revise and/or use an explanation for real world phenomena, examples, or events. (6-8) Apply scientific ideas or principles to design, construct, and/or test a design of an object, tool, process or system. ***Engaging in Argument from Evidence:*** (3-5) Respectfully provide and receive critiques from peers about a proposed procedure, explanation or model.by citing relevant evidence and posing specific questions. (6-8) Respectfully provide and receive critiques about one's explanations, procedures, models and questions by citing relevant evidence and posing and responding to questions that elicit pertinent elaboration and detail. ***Obtaining, Evaluating, and Communicating Information:*** (3-5) Communicate scientific and/or technical information orally and/or in written formats, including various forms of media as well as tables, diagrams, and charts. (6-8) Communicate scientific and/or technical information (e.g. about a proposed object, tool, process, system) in writing and/or through oral presentations.	***Systems and System Models:*** (6-8) Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy, matter, and information flows within systems. (6-8) Models are limited in that they only represent certain aspects of the system under study.	***Human Impacts on Earth Systems (ESS3.C):*** (3-5) Societal activities have had major effects on the land, ocean, atmosphere, and even outer space. Societal activities can also help protect Earth's resources and environments. (6-8) Human activities have altered the biosphere, sometimes damaging it, although changes to environments can have different impacts for different living things. Activities and technologies can be engineered to reduce people's impacts on Earth.

NATIONAL MARINE SANCTUARY FOUNDATION

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www.MarineSanctuary.org

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Purpose:
Students will design and build their own preferred stormwater filtration system and present their project to the class.

Materials:
Tupperware stacking containers
Various filtering materials
- Rocks
- Pebbles
- Dirt
- Sand
- Mulch
- Moss
- Grass?

Dirty water samples (5)
Stopwatches (5)
Posterboards (optional if time allows)

Procedure:
Prep before class:
1. Have filter materials laid out on table up front. Set up Tupperware containers so you have a stacking set per group.
2. Create a dirty water sample similar to the previous lesson: Cabbage juice, charcoal, oil, coffee beans, etc.

Student Filters:
1. Tell the students that they are going to be creating a dirty stormwater filter and testing it today. Have the groups get out their engineering design planning sheets. If they haven't yet already, have them finish writing the strengths and weaknesses of their two ideas. Each group will then pick one option and explain why they chose that one.
2. Have groups come up to the front one at a time to gather materials for their filter.
3. Once all the filters are built it is time to test! They can pour the dirty water in and time how long it takes for all of it to soak through their filter.
4. After everyone has tested their filter, have them go back to their planning sheets. How long did it take to filter? How clean is the water now? Do they have any ideas on how to change their filters?

Student Presentations:
1. Invite each group up one at a time to present their filter to the class. Be sure they explain what they used in the filter and why they chose those items. They can also present how it performed and what ideas they have for improvements.
2. If you have time, the students can write out these answers on a posterboard to use for the presentation.

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