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| **Lesson Title : Water Pollution** | **Unit #:****1** | **Lesson #:****2** | **Activity #:****3** |
| **Activity Title: Water Run-Off and Soil Erosion** |

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| **Estimated Lesson Duration:** | **1 Class period** |
| **Estimated Activity Duration:** | **2 Class Periods** |

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| **Setting:** | **Classroom** |

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| **Activity Objectives:** |

**Objectives**

* Students will describe how pollutants are carried in water as it travels on the earth’s surface.
* Students will build models to demonstrate how soil structure impacts the rate of water flow and the movement of pollution particles
* Differentiate between point and non-point sources of pollution

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| **Activity Guiding Questions:** |

What are some different sources of pollution?

What is pollution?

What is water pollution?

Is there anything in nature that can help prevent or reduce pollution?

| **Next Generation Science Standards (NGSS)**  |
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| **Science and Engineering Practices (Check all that apply)**  | **Crosscutting Concepts (Check all that apply)** |
| ☐ Asking questions (for science) and defining problems (for engineering) | ☐ Patterns |
| ☒ Developing and using models | ☐ Cause and effect |
| ☐ Planning and carrying out investigations | ☐ Scale, proportion, and quantity |
| ☒ Analyzing and interpreting data | ☒ Systems and system models |
| ☐ Using mathematics and computational thinking | ☐ Energy and matter: Flows, cycles, and conservation |
| ☐ Constructing explanations (for science) and designing solutions (for engineering) | ☐ Structure and function.  |
| ☐ Engaging in argument from evidence | ☐ Stability and change.  |
| x☐ Obtaining, evaluating, and communicating information  |  |

| **Ohio’s Learning Standards for Science (OLS)** |
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| **Expectations for Learning - Cognitive Demands (Check all that apply)** |
| ☐ Designing Technological/Engineering Solutions Using Science concepts **(T)** |
| ☒ Demonstrating Science Knowledge **(D)** |
| X☐ Interpreting and Communicating Science Concepts **(C)** |
| ☐ Recalling Accurate Science **(R)** |

| **Ohio’s Learning Standards for Math (OLS) and/or** **Common Core State Standards -- Mathematics (CCSS)** |
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| **Standards for Mathematical Practice (Check all that apply)** |
| ☐ Make sense of problems and persevere in solving them | ☐X Useappropriate tools strategically |
| ☐ Reason abstractly and quantitatively | ☐X Attendto precision |
| ☐ Construct viable arguments and critique the reasoning of others | ☐ Look for and make use of structure |
| ☐ Model with mathematics | ☐ Look for and express regularity in repeated reasoning |

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| **Unit Academic Standards (NGSS, OLS and/or CCSS):** |

 **Diversity and interdependence of Life**

**NGSS:**

* Develop and use models
* Planning and carrying out investigations
* Analyze and interpret data
* Constructing explanations and designing solutions
* Obtaining, evaluating and communicating information
* Cause and effect
* Scale, proportion, and quantity
* Stability and Change

**OLS:**

* Designing Technological/Engineering Solutions Using Science Concept
* Demonstrating Knowledge
* Interpreting and Communicating Science Concepts
* Recalling Accurate Science

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| **Materials**:  |

**What you need for the lab**

**Materials:**

Cheesecloth, 1” X 1” pieces, 2 2 small rubber bands

Clay, modeling, ½ stick Sand

Container – clear plastic Sponge, 1” square

Dye solution (food coloring), blue, 10 drops Air piston, 10 ml

Dye solution (food coloring), red, 10 drops Tape, cellophane or masking

Gravel Clear plastic tubing, 2 – 6” pieces

Plastic medicine cup Water

Pushpin Copies of the lab



 Example container

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| **Teacher Advance Preparation:** |

Make copies of the lab

Locate materials for each lab group

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| **Activity Procedures:** |

Assign student lab teams.

Handout the lab worksheet

Have students read the introduction/background and highlight the key statements and vocabulary (this will help them answer the analysis questions at the end)

Discuss the introduction with the students and review lab procedures

Demonstrate how the lab will be setup and the data will be collected.

Introduce the topic by having the student read the introduction/background material.

Review lab procedures with the students and demonstrate the lab setup.

**Formative Assessments:**

Laboratory worksheets will be collected and data reviewed.

**Summative Assessments:**

Students will complete the application questions located at the end of the lab.

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| **Differentiation: Build one model for the class and complete the lab as a demonstration.**  |

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| **Reflection: The lab activity was very messy but the students enjoyed creating the groundwater models. When completed properly, the models clearly demonstrated how different soils work to clean water as it percolates down through the soil, provides a boundary both to stop pollution from entering groundwater and how it creates the basis for an aquifer. To work properly, modeling clay should be used. Allow one period to build the model and a second to test them. Test the tubing to make sure it fits into the tip of the air piston so water can be removed from the wells.**  |