All Programs

Macroinvertebrates:

Dragonfly Activity – We start the activity by reading "Are you a Dragonfly?" or "The Secret Life of Streams". The books explain the dragonfly lifecycle, and how the dragonfly starts its life off in the water and ends it with a set of beautiful wings. Then students make a dragonfly craft with a clothespin body, colorful paper, pipe cleaner, and ribbon. This is a great educational activity and fun for all.

Caddisfly Activity - Students are read the book "The Secret Life of Streams" by Lynell Marie Garfield. The book teaches about the characteristics and lifecycles of mayflies, stoneflies, caddisflies, dragonflies, dobsonflies, and midgeflies in a fun story. Then we focus on Rocky the case building caddisfly and show the students pictures of different cases made by caddisflies. Then students create their own unique case out of rocks, sticks, and other craft items.

A great way to teach/reinforce lessons on insects that start their life off in the water and transform into a winged insect (such as the dragonfly) is by the use of this resource:
http://extension.usu.edu/files/publications/publication/NR_WQ_Edu_2005-01.pdf
It is a free downloadable coloring book called Bugs Don't Bug Me! It has coloring pages, match adults to babies, a maze, and word find.

Macroinvertebrate Mayhem-This lesson is excellent for the kinetic learners in the group to interactively experience the ramifications of environmental stressors on macroinvertebrates (organisms that lack an internal skeleton and are large enough to be seen with the naked eye). These organisms are an integral part of the food web in any stream or creek and their presence or absence tells us a lot about the health of that stream. Each species of macroinvertebrates has a varying degree of tolerance to environmental stressors, so the more diverse the population the healthier the stream. This activity is a scientific version of tag with specific modifications in place to account for the effects of environmental stressors. Certain organisms that are more sensitive to pollution are restricted in their movement across the field. * We will need an open space (larger than the classroom) inside or outside.

Create an Aquatic Macroinvertebrate – Students draw imaginary macroinvertebrates and explain how their form fits their function. Students will recognize how an organism's physical features are adapted for its survival. This activity brings out the creative side of students while making them think about the scientific reasoning of what they are drawing.

Benthic Bugs and Bioassessment… This is another activity where students focus on benthic macroinvertebrates. In this activity, they will learn about sampling techniques using a net. Three separate streams will be set up in tubs with objects representing different macroinvertebrates. Students will sample their stream, and separate, identify, and count the macroinvertebrates in their sample. Then they will calculate percentages and figure out the EPT/Midge ratio. This is a great science and math combination activity.

Turning Chaos into Order- You don't have to be outside very long to notice the vast differences in organisms in our very backyards. From trees to birds to bees, each organism has very specific characteristics. In this lesson, students will explore basic concepts of taxonomy, by student-led discussion. As a class, they will develop a system to sort themselves by the characteristics they create. In small groups, students will practice using a dichotomous key to classify the various fish specimens found in our watershed.

Human Impact:

Build-a-River - In this activity, students will gain an understanding of the components of a river and the valuable resources found in the Etowah Watershed. The students help create the river by adding rocks, vegetation, benthic macroinvertebrates, and fish (especially darters – Etowah, Rainbow, and Cherokee). We will talk about what makes a healthy river for the macroinvertebrates, fish, amphibians, and mammals that need the river to survive. Then we start adding in human influences such as dirt, fertilizer, and pesticides. We explain how that affects the water quality and the basic needs of the animals (including humans).

Enviroscape –The flexibility of the Enviroscape makes it possible to address human impact issues such as erosion, litter, animal waste, fertilizers, pesticides, pharmaceuticals, and other non-point source pollutants or the process involved with bringing clean water to the home and the removal of it safely back into the environment. This interactive model is a strong visual lesson that does an excellent job of portraying somewhat abstract concepts in an easy-to-understand format.

All the Way to the Ocean and the Fatal Food Game- The students read (or it can be acted out as a play) the book "All the Way to the Ocean" The book explains how important it is to not put trash in storm drains because the trash goes all the way to the ocean. Discuss the 5 gyres, located in our oceans. Then the students play a game called "Fatal Food" where they are an animal looking for "good" food like a fish, algae, or a jellyfish. They may get good food or they may get "fatal" food such as fishing wire, a plastic bag, balloons, or get stuck in a bottle or 6-pack holder. We explain the dangers of plastic pollution on the environment. * We will need an open space (larger than the classroom) inside or outside to play fatal food.

A Drop in the Bucket - This is a great Earth Science activity that covers salt water, fresh water, and consumptive use. A Drop in the Bucket utilizes the skills of gathering information (observing, calculating), Organizing, and Interpreting (drawing conclusions). Students may know the Earth is covered with water but they may not realize that only a small amount is available for human consumption. Learning that water is a limited resource helps students appreciate the need

to use water conservatively. A short “icebreaker” is used to show students how much of the Earth is land and how much is water. This discussion leads to the realization of how much of that water is actually usable.

There is no Point to this Pollution: This exercise allows students to analyze data to solve a mystery, interpret a topographic map, and analyze and compare water quality data to learn about the cumulative impacts of nonpoint source pollution. Students will identify point and nonpoint sources of pollution, demonstrate the cumulative impact of nonpoint source pollution, learn to read and interpret a contour map while identifying important map clues about watersheds and water quality, graph, analyze, and interpret data sets to draw conclusions about pollution sources, compare local household and community nonpoint sources of pollution to surface water quality standards, and list ways to reduce or eliminate nonpoint source pollution.

Poison Pump- This lesson does an excellent job of incorporating history into a science lesson. Based on the real-life epidemic that plagued London in 1854, students are given a series of clues to discover the source of the disease named Cholera. Students are asked to label information on a map provided in the clues to form a supported hypothesis as to the origin of the outbreak. This lesson provides an excellent introduction to water quality, human impacts, and even epidemiology.

F.O.G. Relay –Students learn about fats, oils, and grease and how they affect wastewater pipes which can result in a “spill” (sewage in our streams, rivers, and lakes). Students learn about the importance of crapping the food and grease off the plate into the trash and put the plate in the sink. In a relay style, students race to the trash can and kitchen sink to scrape the plate clean and race back. It is a fun way to learn about F.O.G. There needs to be a big open space inside or outside.

Marvelous Microbes- Have you ever wondered how wastewater gets treated? Similar to a game of sharks and minnows, the students will either be “food” (some of the various components of wastewater such as bacteria, algae, nutrients, or food particles) or they will be a microbe that eats the food. This lesson allows students to interactively learn about a few of the microorganisms that we use to break down wastewater and how we can use them to our benefit.

Don’t Trash your Toilet- This activity begins with the reading of Toilet: How it Works by David Macaulay. This book explains how a toilet functions, and where waste goes when it is flushed including a general overview of wastewater treatment. This is followed by a whole group discussion of what belongs in a toilet and what doesn’t. Students apply their newfound knowledge with an interactive relay. The relay begins with students being randomly given an item, which includes: toilet paper, paper towels, flushable wipes, cotton swabs, Band-Aids, floss, laminated “pee”, and poop emoji stress balls. Students will take their item and run to where a “toilet” (toilet seat on top of a 5-gallon bucket) and trashcan are. Students must correctly place their item in the correct receptacle and run back. This lesson ties into the standard because when inappropriate items are flushed, they can result in sewer back-ups and spills that adversely affect our environment. * We will need an open space (larger than the classroom) inside or outside to play.

Water Quality:

SCIENCE BASIC: Hitting the Mark - The students will distinguish between accuracy and precision, investigate the relationship between accuracy and precision as it relates to water quality data collection, write clear procedures, and recognize the limitations of those procedures. Students work in small groups to create a structure and/or method to make the clay ball hit the target. Then they write the procedure out step by step. The groups then rotate and have to use the other group's procedure to get the same results. This is a fun hands-on interactive way to teach accuracy and precision!

Water Quality - Students will learn about some water quality measures such as temperature, pH, turbidity, conductivity, alkalinity, and dissolved oxygen. The students will work together with field kits to test a water sample. Students will get an understanding of what background levels are normal and what excess is created by human point and non-point source pollution.*If an outside water source (i.e. pond or stream) is available and assessable the water can be collected and tested onsite or brought back to the classroom.

Mystery River- This lesson allows students to critically analyze to real local data and determine whether or not a problem exists. Students have the opportunity to practice working with the Georgia Environmental Protection Division Adopt-A-Stream database to locate current and historical data on waterways all over our watershed, some going back as far as 2000. This lesson is wrapped up with an oral presentation of the student's findings of potential problems that may be present.

Georgia Adopt-A-Stream – https://adoptastream.georgia.gov/
This EPD initiative is a multi-layered program to look at the water quality of any chosen stream of interest. This program has sampling protocols including QA/QC measures and training for indicators such as chemical, bacteria, and macroinvertebrates. Once a site is selected, we will provide the training necessary to allow you and your students to build your program to incorporate the sampling you find desirable. Chemical testing is done monthly and includes DO (Dissolved Oxygen), Alkalinity, pH, Nitrates, Phosphates, Temperature, Conductivity, and Ammonia. Bacteria sampling is done monthly and includes testing for E.coli in the selected waterbody and is measured in cfu/100 ml. Macroinvertebrate sampling is the most time-intensive testing of the testing options and is done quarterly. This sampling is using organisms that lack an internal skeleton and are large enough to be seen by the naked eye as a water quality indicator. Certain Macroinvertebrates have a lower tolerance for pollution than others which makes them an excellent indicator for pollution in the selected site. Other sampling options include a habitat survey, pebble count, and measuring for flow. Water pollution affects us all. Although there are no easy solutions, our hope for the future is a generation of informed and concerned citizens working together to alleviate the problem. Unfortunately, even we, as adults, don't always know how to contribute to help. One valuable contribution we can make is to guide young people as they learn what to do and determine a course of action. The Adopt-A-Stream program is about helping you, help them, help your environment.

The Incredible Journey - This is a great Earth Science activity that covers condensation, evaporation, and electromagnetic forces. The Incredible Journey utilizes the skills of organizing (mapping), analyzing (identifying components and relationships), and interpreting (describing).

When children think of the water cycle they often imagine a circle of water flowing from stream to ocean, evaporating into clouds, and raining down. In this activity, students will role-play a water molecule as it travels through the water cycle. This activity helps students to conceptualize the water cycle as more than a predictable two-dimension path. As students move through the water cycle they will collect beads that map the route of water. The incredible meets the standards for Earth Science and Ecology and aims to get the students to describe the movement of water within the water cycle and identify the states of water. A short "icebreaker" is used to show students how much of the Earth is land and how much is water. This discussion leads to the realization of how much of that water is actually usable.

Water Infrastructure:

JUST PIPE UP! – In this activity, students will learn where their water source comes from and the path it takes through the water treatment and wastewater treatment process. When the proper order is established the students hold labeled tubes representing the locations along the way. Marbles and bouncy balls are then added at the water source (beginning) and students have to negotiate them through the system using elevation changes. There are discussions about water and wastewater line breaks and the consequences. It is a fun, hands-on approach to learn about the water and wastewater process.

From to Place to Place – Students will design a distribution system to get water from the water treatment plant to homes. Depending on how students design the system, they may need some type of "force" to move the water. The vocabulary includes gravity, hydraulics, pressure, PSI, and velocity. Students will learn how a distribution system works, how to read a map of the distribution system, how to calculate how fast water can get to their home, and what the layout of water mains says about the population of an area.