Lesson: Field Games

Arlington Echo works to continuously improve our lessons. This lesson may be modified over the course of the school year.

Environmental Literacy Question: How have humans affected the Chesapeake Bay and its watershed?

Topic/Essential Question: How do weathering and erosion change the Earth?

Unit/Lesson Sequence: This lesson is a school choice lesson in the 4th quarter at Arlington Echo Outdoor Education Center. The lesson's focus is on human causes and prevention of erosion.

Content Standards:

- **Environmental Literacy**
  5.A.1. Analyze the effects on human activities on earth's natural processes
  1.A.5.f. Make recommendations supported by data to help address or resolve the issue.
  8.F.1.b. Identify actions that can be taken as individuals and those that require the involvement of other people, organizations and government.
- **Science**
  4.F.1.a Identify and describe the interactions of organisms in an environment.
  6.B.1 Recognize and describe that people n Maryland depend on, change and are affected by the environment.
  MSDE 3.0 Life Science the students will use scientific skills and processes to explain the dynamic nature of living things, their interactions, and the results from the interactions that occur over time.
- **Physical Education**
  3.B.1.a Interpret errors in personal skill performance based on corrective feedback.
  6.E.1.a Practice a series of activities within a specified amount of time.
  1.A.1.a Use non-locomotor and locomotor skills while varying the movement conditions such as: speed, force, pathways, directions, levels and space in authentic situations.
  6.A.1.a Demonstrate safe practices for self in physical activity settings.

Length of Lesson:
Overnight program: 60 minute
Day program: 45 minutes

Student Learning Outcome: The students will participate in outside environmental field games where they will work together as a group to solve problems. Through these games students will discuss various human activities that cause erosion.

Knowledge of the Learner:

- Prerequisite knowledge, skills, and processes: Students must have a basic understanding of what makes a healthy and stable habitat and the human impact on these habitats. Students should be able to listen to and follow instructions as given.
- Differentiated: This lesson will appeal to different types of learners. Kinesthetic and naturalist learners should do well with the physical aspects of the different games. Interpersonal learners will benefit from the team dynamic required for completing the activities. Logical/mathematical learners will be able to utilize their critical thinking and problem solving skills. All fourth grade students should be able to comment on the impact of humans on the environment.

Knowledge of the Content:

- Content knowledge for instructor: Provided in the Lesson Plan and Supplements
- **Vocabulary:**

Habitat	Pervious
Pollution	Impervious
Runoff	Erosion

- **Materials:**

Square wooden boards	Foam Balls
Hula Hoops	Two Ropes
Small wooden boards	Blindfold
Jenga Boards	Four Cones

- **Supplements:**
  - A: Pass the Energy
  - B: Soil Tag
  - C: Don't Block the Sun
  - D: W.E.D. Game
  - E: Restoration Crossing
  - F: Bats & Moths
  - G: Environmental Jenga

Lesson setup:

All materials should be out on the field for use.
Set up two hula hoops about 15-20 feet apart, and place the amazon boards next to one hoop.
Lie two ropes across from each other on a section of the field separated by 30 feet of open space.
Set up the traffic jam boards in a horse shoe shape.
Set up Jenga blocks either on the picnic tables or on an amazon board on the ground.

Instructional Delivery

Pre-Assessment/Warm-Up

1. Students will come to the field for this activity.
2. Introduce yourself and let the students know that they will be participating in field games in order to gain a better understanding of their impact on the environment

3. Ask the students what the components of a good habitat are (food, water, shelter, space).
4. Discuss the relationship between teamwork and being a "Chesapeake Bay Steward".

Procedures:

5. Briefly discuss with the students ways to play games safely while still having fun.
6. The games available are suggested activities, and not all must be completed during the length of the lesson. The amount of games you will complete is dependent on how long the group spends on each game.
7. See Supplements A-E for game procedures.

Assessment

8. Discuss What types of negative impacts affect the health of a habitat
    a. Excess impervious surfaces leading to increased runoff
    b. Destruction of native fauna
    c. Pollution from over fertilization, pesticide use, and animal waste
    d. Erosion from construction and farming
    e. Natural disaster destroys a habitat
9. Ask the students, as Chesapeake Stewards, what they can do to help protect habitats
    a. Plant native trees and plants
    b. Install rain barrels to minimize runoff
    c. Pick up pet waste
    d. Help plant buffer zones in coastal areas
    e. Pick up trash/litter that may get carried in streams
    f. Reduce, reuse and recycle so natural resources are not depleted

Notes for Inclement Weather

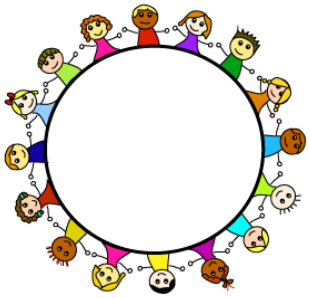
Arlington Echo encourages keeping our outdoor activities outdoors—even in the rain—but in the case of severe weather (thunder/lightning extreme cold, etc.), the rain location for this activity will be under the Main Pavilion or inside Field Hall. In the event of a thunderstorm, the activity Lots of Watts will be done instead of Field Games.

Notes for Cleanup

Please collect, organize and return the lesson materials to the I&C closet (in the Main Pavilion) at the end of each day of instruction. The locations for all the game materials are labeled in the closet. Please inform the Arlington Echo staff if you need assistance or if any materials are damaged or destroyed.

Notes for morning set up:

Please set up your materials prior to the morning's activities. If you do not spend the night, please check in with an AE fourth grade staff member and be at your teaching location by 8:40 a.m. This may require you to leave breakfast a few minutes early.



<u>Supplement A-</u> Pass the Energy

Equipment Two hula hoops, different sizes

Objective To help students understand that everything in nature is connected.

Story

1. Inform students that they are different parts of the Chesapeake Bay watershed's natural environment. Some students are the sun, some are submerged aquatic vegetation, some are minnows that eat the grasses and others are crabs that eat the minnows. Explain how energy moves between species: a plant gets energy from the sun, then another animal can get energy from that plant, and then a carnivorous animal can get energy by eating another animal. In this activity, the students must try to pass the energy between species so that it reaches all students, and returns back to the start location.

Activity Leader Information

1. This activity requires the instructor to spot the students who are working with the hula hoop. It is best to spot from the outside of the circle.
2. Only attempt to send both hula hoops around the circle if the students can successfully pass one hoop all the way around.

Activity Instruction

1. Have the students begin in a large circle, holding hands.
2. Place one hula hoop between two students and have them rejoin hands.
3. Instruct the students to pass the hula hoop around the circle without letting go of each other's hands.
4. If the students are successful, add a second hoop, moving "energy" the opposite direction of the other hoop.

Discussion Questions

1. How does energy pass from species to species?
2. Can humans get all of their energy directly from the sun?
3. Are we all connected?
4. How might erosion affect the balance of a food chain/web?
5. How would sedimentation from erosion impact the food web?

Supplement B- Soil Tag

Equipment: four orange cones

Objective: To help students understand how heavy rains can cause erosion.

Story : Tell the students to imagine that they are a forest during a rain storm. Some students will be trees, some will be soil, and others will be rain drops.

Activity Leader Information

1. This activity is a game of tag. The activity leader should make sure students do not play too roughly and also alleviate verbal disagreements as they occur.
2. The activity leader needs to direct the game (telling students when they are a tree, rain drop, or soil).
3. This activity requires a minimum of 8 students in order to play.
4. Set up four cones to make a square playing space. The space can be fairly large (30'x30')

Activity Instruction

1. To begin the game, choose one student to be the rain drop – they are "it".
2. Choose one student to be the soil – they are being chased by the rain drop.
3. Group the remaining students into sets of twos and have each pair link arms and spread out inside the boundary– they are trees. (For a group of 8 students, there should be three pairs).
4. The student who is a rain drop must try to tag a student who is soil. A soil cannot be tagged if they link arms with a tree. However, if a soil does link arms with a tree, the student on the opposite side must let go and becomes a soil.
5. Explain to the group that if a soil gets tagged, they become a rain drop and the rain drop becomes a soil. A soil that gets tagged by a raindrop represents erosion because the rain is washing away the soil.
6. Point out the four orange cones and let students know they need to stay inside the boundaries.
7. If there are more than eight students playing, the instructor can designate more soil, rain drops and tree pairs accordingly.
8. To see the effect of less trees on erosion turn some tree students into soil and others into rain so that only two students are trees.
9. In a forest, tree roots hold soil together to prevent erosion. A lot of rain and not enough trees however can cause soil to erode away. Explain that in this game, the amount of trees versus the amount of rain will change to demonstrate what happens to soil with less trees and more rain.

Discussion Questions

1. How does erosion affect a habitat? What does that mean for the animals living there?
2. What effect did trees have on erosion? When did more erosion occur?
3. What effect did raindrops have? What happened when there were more raindrops?
4. What can we do to help prevent erosion?

Supplement C – Don't Block the Sun

Equipment: foam balls, wooden boards

Objective: help students understand how erosion affects SAVs (Submerged Aquatic Vegetation).

Story: Tell students that there has been a rainstorm which has carried sediment into the Chesapeake Bay. Explain to students that that erosion and impervious surfaces increase the amount of dirt that reaches the cause water to become extremely cloudy, blocking sunlight from reaching the bottom where SAVs grow. In this game, some students will be sunlight, sediment, or SAVs.

Activity Leader Information

1. Place the rope on the ground before starting the game. The rope will act as the boundary between the sunlight and SAVs. Ensure that the students have some distance between them and the rope boundary.
2. The activity leader will need to direct the game to monitor the flow.
3. Before beginning the game be sure to remind students that:
    a. All plants need sunlight to grow.
    b. SAVs provide oxygen to the water, which is good for the animals in the Bay.
    c. Without SAVs the water has much less oxygen and no habitat for key species at the base of the food chain.

Game Instructions

1. Split the students up into two groups standing opposite each other behind their respective rope boundaries.
2. Explain that the first group is our sunlight and the foam balls represent the "energy" they give to plants.
3. Have the second group sit Indian style on the ground. Explain that if they catch one "sunshine" they can get to their knees. If they catch a second one, they become fully grown SAV and can stand up all the way on their feet.
4. Next take two students from each group (if it's a large group you can take more), and explain that they are going to be our pollution. Give the two students one of the pollution boards, and say that "just like sediment in the Bay, you guys will block sunlight from reaching our plants". They can use their boards to whack away incoming sunlight and may walk along the rope boundary, but are not allowed to cross the rope line OR swing their boards at the SAVs.

Discussion Questions

1. What did the SAVs need to grow? What stopped the SAVs from growing?
2. Where does the sediment come from?
3. Do you think SAVs need clear or cloudy water to grow?
4. Will the health of the Chesapeake Bay be affected if there are no SAVs in the water? If so, how?

Supplement D- W.E.D. Game (Weathering, Erosion, and Deposition)

Equipment: large blocks, rope

Objective: To help students understand how

Story: Inform the students that they are all water trying to weather their team's landform. Point out that one team does not have any obstructions but the other teams do, and that the students must go around any obstructions in the path. Explain that we want to see which team can get the most sediment eroded first.

Activity Leader Information

1. Stack large blocks to make a "landform" for each team (two or three teams), all in a row. Mark a line with rope several yards away from the landforms, enough space for students to crab walk around.
2. For one team, leave the path between the line and their landform clear.
3. For the other teams, place obstructions in the path. For example; cones as "trees", dots as "mulch", etc.
4. The activity leader will direct the game and act as the lead spotter.

Game Instructions

1. Divide students into two or three teams, standing them by the "line" side. Inform the students that they are all water trying to weather their team's landform. Point out that one team does not have any obstructions but the other teams do, and that the students must go around any obstructions in the path. Explain that we want to see which team can get the most sediment eroded first.
2. To cause erosion, one student from each team will crab walk from the line to the landform and pick up a piece of "sediment" (one block).
3. The student will have to balance the sediment on their stomach as they crab walk back to the line where the rest of the team is waiting (weathering; erosion).
4. Once the student reaches the line, they can then drop the piece of sediment behind the line while a new student crab walks across to get more sediment, working as a relay team (deposition).
5. When the first team moves all of their sediment, the game ends.

Discussion Questions

1. Ask the students which landform was easier to erode away, the clear path or the obstructed one(s). *The clear path was easier because when things are in the way, the water has to move around it and the water slows down.*
2. Ask the students if they think this can apply to real-life landforms. Explain how trees are the best prevention of erosion and how mulch can be an alternative.
3. Ask why it is important to keep sediment out of the water. *It makes the water cloudy and keeps out the sunlight. We could have damage to land, properties, and habitats in places where there is a lot of erosion.*

<u>Supplement C-</u> Restoration Crossing

Equipment: 3-4 boards of various sizes, 2 hula hoops

Objective: The group must cross a specified distance by stepping only on the three-four boards and not on the ground.

Story

Explain to the students that they are all members of a restoration crew on their way to an island that is eroding away. The crew is going to plant native trees on the island to prevent it from eroding away forever! Unfortunately, their boat (the hula hoop with the boards) has hit a large rock in the water. The boards are crates of saplings that they are going to plant. Luckily, the wooden crates can float and can be used to get the crew to the island. The other hula hoop is an island that is eroding away and needs trees to stabilize its beaches. However, in between the two hula hoops is shark infested waters! The students' only hope is to cross the water using the crates full of trees that will protect the island.

Activity Leader Information

1. The goal of this activity is for the participants to develop a plan in which the entire group crosses the waters together.
2. In order to complete the activity, the group will have to make a plan of how to shuttle themselves and the boards from start to finish
3. The activity leader is the primary spotter.
4. For groups of over 10 students, the group should be split in half and two playing fields should be set up.

Activity Instructions

1. Set up two hula hoops about 20 feet apart. Place wooden boards next to one of the hula hoops.
2. Students, as a group, must get from one hoop to the other using the boards.
3. Students must develop a plan before attempting to cross.
4. Students may not step off the boards and touch the ground while crossing. If someone touches the ground, the entire group must restart at the original hoop.
5. Students should not leap from board to board
6. Students may not hold onto a board and try to slide it forward
7. All participants must reach the opposite side, bringing the boards with them.
8. Boards should NEVER be above the students' heads.

Discussion Questions

1. Did the students' plan get everyone across together?
2. What was challenging about this activity?
3. What, as humans, can we do to prevent erosion and protect habitats?

<u>Supplement B-</u> Bats and Moths

Equipment: One blindfold

Objective: To have each student participate as a bat and as a moth.

Story

Have the students imagine that it is late at night and there is a very hungry bat inside the cave. Ask the students if anyone knows why the bat would be awake this late? (They are nocturnal, which means they eat at night).There are also some moths in the cave as well, a great food source for the bat. Explain that bats track down and capture a moth using echolocation, or listening to responses. In this game, the bat sends out a call to see if there's anything out there. The sound bounces off the moth(s) and returns to the bat. It takes good concentration to be a successful bat. Let the students know that they will each have a chance to be both bat and moth.

Activity Leader information

1. Ask the students to form a large circle and join hands. Tell them to imagine they are forming the walls of a cave.
2. Make sure students know they are preventing students in the middle from going out of the circle.
3. The activity leader should always be watching the bat in the middle as that student will be blindfolded.

Activity Instruction

1. Choose a member of the circle to be the bat, then have him or her come to the center of the circle. Blindfold the student who will be the bat.
2. Designate one student to be a moth and ask them to also come to the center of the circle.
3. The bat's goal is to tag the moth. In order to do this, the bat calls out "Bat!" Whenever the bat calls out "Bat!" the moth calls back "Moth!" (Similar to the pool game Marco Polo).
4. Once the bat tags the moth, the round is over.
5. The tagged moth can then become the new bat and a new student will become the moth.

Discussion Questions

1. Do all animals eat at the same time? In the same way?
2. What adaptation does the bat have that helps it survive? *(Bats use sound to find food because it cannot see well enough).*
3. What are some animals that also use different kinds of locating skills to find food?

Supplement D- Environmental Jenga

Equipment: 60 Jenga pieces, one large square board

Objective: To engage students in questions about human impact on the environment.

Activity Leader Information

1. Stack the Jenga pieces in rows of three, changing the direction of the pieces, with the questions facing down.
2. This may be played as one large game with 60 pieces of the whole group, or split up into two sets of 30 pieces.
3. If playing with 60 pieces, use the large board to set the game up on the ground.
4. If playing with two sets of 30 pieces, the game can be set up on the picnic tables.
5. Make sure the students know that this is a group game and the goal is to get the blocks as high as possible.

Activity Instruction

1. Ask the students if anyone has ever played Jenga before.
2. Let the students know that in this version of Jenga, the question on the block mut be answered to the best of the group's ability before placing the piece on top of the stack. Any correct answer will suffice. The answers in the lessons are examples for use by the instructor if the group is having trouble.
3. To begin the game, randomly select or ask for a volunteer to go first. Go around in a circle so every student pulls a block.
4. See how high the group can get the tower to stack. Continuing pulling and stacking blocks until the tower falls.

Jenga Questions and Answers

1. Why are trees terrific?
    A. *They turn Carbon Dioxide into Oxygen, they slow down runoff, and they filter pollution out of stormwater and their roots hold soil in place, preventing erosion.*
2. Name one way humans negatively impact the environment.
    A. Pollute water ways, litter, destroy natural habitats, deplete resources, use too many fossil fuels, remove native vegetation, build near the water, etc.

3. Name one way humans negatively impact the environment.
   A. Pollute waterways, litter, destroy natural habitats, deplete resources, use too many fossil fuels, remove native vegetation, build near the water, etc.
4. Name one way humans positively impact the environment.
   A. Plant trees/native grasses, compost, reduce reuse and recycle, restore habitats, reduce pollution production, be energy efficient.
5. Name one way humans positively impact the environment.
   A. Plant trees/native grasses, compost, reduce reuse and recycle, restore habitats, reduce pollution production, be energy efficient.
6. Why are wetlands wonderful?
   A. They prevent flooding, they filter water and hold on to excess nutrients, they slow down the flow of water and they provide habitats to many different species.
7. What is erosion?
   A. Weathering away of the soil.
8. What natural forces cause erosion?
   A. Water, wind, ice.
9. Give an example of a human activity that contributes to erosion.
   A. Removing trees/plants, building structures, paving roads/sidewalks, etc.
10. Give an example of how humans can prevent erosion.
    A. Planting native trees/plants, building step pools, mulching trails, rain barrels, etc.
11. Give an example of how humans can prevent erosion.
    A. Planting native trees/plants, building step pools, mulching trails, rain barrels, etc.
12. Name a sign of erosion.
    A. Exposed roots, bare areas of dirt, cracks in the soil, etc.
13. How can erosion affect local waterways?
    A. Soil covers aquatic plants and animals throwing off the ecosystem, clear areas with erosion allow runoff to carry nutrients and pollutants that lead to algae blooms, etc.
14. What are macroinvertebrates?
    A. Organisms that do not have a spine/backbone that are large enough to see without à microscope (but still small).
15. Name one way humans can reduce pollution.
    A. Use cars less/use public transportation, reduce the use of electricity in their home, reduce the use of fertilizers on their lawns, pick up after pets, clean up litter
16. Name one way humans can reduce pollution.
    A. Use cars less/use public transportation, reduce the use of electricity in their home, reduce the use of fertilizers on their lawns, pick up after pets, clean up litter
17. Name one thing that can be recycled.
    A. paper, plastic, glass bottles, aluminum cans, cardboard, wood, old electronics, old batteries, etc.
18. Name one thing that can be recycled
    A. paper, plastic, glass bottles, aluminum cans, cardboard, wood, old electronics, old batteries, etc.

19. Name one way we can conserve water.
    A. Take shorter showers, turn off the sink when you brush your teeth, wash your clothes only when necessary, collect rainwater and use grey water to water the lawn.
20. Name one way we can conserve water.
    A. Take shorter showers, turn off the sink when you brush your teeth, wash your clothes only when necessary, collect rainwater and use grey water to water the lawn.
21. What is one way you can reduce what you use?
    A. Turn off lights when you're not in a room, only take the food that you are going to eat, do not buy new products unless you need to.
22. What is one way you can reuse something you use?
    A. Use a lunchbox instead of a brown paper bag, use Tupperware instead of plastic bags, or use a reusable water bottle instead of a plastic one.
23. Name one thing that can be composted.
    A. Fruit cores, fruit and vegetable peels and tops, plain bread, plain tortillas
24. Name one thing that can be composted.
    A. Fruit cores, fruit and vegetable peels and tops, plain bread, plain tortillas
25. Name one thing that CANNOT be composted.
    A. Any dairy product (milk, yogurt, cheese), any meat product, any salad dressing, soda, candy, bread with condiments on it.
26. Name one thing that CANNOT be composted.
    A. Any dairy product (milk, yogurt, cheese), any meat product, any salad dressing, soda, candy, bread with condiments on it.
27. Give an example of a renewable resource.
    A. Wind power, solar power, wood, water flow, biomass, geothermal.
28. Give an example of a non-renewable resource.
    A. Coal, oil, natural gas.
29. What do you use to take temperature?
    A. Thermometer
30. Name a way YOU could reduce pollution from cars.
    A. Ride a bike, walk, skateboard, rollerblade, take the bus, carpool.
31. What is an animal called that only eats meat?
    A. Carnivore
32. What is an animal called that only eats plants?
    A. Herbivore
33. What is an animal that survives by eating other animals?
    A. Predator
34. What is an animal that is eaten by other animals?
    A. Prey
35. Name one type of precipitation.
    A. Rain, snow, sleet or ice.
36. Name TWO states that are in the Chesapeake Bay Watershed.

A. Maryland, Virginia, West Virginia, Pennsylvania, New York, Delaware and Washington D.C.

37. Which river flows by Arlington Echo?
    A. The Severn River
38. What does it mean when a species is endangered?
    A. It means a species has a small or declining population size or a very limited range usually caused by factors like, habitat loss, hunting, disease or climate change.
39. What measurement can we take to find out how clear a body of water is?
    A. Clarity (or turbidity).
40. Name one animal you have seen in the past week (Not a pet!)
    A. (Answers will vary)
41. Name one part of the water cycle.
    A. Condensation, precipitation, evaporation, collection
42. What is your favorite activity to do outside?
    A. (Answers will vary)
43. What is your favorite activity to do outside?
44. What is something you did to help the environment in the past week?
    A. (Answers will vary)
45. What is something you did to help the environment in the past week?
46. What do trees and oysters have in common?
    A. They both filter water.
47. Name one stage of the dragonfly life cycle.
    A. Egg, nymph and adult.
48. Name one stage of the frog life cycle.
    A. Egg, tadpole, adult.
49. What watershed are we in RIGHT NOW?
    A. The Chesapeake Bay watershed.
50. What is your favorite Chesapeake Bay species?
    A. (Answers will vary)
51. What is your favorite Chesapeake Bay species?
    A. (Answers will vary).
52. What is an environmentally friendly outdoor activity you can do?
    A. Ride a bike, go on a hike, go kayaking, have a picnic, play a game outside, go for a walk, etc.
53. What is something YOU can do to be a Chesapeake Steward?
    A. (Answers will vary, but should be something students can do to help the environment).
54. What is something YOU can do to be a Chesapeake Steward?
    A. *(Answers will vary, but should be something students can do to help the environment).*