Pickering Creek Audubon Center is dedicated to community-based conservation of natural resources through environmental education and outreach on the Eastern Shore of the Chesapeake Bay.
Keys to Success:

MAKE IT RELEVANT AND HANDS-ON

CLEAR COMMUNICATION

ADDRESS MISCONCEPTIONS

PARTNER BUY-IN
Carbon Footprints, Carbon Sinks, and Carbon Stewardship

- Funded by NOAA Climate Steward Education Project
- All 5th grade science classes at Easton Elementary School
- Pre- and Post-Tests
8. Where are fossil fuels found?
   a. Deep underground
   b. Rivers, lakes, and streams
   c. Forests
   d. I’m not sure what a fossil fuel is

9. Which of the following is NOT a source of adding extra carbon dioxide to the atmosphere?
   a. Cutting down and burning forests
   b. Cars and trucks needing to use fuel and gasoline to run
   c. Leaving lights on when you leave the room
   d. Riding your bike to school

10. Which of the following is the biggest threat (danger) to wildlife and birds in Maryland?
    a. Habitat loss due to climate change and sea-level rise
    b. Hunting
    c. Getting hit by cars when crossing the road
    d. Wildlife and birds in Maryland are not threatened by anything
Climate change is currently the BIGGEST threat to wildlife on the Eastern Shore.
Reducing your carbon footprint slows the effects of climate change.

What is carbon?

Slowing climate change gives animals (and people) time to adapt to changing habitats.
Reducing your carbon footprint helps slow climate change, and...  

...increasing and protecting carbon sinks helps too!

Plants naturally store carbon and act as carbon sinks.
Evaluation Results:

- Percentage of correct answers on pre-test: 41.8
- Percentage of correct answers on post-test: 68.4
- Overall improvement of 26.6% over three lessons

- “What is a carbon footprint?” was the most commonly missed question on pre-test, with only 1.2% of students answering correctly. 68.8% of students answered the same question correctly on post-test, for an improvement of 67.7%

- One class’s most commonly missed question was, “What is carbon?” 0% answered question correctly on pre-test, 94.4% answered correctly on post-test.
6th Service-Learning Project and Curriculum: WETLANDS AND CLIMATE CHANGE
### Travelling Carbon Passport

**Name:** ____________________

**Directions:**

1. Stamp your start location in the space below.

   **Start location**

   Stamp above

2. Roll the die to find out where to go next. Write *How I traveled* in the Trip #1 box below (see example at right).

3. Go to that location in the room and stamp the Trip#1 *Where I went* box. Then, roll the die to find out where to go next.

<table>
<thead>
<tr>
<th>Trip #1: <em>How I traveled:</em></th>
<th>Where I went:</th>
<th>Trip #5: <em>How I traveled:</em></th>
<th>Where I went:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Stamp above</td>
<td></td>
<td>Stamp above</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Trip #2: <em>How I traveled:</em></th>
<th>Where I went:</th>
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</thead>
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<tr>
<td>Stamp above</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Trip #3: <em>How I traveled:</em></th>
<th>Where I went:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Stamp above</td>
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</table>

<table>
<thead>
<tr>
<th>Trip #4: <em>How I traveled:</em></th>
<th>Where I went:</th>
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<tbody>
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<td></td>
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<tr>
<td>Stamp above</td>
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</table>

<table>
<thead>
<tr>
<th>Trip #6: <em>How I traveled:</em></th>
<th>Where I went:</th>
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</thead>
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<tr>
<td>Stamp above</td>
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</table>

<table>
<thead>
<tr>
<th>Trip #7: <em>How I traveled:</em></th>
<th>Where I went:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
<tr>
<td>Stamp above</td>
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</tbody>
</table>

**Guess what!** In this game you are a carbon atom. You are going to travel the carbon cycle stopping in many exciting locations - some of which you probably never have been to before.

**For each stop along your journey, remember to record where you went and how you got there.**

Here’s an example of how to fill out each stop along the way:

- **Trip#1:** *How I traveled:*
  - Decomposed into soil
- **Where I went:**
  - Stamp

**CLASSROOM**
**Record your observations for each jar of soil as water is slowly added.**

**How do the soils compare to one another?**

<table>
<thead>
<tr>
<th>Soil A</th>
<th>Soil B</th>
<th>Soil C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

**Feels...**
(Rub between your fingers. Is it rough, gritty or smooth? Is it mushy, moldable or spongy?)

<table>
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<th>Soil A</th>
<th>Soil B</th>
<th>Soil C</th>
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<tbody>
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</table>

**Size...**
(Use magnifying lens. Can you see individual particles?)

<table>
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<th>Soil B</th>
<th>Soil C</th>
</tr>
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<tbody>
<tr>
<td></td>
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<td></td>
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</table>

**Looks...**
(Squeeze some soil with your finger!)

<table>
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<tr>
<th>Soil A</th>
<th>Soil B</th>
<th>Soil C</th>
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<tbody>
<tr>
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</table>

**I think is made of:**
(Circle one or a combination based on feel and size)

<table>
<thead>
<tr>
<th>Soil A</th>
<th>Soil B</th>
<th>Soil C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gravel</td>
<td>Sand</td>
<td></td>
</tr>
<tr>
<td>Silt</td>
<td>Clay</td>
<td></td>
</tr>
</tbody>
</table>

**Prediction:** I predict that Soil ______ is hydric soil because

________________________________________________________________________

________________________________________________________________________

**Result:** Soil _____ is hydric soil.

**Why is hydric wetland soil able to store carbon and act as a carbon sink?**

________________________________________________________________________

________________________________________________________________________
FIELD

Cattail and Wetland Plants Investigation
To help you in your investigation, refer to the Cattail diagram.

1. Examine one of the leaves. Where are the leaves attached to the stalk? How does the leaf feel?

2. Look at a cross section of a leaf with a magnifying lens. What does it look like?

3. Look at a piece of the stem. What do you think the spongy stuff in the center of the stem is for?

4. What do you think the holes in the stem (or pith) are for? (Hint: Wetland plants grow in wet soil that has no oxygen, and plants' roots need oxygen.)

5. Carefully pull some of the fuzz from the cat's tail - the flowerhead. These are fruits. Use a magnifying lens to check them out.

Walk out into a section of the wetlands and tally as many different species of plants you can find in a three minute period. Take two additional minutes to closely observe one plant (not a cattail) of your choosing.

How many different species did you find? ______________________________

Write down one adaptation you observed about the plant you studied.

____________________________

How do wetland plants store excess carbon from the atmosphere?

Group Members: ________________________________

Macroinvertebrates and Water Quality

The water quality of wetlands can be assessed using macroinvertebrates. Macroinvertebrates are animals that lack a backbone, are large enough to be seen with the naked eye and live at least part of their lives in or on the bottom of a body of water.

Many macroinvertebrates require high levels of oxygen and cannot tolerate toxic pollutants. Others can tolerate very low oxygen levels or high toxicity. Macroinvertebrates are relatively immobile and cannot escape from changes in water quality.

Please list any other findings or observations:

As a class, what was your:

3 Taxa Pollution Index Score?

Circle One: Poor Fair Good Excellent

4 Taxa Pollution Index Score?

Circle One: Poor Fair Good Excellent

What does your wetland survey tell you about the pollution present in the water?

What factors might be affecting the water quality of this wetland (positively or negatively)?

How might climate change impact the macroinvertebrates in this habitat?
After learning about the impacts of climate change, what are two things that you wish people knew about climate change?

I wish people knew that the smallest degree of change can affect other forms of life and that wetlands are important too.

What do you think will happen to plants and animals that live in wetland environments if global temperature rises one degree?

Animals may have to start living in a different area and plants may die out.

What are two things that a community can do to help their local wetland environment that will allow it to continue to survive and be healthy into the future?

The community could come here and see what they can do. Then they can plant reed grass or help conserve.
Wetlands and Climate Change Reflection

After learning about the impacts of climate change what are two things that you wish people knew about climate change?

1) I wish people knew that we are putting too many fossil fuels into the atmosphere.
   2) I also wish people knew how to help cut down of fossil fuels.

What do you think will happen to plants and animals that live in wetland environments if global temperature rises?

some will adapt to the environments,
some will die off,
some will leave.

What are two things that a community can do to help their local wetland environment that will allow it to continue to survive and be healthy into the future?

1) A community can work together and save energy. Turn off the lights when you are done in that area.
2) Communities can also cut down on fossil fuels and ride a bike or walk instead of driving in a car.
Wetlands and Climate Change Reflection

After learning about the impacts of climate change what are two things that you wish people knew about climate change?

1) People should know that burning fossil fuels makes more carbon dioxide and there's too much.

2) I wish people knew that just by riding a bike or walking could save you from burning fossil fuels.

What do you think will happen to plants and animals that live in wetland environments if global temperature rises? Some will either have to adapt or die off. They may even have to move and it will take time.

What are two things that a community can do to help their local wetland environment that will allow it to continue to survive and be healthy into the future?

1) They could think of ways to help conserve fossil fuels and think of how they can do things that don't harm the environment.

2) They could conserve energy, turn off lights don't run water, too long.
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Questions?

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