

## Title

# We're All Connected: Ecosystems, Place-Based Education, and Sustainability

## Inspiration

This unit was inspired by Earthwatch's Amazon Riverboat Expedition. On this expedition, Earthwatch volunteers participate in studies on biodiversity and interdependent relationships. The expedition is led primarily by dedicated conservationists born and raised in the Amazon basin. This unit is based upon the Massachusetts salt marsh ecosystem, but it aims to nurture connection and a desire to preserve what one holds dear. Hopefully this type of unit can help develop adults with similar passion.

## Objective

In this series of activities, students will learn about the diversity and interconnectivity of organisms (including people!) in the context of the salt marsh, though this plan can be modified for any ecosystem.<sup>i</sup> This plan can be modified for any ecosystem. Students will connect with a particular organism and recognize its critical role in the salt marsh community.

Students will learn what they have learned with the school community. Each will make a poster with the goal of teaching others about a particular organism. The posters are showcased in a way that illustrates the salt marsh ecosystem.<sup>ii</sup>

## Standards

This unit was developed in the context of an independent school. Our science department is working collectively to develop curriculum around core themes essential for scientific literacy. Ideally, these themes will come up again and again within various contexts from Kindergarten to 8<sup>th</sup> grade (and presumably when our students go on to high school). This unit was designed with the following core themes in mind:

1. Sustainability
2. Interrelationships
3. Enfranchisement and participation in "real world" issues, particularly in their own communities.<sup>iii</sup>
4. Empathy

The unit provides practice with the following skills:

- Metacognition- Students apply their knowledge from a previous unit on learning preferences and multiple intelligences.
- Forming personal connections with the non-human world in one's own environs
- Making detailed observations
- Doing research and deconstructing information to find the most important details.
- Art and design

## Day 1. Introduction to the Unit

- The basics: The salt marsh
  - What do students know already? What is a salt marsh? What's an estuary? A wetland? Where is a salt marsh located? What does it look like? Some information to start with: an estuary is a kind of wetland; a salt marsh is a kind of estuary, and therefore also a kind of wetland (writing this on the board is probably necessary).
  - Google Earth Activity
    - On a SmartBoard, projector, or on overheads, show students wetlands around the world.
      - Images to supplement Google Earth can be found by playing around with Google Images. Some examples: The Tigris-Euphrates in Egypt
      - Iraqi salt marshes, which also have an interesting cultural history
      - California salt marshes
      - Florida Everglades
- With Google Earth, students enjoy coming up and finding their school, then nearby salt marshes nearby
  - Students try to find their school and where they will be going.
- Brainstorms (Think, Pair, Share)<sup>iv</sup>
  - What is a habitat?
  - Can you name one?
  - What are some habitats in your neighborhood?
  - What are some habitats you have studied at Brookwood?

## Day 2. Exploring Habitats

- Brainstorm (Think, Pair, Share)
  - What are "biotic" parts of a habitat? Abiotic?
  - What is a "microhabitat?"
- True definition of a biotic, abiotic, and microhabitat
- Microhabitat Activity<sup>v</sup>
  - In order to prepare for study of the salt marsh,<sup>vi</sup> students will study a microhabitat outside, behind the science classroom. Each student finds an area and measures a 2 m X 2 m square with a tape measure. They answer the following questions on a worksheet.
    - What do you notice about your habitat?
    - Biotic features? Abiotic? What organisms do you see? What organisms might live there that you can't see? Why?

## Day 3. More Complexity: Habitats to Ecosystems

- Definitions: Habitat, Ecosystem/Food Chain, Food Web
  - Puzzle Game- Habitat vs. Ecosystem

- In pairs or triplets, students are given puzzles in which each word of a definition is written on an index card. They work out the two definitions of each pair.
- Brainstorm (Think, Pair, Share)
  - What is the difference between a “habitat” and an “ecosystem?”
  - What is the difference between a “Food Chain” and a “Food Web?”

#### Day 4. First Trip to the Salt Marsh

- Rainbow chips
  - Sometimes the marsh can look rather drab and dull when you first see it. Children are given cut-out pieces of paint samples. Instruct the children to find a perfect match for their sample. They almost always can!
- Salt Marsh Metaphors
  - Pairs of students are handed index cards with the following words and pictures:
    - Nursery
    - Kitchen
    - Hardware Store
    - Sponge
    - Cleaner
    - Hotel
    - First Aid Kit
    - Levee (this will need a definition)
  - They are given a “marsh tour”<sup>vii</sup> and have to listen for ideas about how the salt marsh is like the word on their card.
- Free Exploration
  - Field Guides on hand

#### Day 5. More Detail

- Marsh Metaphor Worksheet
  - Students fill out a worksheet asking “how the marsh is like a \_\_\_\_\_” and discuss their ideas via Think, Pair, Share.
  - More detail about these aspects of the salt marsh
- Your organism chooses you!
  - Now that students are armed with knowledge about the salt marsh, they will be assigned the organism they will study.
  - Each student picks an index card with the name of an organism from a hat. Tell children that for some reason, this organism chose you.<sup>viii</sup>
    - The following are examples of organisms to use:
      - Red-tailed Hawk
      - Harvest Mouse
      - Great Blue Heron
      - Cordgrass
      - Glasswort

- Seaside Orach
  - Garter Snake
  - Snapping Turtle
  - Mummichog
  - Striped Bass
  - Bacteria
  - Algae
  - Fungus<sup>ix</sup>
  - Bee
  - Fiddler Crab
- Discussion: Why did your organism choose you? Do you have Goldenrod in your yard? Do you wish you could fly like a hawk?
- Food Web Activity
    - Students tape the index card with the name of the organism on their shirts so that everyone can see who's who.
    - One student is handed a ball of yarn and throws it to another student that "uses" this organism to survive. The next student then throws the ball and so on until a web is created.
    - Once everyone is holding at least one piece of yarn, pick one student to gently tug his or her piece or pieces. If another student feels a GENTLE tug, she or he should gently tug and so on until everyone feels a tug.
    - Next, choose one student to drop his or her piece as if this organism has disappeared. If a student feels his or her piece of yarn slacken, he or she should drop the piece or pieces and so on.
    - Think, Pair, Share
      - What did you notice about this activity?
      - Share John Muir quote: "When we try to pick out anything by itself, we find it hitched to everything else in the universe." What do you notice about this quote?

#### Day 6. Poster Instructions in Detail

- Hand-outs outlining poster instructions are attached.
- Poster research begins
  - Provide field guides for students. The best have more than a description of how the organism looks, but also some natural history. Good examples are The Sibley Guide to Birds and The Stokes Guide to Reptiles and Amphibians. [enature.com](http://enature.com) is a good online field guide. For students studying humans,

#### Day 7. 2<sup>nd</sup> trip to the marsh

- Students bring clipboards and fill out a worksheet that asks: Can you find your organism, find where it lives or find signs that it came through the salt marsh? Explore its microhabitat. What do you notice about it? Why do you think it likes this habitat? Encourage students to make their own conjectures. A need for right answers will be constraining.

#### Day 8. Poster work continues

- Brainstorm (Think, Pair, Share)
  - o How should we design our poster presentation? What can we do to teach people about the salt marsh ecosystem? Explain that we want to show how the organisms interact, not just who they are.
- Students begin designing rough drafts of posters

#### Day 9. Poster Work Continues

- Continued planning of presentation
- Students can trade rough drafts and begin final drafts

#### Day 10. Poster Work Continues

- Students who finish early can work on general signage

#### Assessment

- See attached rubric. I focus more on effort than perfection. I like to give students a rubric half-way through so that they can improve by the end. They also fill out the rubric themselves as a self-evaluation before I give them the final feedback.

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<sup>i</sup> For my school in coastal Massachusetts, the salt marsh is an important and accessible ecosystem, thus making it relevant to our students. Also, each year at my school, students study a different aquatic environment. Fifth grade is charged with the salt marsh. In fourth grade, students study rivers and watersheds, in sixth grade, they study tide pools, in seventh the open ocean etc.

<sup>ii</sup> Our school has a Sustainability Fair each year. Our community shares our contributions towards sustainability with booths and presentations. For my class, we'll showcase our project then.

<sup>iii</sup> Particularly in terms of "place-based education." See Sobel, David. Placed-Based Education, 2005.

<sup>iv</sup> Think, Pair Share: Students answer questions on their own. Next, they are paired with another student and share their ideas. Then, the class is asked to share their ideas as a group.

<sup>v</sup> Brookwood is lucky to have a creek, fields and forest behind the school, but anything works. Students should only have 10 minutes at most to do this activity. Fifth graders will tend to get out of control after that. After all they're outside by a creek- how fun! But I've learned from experience that quicker is better if staying on-task is important.

<sup>vi</sup> Given the 15-minute walk there and back, the fervor, the need for boots and gear, and the inevitable immersion in water, I wanted to have activities that still involved being outside without having to actually go to the salt marsh every time.

<sup>vii</sup> An outline of "marsh metaphor" answers is attached.

<sup>viii</sup> This helps students feel more contented with their assignment.

<sup>ix</sup> Including fungus and other decomposers starts the game up again if kids get stuck- decomposers eat anything and make soil for plants etc.



### SALT MARSH ORGANISM PROJECT RUBRIC

Showed effort during class and trips to the salt marsh  
(listened to instructions, followed instructions, focused on  
work, tried to do the best job possible).

1 2 3 4

Poster showed good effort (fun to look at, includes good  
information, instructions followed)

1 2 3 4

Journal and worksheets handed in on time with all questions  
answered completely

1 2 3 4

Shared ideas with others

1 2 3 4

Listened to the ideas of other's respectfully

1 2 3 4

P.S. What is the name of the organism above? Extra credit  
if you can find out.



## THE GREAT SALT MARSH PROJECT

The sustainability fair is coming! As a class, we are going to teach others about the salt marsh and its importance to the Earth.

A salt marsh organism has chosen you, and your mission is to teach Brookwood about it. Then, as a class, we will show Brookwood how each organism plays an important role in the salt marsh ecosystem.

Use the paper provided for your poster. If you need new pieces, just ask!

Include the name of your organism so that it can be seen from far away. Draw an accurate picture of your organism. You must draw it- no pictures from the internet. Just do your best!) Then, describe what your organism needs to survive. Include any other information you think is particularly interesting.

Other than that, be as creative as you'd like. The more creative the better!

Remember to think about your learning preferences and those of others. For instance, visual learners might like a colorful poster. Can you make your sentences really clear for people who like to learn from words?

HAVE FUN!!!

P.S. Remember: *Always* come to me with questions. I love questions.

P.P.S. What is the name of the organism on the top of this page? Extra credit if you can find out.