

The Intertidal Biome Worldwide

Subject

Intertidal biomes

Materials/ Teacher Preparation

- Locate Intertidal Ecosystem Picture File Cards (PFCs). Located in plastic ziplock labeled as PFCs
- copy a class set of the Cognitive Content Dictionary (CCDs)
- Hang a blank poster for the concluding discussion; entitle it “Characteristics of the Intertidal Biome”
- Write the following sentence frames on sentence strips. Place #1 up only:
 - #1 *"the intertidal biome____because____"*
 - #2 *"____is an abiotic/biotic factor because____"*

Size/setting/duration

Entire Class/Indoor/Part 1: 35 minutes, Part 2: 30 minutes

Background

The intertidal zone is a difficult place to live since organisms have to survive being both underwater and exposed during low tides. Many organisms have adaptations to live in specific parts of the intertidal zone. Intertidal zones around the world are called the intertidal biome and have shared characteristics.

Overview

Target:

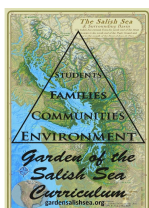
- I can describe the characteristics of the intertidal biome worldwide.

Success Criteria:

- students sort pictures to draw conclusions about the intertidal biome
- students identify abiotic and biotic factors within the biome

Procedure

1. Activate/Connect (2 min): *Yesterday we... today we will (refer to target/success*



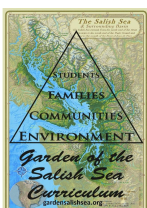
criteria)

2. (2 min) [Biomes of the World Video](#):

- a. Teacher Note: Pause the video at 3:00. “Kids, you’ve learned that biomes are large areas where the plants, animals, temperature, and climate are similar. We saw the marine biome, and were just introduced to a biome inside the marine biome...the coral reef biome. Let’s jump to multiple points here in the video with the sound off...do you recognize any of the other biomes on earth?” (allow kids to see snapshots of the rest of the biomes in the video)
 - b. Answers: freshwater biome, land biomes, tundra, grasslands, rainforest, tropical rainforest, deserts, etc. “As you can see there are a lot of different biomes depending on what large area you are talking about.”
3. (5 min) Today we’re studying the intertidal biome. The intertidal biome of the Salish Sea mostly has the same sorts of plants, animals, temperatures, and climate. It’ll look similar if you’re in Blaine, Bellingham, Seattle, the Olympic peninsula, Victoria Island, etc. But the intertidal biome doesn’t look the same in every part of the world. Now you’ll draw conclusions about the characteristics of the intertidal biome worldwide. What is it?

4. PFC Sort (10-15 min)

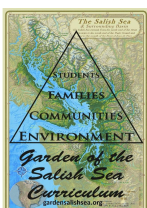
- a. Put a bunch of PFCs in front of every small group of students: 3-4 kids to about 12ish PFCs.
- b. Explain that kids are going to draw conclusions about what the intertidal biome looks like around the world.
- c. They should sort the pictures in different ways, using the sentence frames listed on the board. (For example, they might choose to sort the cards by types of animals or plants, or by things that probably live in the same area, or...anything.)
- d. Model the sentence frame: *maybe you’ll say to your partner, “I think intertidal biomes have some animals that live partially on the land because there are pictures of a crocodile and a lizard.”*
- e. As students draw conclusions, have them jot them down somewhere so they’ll be prepared to share at the end.
- f. Walk around the room guiding students to draw conclusions. As you listen, record student names who drew the following conclusions about the intertidal biome worldwide.
 - i. the intertidal biome has different types of plants
 - ii. the intertidal biome is located along different shorelines around the world



- iii. the intertidal biome has some animals/plants that live on the shore, shallow water, and deep water
 - iv. the intertidal biome includes living and nonliving things
 - v. Some intertidal biomes have hot climates, like the mangrove forests, and some intertidal biomes are more temperate, like the Salish Sea intertidal biome
 - vi. intertidal biomes all are related to ocean water.
 - vii. the intertidal biome support different food chains, depending where in the world it is located
 - viii. intertidal biomes are important nurseries for young animals to grow
5. Conclusion (10 min): Teacher wraps up the session by including big ideas on a class poster. "The intertidal biome_____".
 6. CCD routine:
 - a. Word: Intertidal biome. (allow kids to make predictions on their own, but wait to record the sketch).
 - b. Final definition: "the environment that is covered with water during high tide and exposed to air during low tide."

Part II (25-30 min)

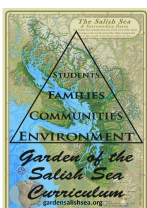
1. Post Sentence Frame #2 on the whiteboard: *#2 " is an abiotic/biotic factor because_____"
2. Have kids get out their Cognitive Content Dictionaries (CCDs)
3. Vocabulary (8 min)
 - a. TPR: "biotic: living"; "abiotic: non living" (include student created motions)
 - b. CCD routine: "abiotic factor" "biotic factor" (Word, prediction, sketch, and final meaning).
 - i. biotic factor: a living that influences that environment.
 1. Sketch: types plant life and animal life present
 - ii. Abiotic factor: a nonliving thing that influences the environment
 1. Sketch: wave force, water temperature, or amount of sunlight
 2. Explain that these are three abiotic factors of an environment but there are many more.
4. PFC Sort #2 (10 min)
 - a. Next, explain that students should sort their cards again, this time by abiotic and biotic factors, justifying their choices using the sentence frame.



5. Share (5-10 min):
 - a. Rephrase students observations to highlight examples and nonexamples of abiotic/biotic factors. Begin to bring in trophic level (food chain) language.
 - b. Biotic factors in intertidal biomes include a orca as a consumer (eats other organisms), seagrasses as producers (uses energy from the sun to make its own “food”), and plankton as either consumers or producers (zooplankton are plankton consisting of small animals and the immature stages of larger animals. Phytoplankton consisting of microscopic plants.)
 - c. Abiotic factors of intertidal zones include the water temperature, amount of sunlight, soil composition, and dominate geographical features like the size and type of rocks.
 - d. Review that an the intertidal biome is “the environment that is covered with water during high tide and exposed to air during low tide.”
6. Input Poster: 15 min
 - a. Have students take a few Eat or Be Eaten Cards or PFC’s near them and gather on the carpet in front of the large Intertidal Input Poster. Explain that if students see a connection between the information presented on the poster and their picture, they should quietly hold it up. If the teacher gives them a thumbs up they can grab a piece of tape and add it to the poster.
 - b. Teacher outlines the poster in marker as they introduce the various facts about the intertidal zones.

Key Ideas to add to Poster

- the part of the shore between high tide and low tide is called the intertidal ecosystem. Inter means between, and tidal refers to the water coming and going
- This marine ecosystem is found all over the world, and it looks different in each setting
- It is rich in nutrients and oxygen and is home to many plants and animals (organisms)
- The closest intertidal ecosystem to us is down at Drayton Harbor or Birch Bay!
- The intertidal zone is an active place. Many organisms have adapted by anchoring themselves to rocks in this high energy environment with a holdfast or by a type of “glue” it makes.
- At high tide, organisms in the 1. spray zone get wet, but not covered with water.
- Organisms in the 2. high tide zone are wet during high tide, but somehow have



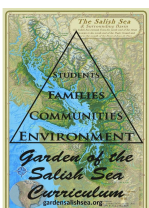
to hold their own when the water leaves. Everything gets dried out.

- Same thing goes for the 3. middle tide zone, but they get access to the water a bit longer than their neighbors above. When the tide is in, it's dinner time, oysters open their shells a bit and filter the water, keeping the food and releasing the rest of the water.
- When the tide goes out, shellfish close their shells to help them stay wet while the tide is out and animals that can move will follow the water (salmonids, sculpins, seals).
- Organisms in the low tide zone get the most access to water and scrumptious food. They still can't wait for the next tide though, since it will bring fresh nutrients for them and their neighbors in zones above.
- Plants that waved in the water now lay flat on sand or rocks (eelgrass).
- Algae take nutrients from the water and plants get nutrients through their roots from soil (or whatever substrate they are growing from). Both algae and plants use photosynthesis to make their own food from sunlight.
- This is sure a tough place to live! Organisms here have to survive changing moisture levels, being underwater during high tide and dry during low tide. They have to be ok with the changing temperatures, according to tides. They have to be able to get oxygen while underwater, and also have a strategy to get oxygen when there's no water! They must survive the wave action pushing and pulling them around.
- Shellfish like oysters have adapted like this: build Oyster Adaptation Table together as a class.

(Put up the Oyster Challenges strips, kids should discuss the adaptation strips with the class as they put them up)

Next Generation Science Standards

Performance Expectations		
5-LS2-1: Develop a model to describe the movement of matter among plants, animals, and decomposers, and the environment 5-ESS2-1: Earth Systems. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact		
Scientific and Engineering Practices	Disciplinary Core Ideas	Cross-cutting Concepts
Developing and using models	LS2.A Interdependent Relationships in	A system can be described in terms of its



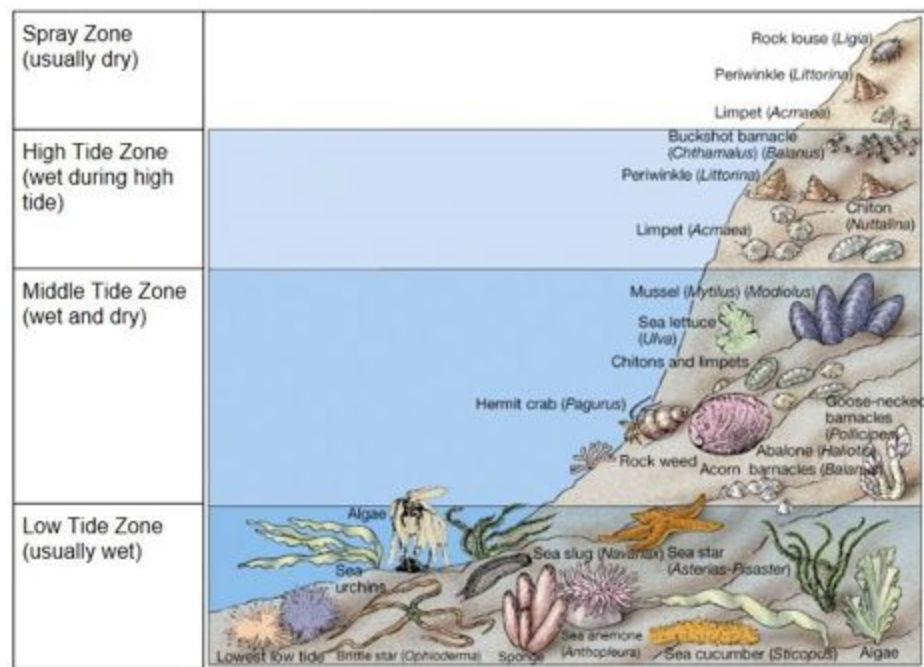
	Ecosystems ESS2.A Earth Materials and Systems	components System and System Models
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Other Standards

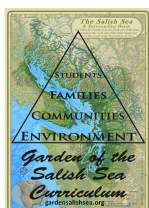
ESE2: The Natural and Built Environment. Students engage in inquiry and systems thinking and use information gained through learning experiences in, about, and for the environment to understand the structure, components, and processes of natural and human-built environments.

Graphics

[Link to Intertidal Ecosystem Cards](#)



Challenges	Oyster Adaptations
must survive changing oxygen levels, both when underwater and exposed	ability to pump oxygenated water through gills and close to protect against drying out
must be able to find food both without water and with water. Or, just wait.	"clam up," close shell tightly to keep in moisture and food. Wait until the next tide



must be able to withstand the changing temperatures	build a dense shell with many layers, like a blanket to stay cold
must be able to withstand the wave action	produces a special glue that holds them to the rock. Dentists/scientists copied this glue.

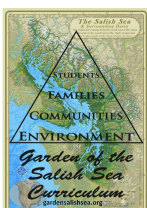
Vocabulary

- the intertidal biome worldwide - the community of organisms that live between the low and high tide lines
- abiotic factor - non-living chemical or physical factor in the environment
- biotic factor - the living parts of an ecosystem
- Phytoplankton - microscopic marine algae
- Zooplankton - microscopic marine animals and larvae

Extension

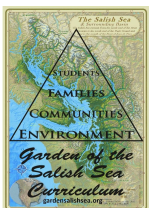
- 2 min Extension: Show the first 2 minutes of [this video by Neil DeGrasse Tyson](#). It helps students understand that tides aren't actually moving in and out, the earth is turning into a bulge of water created by the pull of the moon.
- Intertidal Zones Box
 - Students use a shoebox without the lid to create their own intertidal ecosystem. Project requirements:
 - labeled zones
 - at least 3 biotic and 3 abiotic factors placed at their correct intertidal zone. Each factor should be numbered.
 - Sides of Box: Biotic Factors Key and an Abiotic Factors Key (**) = required

Biotic Factors	
1.	Oysters**
2.	Otter
3.	Eelgrass



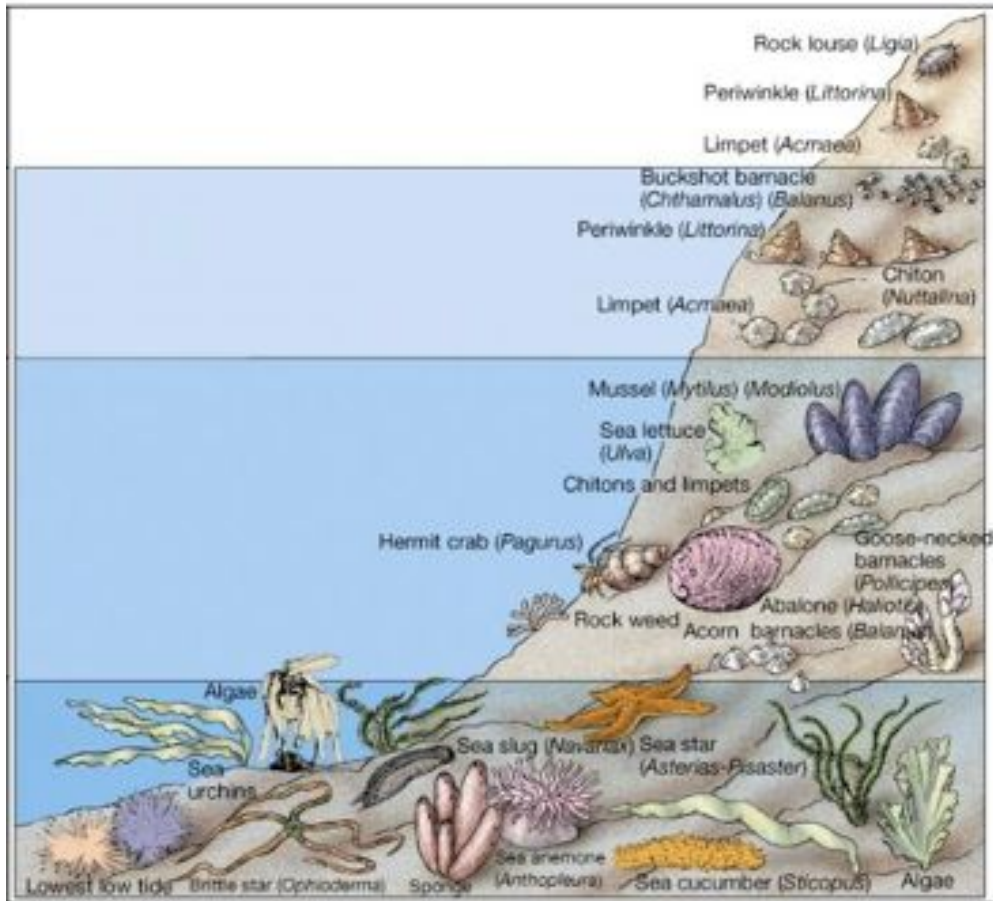
Abiotic Factors	
1.	Rocky shore
2.	Tides**
3.	Sun

Worksheet



Exit Ticket:

1. Draw a picture of an intertidal ecosystem. Draw and label 2 biotic and 2 abiotic factors. Please include a caption describing what an intertidal ecosystem is.



2. What are the four zones of an intertidal ecosystem? Where does an oyster live and how does it survive (name a challenge and adaptation the oyster uses)?

