



Lesson 2: Farming in the Sea

VR Objectives

Students will understand that:

- Discover the biology of larval and adult oysters, and how this changes between different oyster species.
- Describe ways that juvenile and adult oysters are produced through aquaculture.
- Identify how culture methods and post-harvest processing is influenced by market outlets.
- Learn how the environment affects oysters, and how oysters affect the environment.



Lesson Materials

- VR Headset OR iPad and TimeLooper App.

Download the Free
App



PART 1: VR experience

Oysters and Aquaculture

PROCEDURE



PRE-VR Discussion:

- What do you think of when you hear “sea farming”?
- How might farming in the ocean be similar or different from farming on land?

EXPLORING THE APP.

As students go through the VR experience, have them:

- the different life stages of oysters
- the ways that oysters benefit the environment
- the impact that ocean acidification has on oysters

POST VR Exploration

When students are done exploring, choose some of the POST exploration questions to ask them.



Lesson 2: Farming in the Sea

Lesson objectives

Students will understand that:

- follow an oyster's journey from birth to death
- consider the economic importance of oyster farming to coastal communities
- the impact and reach that ocean acidification has on the oyster industry

PART 2: Classroom connection

Journey of an Oyster: From Farm to Plate



PROCEDURE

Activity

What is a polarizing food that you have eaten (e.g. people love or hate it!)? People tend to love or hate beets, brussel sprouts, mushrooms, blue cheese, cilantro.....and oysters! Oysters are an example of a very polarizing food.

2. Show students a clip [of an oyster being eaten](#)- have you ever eaten an oyster? What was it like? What do you imagine it would be like? Would you be willing to try an oyster? Let students know that most oysters in Oregon are grown on farms- similar to how food on land is grown on farms. Farming in the sea is called Aquaculture.
3. Brainstorm with students how a sea farm might be similar and/or different from a farm on land? Create a Vinn diagram. Similar to growing food on land, the food that grows in the sea also ends up in the store or in a restaurant for humans to eat. **Ask students to think about some of the things that they eat that come from the ocean or a sea farm.** Let them know that more than half of the world's seafood comes from aquaculture.
4. Tell students that they are going to [watch a short video about oyster farming](#) on the Oregon coast and follow the journey that oysters take to make it all the way to our plates. Have students get with a partner and **hand out the Oyster Journey Map**. Tell students that as they watch the video they should consider where the stages in the oysters life cycle match up in the farm to plate journey they take in the farm setting. Pay attention to every time the oyster changes location or form and record the connection.

Lesson Materials

- Lesson handouts
- Linked videos
- Highlighter pens
- Large poster paper
- Markers

Highlighted NGSS

Disciplinary Core Ideas

- ESS3.A: Natural Resources

Crosscutting Concepts:

- Systems and System Models

Science and Engineering Practices:

- Developing and Using Models
- Obtaining, Evaluating, & Communicating Information

Teaching Tips



Did you know?

Carrageenan, which is derived from seaweed, is used as a thickening agent in ice cream, toothpaste, salad dressing, etc. Many things you may not be aware of come from the sea!



Lesson 2: Farming in the Sea

PROCEDURE

PART 2: *Classroom connection*

Journey of an Oyster: *From Farm to Plate*



- When the video is over, have students discuss their findings with a partner and review their diagrams. Let the students know that as they heard in the video, the journey of an oyster both at sea and in a farm setting is being changed as ocean water becomes more acidic. Tell students that they are going to consider some additional information and how it might affect the journey of the oyster. Pass out the *Breaking News* article and have them read it with their partner (or read it aloud as a class).
- Ask students to consider who has been impacted by ocean acidification, have them underline or highlight anyone (or oyster) that is impacted either directly or indirectly. Invite students to share and make a list on the board.
- Tell students that they are going to create a new version of the oysters journey that includes the impact of ocean acidification on the industry. How does OA...
 - change the story for the: oyster? farmer? worker? chef? consumer?
 - radiate out to the market in japan and china?
 - affect the coastal economy? state economy? global economy?
- Provide each pair with a large sheet of paper and encourage them to be creative! Map out the journey using art and word bubbles or make it more like a comic strip. What do each of the characters experience at each part of the journey? (the oyster, farmer, consumer, chef, etc.).
- Once students have finished their story maps, have them imagine what they could include in the story to address the issue of ocean acidification. Could they add something to the story that might make things better for:
 - hatcheries? Oyster Farms? Restaurants? Consumers?
- Have students post their maps around the room and do a gallery walk to look at the different versions of the story that were told by their classmates.

Debrief

- How did the story change as a result of OA?
- What was the economic impact on the industry?
- What solutions did they imagine that might address the issue of ocean acidification?

Teaching Tips



Extension

Have students take part in the Great Oyster Debate over non-native vs. native oysters in the Yaquina Bay.

Have them read the Break students into two groups and have them debate the pros and cons of native and non-native oysters in the bay

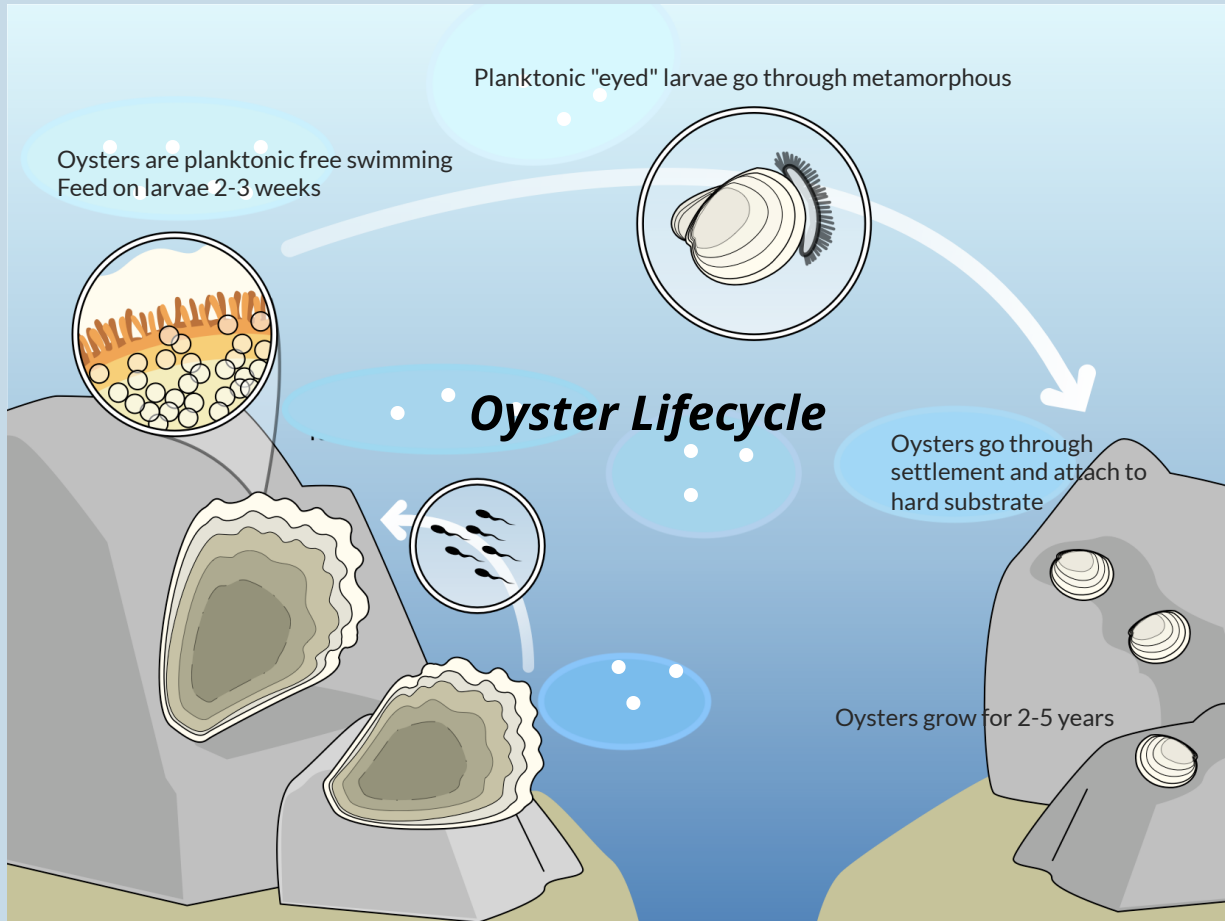
Career Corner



Did you know that you can study aquaculture? Studying aquaculture prepares you for careers related to rearing fish and shellfish.

Oyster Journey Map

From Farm to Plate



Hatchery



Oyster Farm



Production Facility



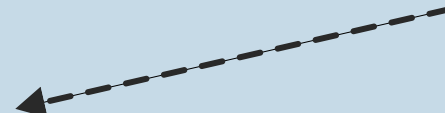
Consumer



Restaurants



Oysters Shipped



Journey of an Oyster

Student Handout



BREAKING NEWS!

Oyster producers and restaurant owners along the Oregon Coast are bracing themselves for another price hike for the Pacific delicacies as ocean acidification makes it more difficult for oysters, and other shelled creatures to survive.

Charlie Bean, owner of the Oysters R US Restaurant chain, noted that the prices of oysters have gone up 30% in the past three years and are expected to jump another 10% over the course of this year.

"This is absolutely not what we want to see, another price increase means that we will have to raise the prices on our menu again and it will surely drive some of our customers away" Mr. Bean said. He added that over the last three years business has slowed.

According to Dr. Sunshine, a professor at an important University, the acidity of global oceans has increased rapidly in the past decades and a dramatic rise of carbon dioxide (CO₂) is thought to be the main contributor to it.

"CO₂ has more than doubled in the past century, which dissolves into the water, breaks down into acid and reduces the pH level of ocean water," said Sunshine. "Oysters, and other shellfish, are the most sensitive animals to these changes because they have calcium and carbonate shells. The more acidic the water is, the harder it is for shells to grow."

The expected price hike comes after many challenging years for the oyster industry. There have been massive die-offs of oysters off the west coast and millions of oysters have been found dead. Acidic water was blamed.

The Happy Oyster Farm on the Oregon Coast currently has 25 staff members, including shuckers, packers, drivers, field crew and retail workers. Owner and operator Cassie Bird fears that more layoffs are coming. Over the past 3 years, as a result of ocean acidification, they have been unable to produce as many oysters and revenue at the farm has decreased by at least 20%.

Birds farm supplies oysters up and down the Oregon Coast, and has a standing order from New York City's Fancy Oyster Bar for Pacific oysters. Additionally, about $\frac{1}{4}$ of the oysters they harvest are flown to Taiwan and China where people are excited for Oregon oysters.

"As oysters become more expensive and hatcheries fail to produce enough for the market, we don't know what the long-term situation will be." said Bean.