Lesson 3

Seafood: Wild and Farmed

[Lesson Duration: 45 minutes, plus 15 optional minutes]

Social Studies
Science
Health

Lesson Overview

Students will explore how aquatic animals are harvested from the wild and farmed (aquaculture) and how those practices impact **ecosystems**. They will also consider health benefits and risks of eating seafood. Although seafood includes both aquatic plants and animals, the focus of this lesson is on fish and shellfish.

Learning Objectives

- Describe some of the ways aquatic animals are harvested and farmed.
- Describe some of the ecological impacts of seafood production.
- Analyze the health benefits and risks of eating different types of seafood.
- Design recommendations for more **sustainable** fishing practices.

Essential Questions

- How does seafood production affect ecosystems?
- What factors should we consider when making choices about seafood in our diets?
- What would make seafood production more sustainable?

Materials

- Student handouts
- Presentation slides
- *Seafood* primer
- FoodSpan Infographic

Resources

- *Seafood* primer (www.foodsystemprimer.org/food-production/seafood/)

© 2020 Johns Hopkins University

Warm-up:
What Does Seafood Production Look Like?

[10 minutes]

Ask students to draw a picture or write a description of how they imagine most aquatic animals are caught for human consumption. Then, present the ***Seafood Production slides***.

Ask: *What is the difference between their impressions and reality? What is most surprising about the real images?*

Most global seafood harvests use gigantic nets that are pulled through the water or along the sea floor.

Photo credit: C. Ortiz Rojas, 1997. NOAA Photo Library.

In the shrimp harvesting industry, only 5 percent of what some trawlers catch is actually shrimp, and the rest is bycatch.

Photo credit: National Oceanic & Atmospheric Adminstration, 1969. NOAA Photo Library.

Shrimp farms in Vietnam. In 2011, the U.S. imported 91 percent of its seafood.

Photo credit: American Museum of Natural History, 2009. Creative Commons CC BY-NC-SA 2.0. https://creativecommons.org/licenses/by-nc-sa/2.0/

On this Australian farm, oysters are raised in submerged bags attached to poles.

Photo credit: Saoysters, 2009. Wikimedia Commons. Creative Commons CC BY 3.0. https://creativecommons.org/licenses/by/3.0/deed.en

© 2020 Johns Hopkins University

Main Activity: How are Aquatic Animals Harvested and Farmed?

Science, Health, Social Studies
[30 minutes]

Students will work in groups to read about seafood production practices and document the ecological impacts and potential advantages of each.

Distribute the ***Seafood: Wild and Farmed primer*** and the ***Seafood Production Handout***. Divide the class into an even number of groups and assign half the groups the *Wild Caught Seafood* section and the other half the *Aquaculture: Farming Seafood* section. All groups should read the background section. Have students read their sections in groups and record on their handouts: 1) the different methods in their section, 2) the ecological impacts of each method, and 3) the potential advantages of each method.

Have each group choose a representative to present one seafood production method to the class. Ask for a volunteer to take notes on the board and instruct students to keep adding to their handouts. Provide time for questions, and then guide a brief class discussion with the following questions:

- *Which methods seem the most sustainable and why?*
- *Which methods seem the least sustainable and why?*
- *In general, which seems more sustainable: aquaculture or harvesting seafood from the wild? Why? Optional: Have students debate the merits of each.*
- *What can governments do to reduce ecological harms caused by seafood production? What can individuals do?*

If needed, offer the following examples of policy measures that have been used in different countries to reduce overfishing and damage to marine ecosystems:

- Temporarily stop fishing in specific areas to allow stocks to recover.
- Restrict the amount of fish allowed in aquaculture enclosures.
- Ban the most ecologically harmful fishing methods, such as dredging.
- Require a larger mesh size for nets to let small fish escape.
- Protect vulnerable aquatic ecosystems, such as coral reefs, by closing them to fishing.

© 2020 Johns Hopkins University

Optional Activity: Health Benefits and Risks of Eating Seafood

Science, Health

[15 minutes]

Explain that seafood contains many healthy nutrients, including vitamins, minerals, and protein. However, some types of seafood also contain high levels of harmful contaminants, such as mercury and other industrial chemicals.

Provide copies of the ***Seafood Safety Handout*** and/or display the ***Seafood Safety slide***. Ask students to work in pairs to interpret this image. Solicit volunteers to explain the seafood safety message explained in the handout. Ask: *Is it safer to eat smaller or larger fish? Why are these guidelines designed for children and pregnant women?* Students can refer to the ***Seafood primer*** for more information.

Discuss:

- *Some government agencies advise people to eat more fish for the sake of health, but others point out the dangers of consuming heavy metals (e.g., mercury) that accumulate in some fish. How do we balance these conflicting recommendations?*
- *If all Americans followed recommendations for seafood consumption, could production keep up with demand? How would this affect aquatic ecosystems?*

Wrap-up: Reflecting on Our Relationship with Seafood

[5 minutes]

Have students write a journal entry in response to the prompt: *Has what you learned today changed your ideas about seafood? Will it affect your eating habits? Why or why not?* Optional: Have students share their responses.

Share Your Knowledge: *Ask students to tweet about seafood production: What should people know about where their seafood comes from? Tag* **#seafood** *and* **#foodspan** *to join the conversation.*

© 2020 Johns Hopkins University

Extensions:

Revisiting the Infographic
(Social Studies)

Distribute copies of the ***FoodSpan Infographic*** (students may already have their own from previous lessons). Ask students to identify parts that represent seafood production. Ask: *Do these accurately and fully represent what we learned about seafood production? If not, what could we add to make the infographic more accurate?* Working individually or as a class, have students draw their own versions, create a collage, or add images to the existing infographic. Share photos of students' work on social media and tag #foodspan.

Field Trip
(Science, Social Studies)

Students will visit a fishery, seafood processing plant, or aquaculture or aquaponics facility, if those exist in the area. Students can research different steps of the production processes ahead of time and come prepared to ask questions about the impacts of the facility's methods.

Endangered Species Research Project
(Science, ELA)

For many aquatic species, centuries of overfishing—both with traditional and industrial methods—have depleted populations well below historic levels. Now, rising ocean temperatures associated with **climate change** are also affecting many aquatic species. Some species, such as Atlantic salmon, have been nearly eliminated from many of their natural habitats, affecting people who depended on those animals for food and livelihoods. Students will research an endangered species threatened by industrial seafood production and provide recommendations for how to protect that species.

© 2020 Johns Hopkins University