

Ecosystem Services - Oceans

Upper Primary/ Lower Secondary

Key Inquiry Questions

1. What ecosystem services do oceans provide?
2. Why are oceans so important to your community and lifestyle?
3. How do human activities affect the oceans and ocean life?
4. What are some ways we can protect the oceans?

Learning Outcomes

1. Students will be able to understand the important ecosystem services ocean and coastal ecosystems provide and how they can better protect them by the end of the lesson.
2. Students will be able to realize how oceans are specifically important to their daily lives by the end of the lesson.
3. Students will engage their creativity through the creation of a poster while expanding their perspective on the importance of oceans by the end of the lesson.

Sustainability Curriculum Goals

Systems Thinking:

1. Our planet - the biosphere - is a complex system that supplies resources and creates conditions that sustain life on Earth.
2. All forms of life, including humans, are connected to each other through man-made and natural ecosystems on which their well-being depends on.

Sustainable Futures:

1. Actions associated with a sustainable future reflect values of care, respect, responsibility, empathy, and compassion for all living and nonliving things.
2. Sustainable futures involve actions that work to preserve, protect, and/or restore the natural environment.

Activities/Goals:

1. Students should be able to explain what sustainability is, the importance of ecosystem services and biodiversity.

Overview:

The lesson will begin with students critically thinking about the extent of how dependent humans are on oceans, and how humans can help oceans. Students will then watch a short video to introduce the challenges ocean ecosystems are facing as a result of actions from humans. Lastly,

students will have the opportunity to engage with the United Nations Millennium Ecosystem Assessment, which was a research initiative conducted by over a thousand researchers on behalf of the UN to assess the consequences of ecosystem change for human well-being. Through this engagement, students will create posters to bring awareness of the problem and showcase possible solutions to the community so that communities feel empowered to become involved with the decision making process associated with protecting oceans.

Materials

SolarSPELL Resource:

1. “Explainer Awesome Oceans” (Pacific Islands > Environment > Teaching Resources > Environment and Sustainability > Explainer Awesome Oceans)
2. “Marine and Coastal Ecosystems and Human Well-Being Synthesis Report” (Pacific Islands > Environment > Teaching Resources > Environment and Sustainability > Marine and Coastal Ecosystems and Human Well-Being Synthesis Report)

Other:

1. Poster paper (if not available, sheets of paper can be taped together).
2. Colored pencils, markers, or crayons (if available)
3. Pencils

Suggested Procedure

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- Ask students to take out a sheet of paper.
- Have students begin by listing as many ways humans use the oceans as they can think of.
 - Possible answers: fishing, transportation, trade, extracting oil/minerals, salt, tidal energy, medicine.
- Next, ask students to list as many ways the oceans help humans (ecosystem services) they can think of.
 - Possible answers: produce clean air we breath, stores carbon, is a part of the water cycle that produces clean, freshwater, produces fish for our food, biodiversity maintains the ocean ecosystem that provides all of the resources for humans, provides a home for mangroves that can protect against tsunamis and sea-level rise from hurricanes.
- Now ask students the following questions to get them thinking about the importance of oceans:
 - What percent of Earth is made up of oceans?
 - Answer: 3/4ths.
 - How much of the total water on Earth is in the oceans?
 - Answer: 97%

- How much of the oxygen in our atmosphere is produced by plant life in oceans?
 - Answer: 50 to 85%.
- Do oceans capture carbon dioxide from the atmosphere?
 - Yes! Small organisms, such as phytoplankton, algae, and other plant life pull carbon dioxide from the atmosphere.
- True or False: The oceans are so huge that it is impossible to pollute them?
 - Answer: False. Plastic bags, bottles, and oil can kill marine life and get tangled in propellers of boats.

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- Direct students to the video titled “Explainer Awesome Oceans”
- Ask students to write down the following questions in their journals:
 - 1. What is one thing mangroves do to help humans and/or animals?
 - Answers: the network of roots offers protection for fish eggs, the forest stops tsunamis and floods, the tree itself is a habitat for crabs
 - 2. What is one thing coral reefs do to help humans and/or animals?
 - Answers: coral reefs help protect the coast and provide a habitat to fish and small organisms
 - 3. Fill in the blanks: Every _____ breath of air we take is thanks to the ocean. For more than half of all the oxygen created is produced by _____.
 - Answer: second, plankton
 - 4. True or False: The oceans store and transport heat, and store carbon, which creates a stable climate and weather.
 - Answer: true
- Pause the video at 4:23 to discuss the above questions as a class.
- Before continuing to play the video, ask the students to write down the following questions.
 - 1. Name two ways that oceans are in danger and why those things create danger for the oceans.
 - Answers: drilling for oil and taking minerals from the ocean can create pollution and destroy the ecosystem, trash in the ocean is eaten by animals and can kill them.
 - 2. True or False: we will never run out of fish.
 - Answer: False, because we take out fish from the ocean faster than the fish can reproduce
 - 3. Name one type of fishing that destroys habitats and catches excess fish.
 - Answer: bottom trolling, dynamite fishing
 - 4. Name two “invisible” threats to oceans.
 - Answer: pesticides from agriculture, untreated sewage from factories, towns, and ships, increase in carbon dioxide leading to acid water that kills mussels and clams, rising temperatures cause corals to die, the destruction of mangroves results in a decrease in fish populations and increased exposure to natural disasters
- Discuss the answers to the questions as a class.

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- Direct students to the reading resource titled “Marine and Coastal Ecosystems and Human Well-Being” published as a part of the United Nations Millennium Ecosystem Assessment.
- Divide students into 5 groups.
- Give each group a large poster-sized sheet of paper.
 - If poster paper is not available, tape together 4 regular-sized sheets of paper.
 - If tape is not available, have students complete the assignment individually with a regular-sized sheet of paper.
- Instruct students to read the “Key Messages, Summary, and Chapter 4” and create a poster to be hung in their classroom and/or their community about the importance of oceans.
- Posters should consist of drawing and words, and *eqwif* include the following:
 - Answers from at least 3 questions from both sections of the video.
 - Three drivers of ocean and coastal ecosystem change.
 - Why people should care about the oceans.
 - Four ways oceans can be better protected, preserved, and cared for by individuals and their community as a whole.
 - One slogan, rhyme, or phrase
 - Example: Don’t give me sass, throw away your trash.
 - Example: Be a part of the solution, not the pollution.

Examples of ways posters could be organized:

10 WAYS TO HELP OUR OCEAN

at home **around town** **on the water**

- 1** **Conserve Water**
Use less water so excess runoff and wastewater will not flow into the ocean.
- 2** **Reduce pollutants**
Choose nontoxic chemicals and dispose of all chemicals properly.
- 3** **Reduce waste**
Cut down on what you throw away.
- 4** **Shop wisely**
Choose sustainable seafood. Buy less plastic and bring a reusable bag.
- 5** **Reduce vehicle pollution**
Use fuel efficient vehicles, carpool or ride a bike.
- 6** **Use less energy**
Choose energy efficient light bulbs and don't overset your thermostat.
- 7** **Fish responsibly**
Follow "catch and release" practices and keep more fish alive.
- 8** **Practice safe boating**
Anchor in sandy areas far from coral and sea grasses. Adhere to "no wake" zones.
- 9** **Respect habitat**
Healthy habitat and survival go hand in hand. Treat with care.

10 **Volunteer**
Volunteer for cleanups at the beach and in your community. You can get involved in protecting your watershed too!

anywhere, anytime

oceanservice.noaa.gov

MAPPING OCEAN WEALTH

COASTAL BLUE CARBON

Coastal wetlands — seagrass meadows, salt marshes and mangroves — provide one of the most effective natural solutions for carbon capture and long term storage on the planet.

Policymakers, industry and coastal practitioners should begin now to preserve and restore coastal wetlands because of their climate mitigation and market potential for the benefit of local communities and economies.

Mapping Ocean Wealth demonstrates what the ocean does for us today so that we maximize what the ocean can do for us tomorrow.

oceanwealth.org @ocean_wealth

EVERY YEAR coastal wetlands sequester enough CO₂ to offset the burning of over **1 BILLION BARRELS OF OIL**

726 TONNES OF COAL emissions are offset by **ONE HECTARE OF MANGROVE**

Coastal wetlands are **THE ONLY HABITAT** that can continuously sequester and store carbon in soil **FOR MILLENNIA**

In some areas **ONE HECTARE OF SEAGRASS CAN STORE 2X THE CARBON** captured by an average terrestrial forest

COASTAL WETLANDS ARE SMALL BUT MIGHTY
Although they cover less than 1% of the ocean they store over 50% of the seabed's rich carbon reserves

