

## Ecosystem Services - What Does the Earth Provide for Us? *Secondary*

### Key Inquiry Questions

1. What are ecosystem services?
2. Why are ecosystem services important for humans?

### Learning Outcomes

1. Students will be reminded of what an ecosystem is and be able to discuss the basics of what ecosystem services are by the end of the lesson.
2. Students will be able to relate their personal lives to ecosystem services by the end of the lesson.
3. Students will understand the 4 different categories of ecosystem services and examples that fall under each category by the end of the lesson.

### Sustainability Education 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.
3. Sustainable living relies on the interdependence of viable, healthy social, economic, ecological, and political systems.
  - a. Without a healthy ecological system, human life cannot be supported by the biosphere.

#### **Worldviews and Mental Models:**

1. To achieve sustainability, worldviews must recognize the interdependence between living and nonliving things on healthy ecosystems, value diversity in nature and in human perspective, and social justice.

#### **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 an introduction to the basic types of ecosystem services the environment provides that students may not even realize. Students will learn that almost

everything they do in a day or have is because of nature/the environment. Students will further examine ecosystem services in their environment by completing an exercise on ecosystem services. This promotes critical thinking and engages their curiosity in thinking about why the environment is so important. The lesson will conclude with students color coding their responses to the exercise to reflect the 4 different types of ecosystem services, and answering questions about how ecosystem services related to sustainability and how climate change can impact them.

## Materials

### **SolarSPELL Resource:**

1. “Ecosystem Services - Wikipedia” (Environment > Teaching Resources > Environment and Sustainability > Ecosystem Services - Wikipedia)

## Suggested Procedure

Before beginning the lesson, it is recommended that you review the document titled, “Ecosystem Services” to gain a complete understanding of ecosystem services and the 4 types that exist.

### *Before Lesson:*

- Take students outside and give them 5 minutes to write down their answers to the following question:
  - Why should people care about the environment?
  - What can people do in nature?
- When the 5 minutes are up, call on a few students to share.
  - This is an opinionated question so there are no right or wrong answers. Allow students to discuss their answers and build off of what their peers are saying.

### *During Lesson:*

- Ask students to look outside around them. Ask them to write 2 to 3 sentences about the ecological community they see.
  - Ecological: living organisms and their surroundings.
  - Ask: How might all of the living and non-living things interact?
    - Tell students that they may not be able to see everything going on, but that they can assume they are present.
- Next, ask students to write 2 to 3 sentences about what value the organisms around them have to humans.
- Take 5 minutes to share and discuss answers as a group. All answers can be accepted as these questions are only meant to foster discussion.
- After sharing, ask students to take three huge breaths!!
  - Ask students where the air they breathed comes from?
    - Answer: it comes from nature/the environment
- Next, ask students to point to their favorite piece of clothing they’re wearing that day.
  - Ask students where they think the materials for their clothing come from?

- Answer: it comes from nature/the environment
- Next, ask students to think of their favorite food.
  - Choose a few students to share by way of raising their hand.
  - Ask students where their favorite foods come from?
    - Answer: they come from nature/the environment
- Next, ask students if they recognize a pattern with all of these answers?
  - Answer: everything comes from nature/the environment.
- Bring the students back inside and inform them that each of the things just talked about represents an ecosystem service.
- Write the following definition on the board and ask students to write it down in their notebooks:
  - Ecosystem services are the benefits humans receive from \_\_\_\_\_.
  - Ask students what they think belongs in the blank (feel free to give them the hint that it has to do with the same pattern they found in the exercise from just before this).
  - Answer: nature!!

*After Lesson:*

- Next, have the students write a list 1 - 10 on a sheet of paper.
- In pairs, have students write down 10 different ways that healthy ecosystems benefit humans. Think broadly, including food, protection from natural disasters, clothing, health, and outdoor activities.
- Have everyone stand up when they are done. Inform students that they will be sharing one of the things they wrote down. Tell them that the goal is to say the most unique one.
- Have the first person say one of their 10 things. Ask for any other student that has that one on their list to sit down. If this is the case, tell the student who shared the list item to also sit down.
- Go to the next person standing up and ask them to share one thing off their list.
  - Continue this process until everyone is sitting down.
  - If the student sharing their response does not have it in common with anyone still standing, ask the students sitting down if any of them have that service on their list.
  - If not, congratulate the student on finding a unique ecosystem service!
- Explain to students that the ecosystem services they wrote down can actually be grouped into 4 different categories of ecosystem services:
  - Provisioning Services: a material benefit that humans take from nature. Examples of these services include food, water, and raw materials for creating products like clothing.
  - Regulating Services: the benefits humans get from the regulation of natural processes in the ecosystem. Examples of these services include climate, water, and air quality, protection from extreme heat, diseases, and natural disasters.
  - Cultural Services: non-material benefits humans gain from nature. Examples of these services include recreational activities that promote mental/physical health, tourism, and a sense of place.

- Supporting Services: processes that support other ecosystem services. Examples of these services include maintaining species and genetic diversity, and photosynthesis.
- Assign a color to each of the 4 different services.
  - Example:
    - Provisioning Services: Red
    - Regulating Services: Green
    - Cultural Services: Blue
    - Supporting Services: Orange
- Put students into groups of four, and have them color in/draw a circle around the items on their list that correspond with each type of service.
  - Example: For anything related to “protection from natural disasters”, students will color it green for regulating services.
- Tell students to raise their hands when they are done. Go to each group of students and check their answers. Discuss any of the incorrect answers with them.

*Assessment:*

- Ask students to answer the following questions in their notebooks:
  - 1. Summarize what an ecosystem service is.
  - 2. What would happen if ecosystem services are degraded/destroyed? Give a specific example.
    - Possible Answer: Without these resources protected and available, humans will not be able to survive as we do now. For example, if we overfish the fish in the ocean, they will eventually run out because they can't reproduce as fast as we are taking them out. Therefore, we should make sure the population is stable and that we are not taking out all of the super big fish in the ocean.
  - 3. How does climate change affect ecosystem services? Give a specific example.
    - Possible Answer: Climate change can force species to migrate to different latitudes or higher elevations where the temperature is better for them. This may result in non-native (invasive) species coming in, which can eat all of the resources the native species need to survive, reducing overall diversity and rupturing the balance of the ecosystem and the services it provides.

## Example of 10 Ecosystem Services Assignment

1. Trees provide air for us to breath
2. Cows provide meat for us to eat
3. The sunlight allows for plants to grow, which provide us with food and are food for animals that we eat
4. Mango trees provide fruit for us to eat
5. The amount of different gases in the atmosphere provides us with a stable climate
6. Mangroves protect us from floods
7. Cotton provides material for our clothes
8. Rivers provide us with water
9. The grass/open space provides us with space to play games and sports
10. Nutrient cycling provides us with freshwater and maintains soil health

