



Connecting ecosystems and human health

These materials are part of EPA Report #EPA/600/R-18/186.

Student Name: _____

Key Words/Vocabulary

aesthetics	benefit	biodiversity	conservation
ecosystem	ecosystem services	habitat	human health
mitigation	recreation		

Part 1: Engage

Ecosystem Services 101 with Hank, <https://www.youtube.com/watch?v=N2whWWYSh6M>

video questions (vlogbrothers)

1. According to Hank in the video, the concept of ecosystem services is based on which main idea? List some examples. _____

2. In New York, a decision was made to restore the health of an ecosystem to filter the water as opposed to spending \$6-8 billion to build a water filtration plant to filter the water. Placing dollar values on ecosystem services combines ecology and which other field? _____
3. What was the worth of all of the world's ecosystems, as determined in 1997?
_____ trillion dollars
4. What argument does Hank make that the ecosystem services are good for the economy? _____

Ecosystem Services, <https://www.youtube.com/watch?v=BCH1Gre3Mgo>

video questions (California Academy of Sciences)

5. What are the three main ways in which biodiversity is crucial to humans?
 1. _____
 2. _____
 3. _____
6. List some of the things that we get directly from biodiversity on the planet: _____

7. Name one direct service from nature: _____

8. Rosy periwinkle is a plant with extracts that are used to treat which childhood disease? _____
9. List some of the services of mangrove forests: _____

10. The video discusses the source water to New York City and how it was contaminated. How much was it going to cost just to build a water filtration system to clean up the water? \$ _____
11. What was the cost going to be to restore the wetlands in upstate New York to clean the water through means of natural filtration? \$ _____
12. After watching the video, describe why the last ecosystem service, the aesthetic and ethical ecosystem service, could be considered the *most important*: _____

13. Describe a place where you like to go outdoors (you can name it if you know the name!) that makes you feel relaxed, happy, or calm. Remember, that's an ecosystem service, too! _____

Part 2: Explore, Outdoors Lesson

Answer the questions after going outside and discussing ecosystem services.

- How do you *feel* being outdoors? Be descriptive if you can. _____

- Are those feelings technically an ecosystem service? Explain why or why not. _____

- List and describe some of the ecosystem services you experienced outdoors:
Example: tree cover reduces air and water temperatures
 - a. _____

 - b. _____

 - c. _____

Use the Student Instruction Sheet for Parts 3 and 4: Explain and Elaborate, Eco-Health Relationship Browser

Answer the questions below using the [Eco-Health Relationship Browser](#).

STUDENTS: LOOK UP 2 HEALTH OUTCOMES ON YOUR OWN. THEN PAIR-SHARE WITH YOUR GROUP OR CLASSMATES TO FILL IN THE REST OF THE CHART.

Air Quality: **AQ**

Heat Hazard Mitigation: **HHM**

Water Quality: **WQ**

Water Hazard Mitigation: **WHM**

Aesthetics & Engagement with Nature: **AEN**

Recreation & Physical Activity: **RPA**

#	Human Health Outcome	All associated Ecosystem Services	How does the <u>ecosystem</u> play a role in the health outcome? (look at the info in the (+) signs and then think about how the ecosystem is related to the health outcomes) THIS SHOULD BE JUST A SHORT SUMMARY.
	Example bronchitis	AQ and WHM (see above for acronyms)	<p>-bronchitis rates: 2.2x up in the most polluted Swiss city compared to the least polluted city. (How ecosystems help: Forests filter pollution, Urban tree cover can remove PM from the air)</p> <p>- the odds of bronchitis for children were increased 14% when dampness and/or mold were present in the home (How ecosystems help: Flooding can increase mold in the home, and wetlands and forests serve to buffer flood impacts...)</p>
1			
2			

#	Human Health Outcome	All associated Ecosystem Services	How does the <u>ecosystem</u> play a role in the health outcome? <i>(look at the info in the (+) signs and then think about how the ecosystem is related to the health outcomes)</i> THIS SHOULD JUST BE A SHORT SUMMARY.
3			
4			
5			

Part 5: Evaluate. At this point, your teacher may do a class share-out exercise with string. While you're waiting, begin to work on the questions below.

Talk with your group members about the following questions. Then, in complete sentences and citing evidence from your chart and the string exercise, **describe in your own words** (using a separate sheet of paper):

1. How important ecosystems are to human health;
2. How two ecosystems can affect the same human health issue. Give at least one example of a human health issue that is affected by two different ecosystems and the services that those ecosystems provide;
3. At least one way that you might think differently about ecosystems when you're outdoors or in a local ecosystem;
4. At least one thing that surprised you during this lesson (or the string exercise if your class did the string exercise)



Connecting ecosystems and human health

Student Name: _____ ANSWER KEY _____

Key Words/Vocabulary

aesthetics
ecosystem
mitigation

benefit
ecosystem services
recreation

biodiversity
habitat

conservation
human health

Part 1: Engage

Ecosystem Services 101 with Hank, <https://www.youtube.com/watch?v=N2whWWYSh6M>

video questions (vlogbrothers)

1. According to Hank in the video, the concept of ecosystem services is based on which main idea? List some examples. *That all of life on Earth does “useful stuff” for people. Examples: providing pharmaceuticals, regulating the weather, filtering the water, cleaning the air...*
2. In New York, a decision was made to restore the health of an ecosystem to filter the water as opposed to spending \$6-8 billion to build a water filtration plant to filter the water. Placing dollar values on ecosystem services combines ecology and which other field? *Economics*
3. What was the worth of all of the world’s ecosystems, as determined in 1997?
33 trillion dollars
4. What argument does Hank make that the ecosystem services are good for the economy? *They provide the services for free.*

Ecosystem Services, <https://www.youtube.com/watch?v=BCH1Gre3Mgo>

video questions (California Academy of Sciences)

5. What are the three main ways in which biodiversity is crucial to humans?
 1. *Direct services*
 2. *Indirect services*
 3. *Aesthetic/Ethical Effect*
6. List some of the things that we get directly from biodiversity on the planet: *Food, clothing, housing, transportation, many medicines and medical supplies, energy...*

7. Name one direct service from nature: Shelter
8. Rosy periwinkle is a plant with extracts that are used to treat which childhood disease? Leukemia
9. List some of the services of mangrove forests: Protect the ocean from wave action, nurseries for aquatic species
10. The video discusses the source water to New York City and how it was contaminated. How much was it going to cost just to build a water filtration system to clean up the water? \$6 billion
11. What was the cost going to be to restore the wetlands in upstate New York to clean the water through means of natural filtration? \$1 billion
12. After watching the video, describe why the last ecosystem service, the aesthetic and ethical ecosystem service, could be considered the most important: Answers will vary, but should describe a human element
13. Describe a place where you like to go outdoors (you can name it if you know of the name!) that makes you feel relaxed, happy, or calm. Remember, that's an ecosystem service, too! Answers will vary

Part 2: Explore, Outdoors Lesson

Answer the questions after going outside and discussing ecosystem services.

- How do you feel being outdoors? Be descriptive if you can. Answers will vary
- Are those feelings technically an ecosystem service? Explain why or why not. Technically, positive feelings inspired by the outdoors are classified as a human benefit, while the ecosystem service is providing the opportunity for engaging with nature. Often, this ecosystem service is paired with opportunities for physical activity and social interaction.
- List and describe some of the ecosystem services you experienced outdoors:
Example: tree cover reduces air and water temperatures

Examples: Trees filter air for healthful breathing; trees offer habitat for wildlife; plants alongside a stream or creek can prevent erosion of sediments into the water; wooded areas provide recreation for hunters, fishermen, and people that enjoy being outdoors