

Learning Objective: Human Impacts on Earth Systems

NGSS Standard: (MS-ESS3.C-1) Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth’s environments can have different impacts (negative and positive) for different living things.

Objective:

Students will be able to:

- 1 Identify the human activities that have altered Earth’s systems.
- 2 Describe the human activities that have altered Earth’s systems.
- 3 Explain the positive and negative effects of the human activities on Earth’s systems.
- 4 Explain ways to impede the negative effects on Earth’s systems.

Time Required: 90 minutes

Materials Needed:

- Teacher computer with internet access
- Projector/Smartboard
- 1 computer/laptop/iPad per student with internet access
- Humans and Earth’s Systems handout (attached)

Teacher Preparation:

1. Create Playlist 1, a 5 minute [playlist](#) in [Legends of Learning](#) with the following game found in the Human Impacts on Earth Systems learning objective.
 - *Oscar’s World - Human Impact on Earth Systems*
2. Create Playlist 2, a 25-minute [playlist](#) in [Legends of Learning](#) with the following games found in the Human Impacts on Earth Systems learning objective (in order):
 - *Human Survival*
 - *Match and Learn - Humans Impact on Earth’s Systems*
3. Create Playlist 3, a 10-minute [playlist](#) in [Legends of Learning](#) with 5 [assessment questions](#) from the Human Impacts on Earth Systems learning objective
4. Make copies of the Humans and Earth’s Systems handout (1 per student)

Engage (10 minutes):

1. Have your students [sign in to Legends of Learning and enter your teacher code](#).
2. [Launch](#) Playlist 1 to your students.
3. The teacher will ask the students, “What information did you come to realize from the game *Oscar’s World - Human Impact on Earth Systems*?”
 - ANSWER: The students should come to the realization that most human actions have a negative impact on Earth’s systems. For example, building large apartment complexes in an area that is heavily wooded will displace the organisms and decrease the amount of trees.
4. The teacher will ask the students, “Are all the actions that humans take negative?”
 - ANSWER: Not necessarily. Many people recycle and try to reduce their carbon footprint in other ways.
5. Explain to students: “We just interacted with some information about ways humans impact the Earth’s Systems. Today we will learn about other ways humans can impact the Earth’s Systems. Think about this game during today’s lesson as we will refer back to it at the end of class.”

Explore (25 minutes):

1. Have your students [sign in to Legends of Learning and enter your teacher code](#).
2. [Launch](#) Playlist 2 to your students.
3. As students complete *Human Survival*, students should fill out the Humans and Earth's Systems Handout Part I.
4. Assist students as needed during game play, pause playlist if you need to address content or questions to entire class.

Explain (25 minutes):

- 1 Review answers to Humans and Earth's Systems Handout Part I.
- 2 Relate student knowledge to the game at the beginning of class.
 - Why was Oscar talking about human population? *(The more humans that inhabit the Earth, the more resources we will need, and we create a lot of pollution.)*
 - What is smog? *(A type of pollution that is a combination of smoke and fog.)*
 - Is solar power a positive or negative impact on Earth's Systems? *(Solar power is a positive impact on Earth's systems, because the Sun's energy is being used to produce electrical power.)*
 - What is the relation of nuclear fuel to Earth's systems? *(Nuclear fuel is clean energy. However, nuclear fuel creates a large amount of waste that is dangerous for thousands of years and there is always the potential for dangerous accidents.)*
 - Is geothermal energy a positive or negative contribution to Earth's systems? *(Geothermal energy is an alternative source of energy. Therefore, it is a positive contribution.)*
 - How does wind energy impact Earth's systems? *(Wind energy is an alternative source of energy, and the pros outweigh the cons.)*
- 3 The teacher will ask the students, "Why are the Earth's systems something we, as humans, should be concerned about?"
 - Since we (humans) live on Earth, we depend on the Earth's systems to run efficiently. Without the Earth's systems, we would not survive.

Elaborate (20 minutes):

- 1 Explain to students that human activity has significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species, but we (humans) can make some changes in order to stop/slow down the altering of the biosphere.
- 2 Show this [short video](#) to students.
- 3 Students should fill out the Humans and Earth's Systems Handout Part II.
- 4 The teacher will ask the students, "Other than recycling, what are some other ways that humans can make changes so that the biosphere is not harmed?"
 - ANSWER: *(This list of answers is not complete. The students may have many more answers.)* Humans can:
 - carpool to work/school and/or take public transportation
 - conserve natural resources, such as water, by timing showers, etc.
 - adhering to lawn watering policies
 - research additional ways to stop polluting the atmosphere

Evaluate (10 minutes):

- 1 [Launch](#) Playlist 3 to your students. When they finish the assessment questions, any time left is freeplay.
- 2 [Analyze student results](#) to determine what concepts need to be a focus for reteaching.

Additional Lesson Strategies:

- To use Legends for additional instruction, create a [custom playlist](#) with an [instructional game](#) and pre and post [assessment](#).
- To use Legends for a quick formative assessment, create a 5-question [assessment](#) in a [playlist](#).
- To use Legends for a student-directed experience, create a [targeted freeplay](#) playlist.
- Encourage students to play on their own at home in [Legends of Learning: Awakening](#) for a student-driven experience including avatars, battling, and quests all centered around topics they are covering in class.

Humans and Earth's Systems

Name: _____

Directions: While playing the first game in Legends of Learning called *Human Survival*, use what you learn to answer the questions below.

Part I

- 1 In what ways can we (humans) impact the Earth's systems?
 - A** Humans can negatively impact the environment by building several buildings and roads in a short amount of time.
 - B** Humans can positively impact the environment by using alternative sources of energy and conserving energy.
 - C** Both A and B
 - D** None of the above
- 2 What are some ways we (humans) impact the Earth's systems?
 - A** Humans use land to build structures which impacts wildlife.
 - B** In certain areas, humans can overfish, which impact wildlife.
 - C** Both A and B
 - D** None of the above
- 3 Based on the game, how can we (humans) minimize our impact on Earth's systems?
 - A** Humans must utilize Earth's resources in a way that creates a balance between man made structures and Earth's systems.
 - B** Humans can utilize Earth's resources freely without any negative impacts to Earth's systems.
 - C** Both A and B
 - D** None of the above
- 4 What impacts does mining have on Earth's systems?
 - A** Naturally occurring minerals are exposed and utilized with minimal impact.
 - B** Large areas of land are destroyed and pollutants are released into bodies of water.
 - C** Both A and B
 - D** None of the above

- 5 What effects do hydroponics have on Earth's systems?
- A** Hydroponics use more land and water than conventional methods.
 - B** Hydroponics use about the same amounts of land and water as conventional methods.
 - C** Hydroponics use less land and water than conventional methods.
 - D** None of the above
- 6 How can nuclear energy impact Earth's systems?
- A** Nuclear energy has no negative effects on Earth's systems.
 - B** Radioactive waste accidents are extremely dangerous to Earth's systems
 - C** Both A and B
 - D** None of the above
- 7 Why are organic farms better for Earth's systems?
- A** Organic farms have higher standards of farming protocols.
 - B** Organic farms employ post secondary graduates who are more knowledgeable.
 - C** Organic farms do not use dangerous pesticides that can seep into the groundwater.
 - D** None of the above.

Part II

- 8 Can the impact that we (humans) have made on Earth's systems be reversed? Explain.

- 9 What steps should we (humans) take to minimize our impact on Earth's systems?
