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How We Impact the Environment Curriculum Map

Empower your students, by educating them on the human impact on our environment. Lessons with activities and experiments covering these topics, water treatment and contaminants, human impact on land - erosion - fertilizer - urban sprawl, pollution and energy - the greenhouse effect - energy trade-offs, invasive species, endangered and extinct plants and animals, protecting the future and governments thoughts.

The activities have two objectives:

1. To teach students about human impacts on the environment.
2. To teach general science through the theme of the environment.

Concepts include: recognizing environmental issues, understanding what impacts people have on the environment.

Learning Expectations:

UNDERSTANDING CONCEPTS:

- ⌚ Recognize environmental issues
- ⌚ Understand the impacts people have on the environment
- ⌚ Be aware of energy usage and waste
- ⌚ Help spread public awareness about environmental issues
- ⌚ Research important environmental information
- ⌚ Understand the importance of caring for and protecting our environment

SKILLS OF INQUIRY, DESIGN AND COMMUNICATION

- ⌚ Demonstrate an understanding of the scientific method by following the steps for experimentation, and recording the procedures and observations
- ⌚ Use appropriate vocabulary to describe environmental issues
- ⌚ Formulate questions and seek answers
- ⌚ Record observations, findings, and measurements using drawings, charts, and written descriptions
- ⌚ Demonstrate problem-solving skills and creativity

RELATING SCIENCE AND TECHNOLOGY TO THE OUTSIDE WORLD

- 🕒 Synthesize information
- 🕒 Recognize the main idea
- 🕒 Research facts/definitions
- 🕒 Distinguish between opinion and fact
- 🕒 Debate controversial topics
- 🕒 Illustrate creatively
- 🕒 Innovate designs and creative solutions to problems
- 🕒 Help spread public awareness about environmental issues
- 🕒 Make inferences

Teachers Guide includes:

- 🕒 At A Glance™ - List of Skills
- 🕒 Teacher Rubric
- 🕒 Student Rubric
- 🕒 Introduction
- 🕒 Materials List

TOPIC 1: INTRODUCTION TO HUMAN IMPACTS ON THE ENVIRONMENT

- What Impact Are We Having?
- Environmental Dictionary
- Ecological Footprint – Printable and Google Slides
- Positive, Negative, or Neutral?
- Topic 1 Answers

TOPIC 2: WATER

- Fish and Food Webs
- The Efficiency of Fishing
- Purple Loose strife & Wetlands
- Testing for Contaminants
- Local Water Treatment
- Building Dams
- Topic 2 Answers

TOPIC 3: LAND

- Erosion
- Tree Planting
- My Patchy Forest
- How Do Trees Clean the Air?
- Fretting Over Fertilizer
- Effects of Recreational Vehicles on the Environment
- My Corn
- The Urban Sprawl
- The Genetically Modified Organisms Debate
- Topic 3 Answers

TOPIC 4: POLLUTION AND ENERGY USE

- Does Recycling Really Help?
- The Greenhouse Effect Game
- Classroom Composter
- Alternate Transportation Challenge
- Packaging Problems
- Battery Battle
- Clearing the Air
- Car Craze
- Are You Energy and Water Efficient?
- Energy Trade-off
- Understanding Nuclear Energy
- Industrial Pollution
- Topic 4 Answers

TOPIC 5: INVASIVE SPECIES

- Improving the Image
- Why Are Invasive Species so Invasive?
- Dealing with Invasive Species
- The Zebra Mussel Problem
- Topic 5 Answers

TOPIC 6: ENDANGERED OR EXTINCT ANIMALS AND PLANTS

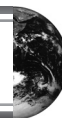
- Endangered Animal Encyclopedia
- Sea Turtle Conservation
- North American Endangered Animals
- Rainforest Simulation
- Species Identification
- Protecting the World's Animals
- Antibiotic Resistance
- Topic 6 Answers

TOPIC 7: CONCLUSION

- Does the Government Care?
- Projecting into the Future
- Money Madness
- Conclusion
- Topic 7 Answers



What Impact Are We Having?

**Objective:**

- Learn about the impact people are having on the environment.
- Find out how aware people are about their environment.
- Learn to analyze surveys to obtain the information you need.

Introduction: Look around you! Almost everywhere you look something natural has been changed by people. Depending where you live you will see a different amount of change to the environment. In a rural town you will see roads, houses, farms, and fields, while in cities you will see sky scrapers, city buses, sidewalks, factories, and street lights. No matter where we live people are having an impact on their world. Is this a bad thing? A good thing? Let's find out!

Procedure:

Answer the following questions.

1. Name some of the impacts people are having on the environment.

2. How do you think people can reduce the impact they are having on their environment?

3. Do you think people can undo the effect they have already had on the environment?

4. Do you know of any measures that are in place in your town or city to help the environment?

5. Do you think the average person is more or less aware of their effect on the environment today than they were three years ago? Why?

Create and use a survey to find out what your friends, family, and neighbors think about human impacts on the environment. The purpose of a survey is not to see what one person thinks but to combine the information you collect to see what people in general are thinking. Use some or all of the following questions in your survey, or create your own ideas of human impacts on the environment.

Survey: Human Impacts on the Environment

Put a checkmark ✓ in the box beside your answer or record your answer on the lines provided.

1. Do you:
 - ☐ walk to work or school?
 - ☐ drive to work or school?
 - ☐ take the bus to work or school?
 - ☐ bike to work or school?
 - ☐ carpool to work or school?
 - ☐ other _____
2. What effect do you think you are having on the environment?
 - ☐ a very big impact
 - ☐ a big impact
 - ☐ an average impact
 - ☐ a small impact
 - ☐ no impact
3. Do you recycle?
 - ☐ yes
 - ☐ no
4. Do you compost?
 - ☐ yes
 - ☐ no
5. Name three negative impacts you think people are having on the environment.

6. Name three positive impacts you think people are having on the environment.

7. Do you think people need to change the way they treat the Earth?
 - ☐ yes
 - ☐ no



8. What type of vehicle do you drive on a daily basis?

- ☐ car or minivan
- ☐ motorcycle
- ☐ SUV or light truck
- ☐ Hummer
- ☐ Smart car
- ☐ bicycle
- ☐ other _____



9. Do you use florescent bulbs in your home. (bulbs that are shaped like a coil)?

- ☐ yes
- ☐ no

10. When you brush your teeth do you:

- ☐ let the water run?
- ☐ turn the water off while brushing?

11. How many large bags of garbage, on average, do you think you throw out each week?

- ☐ Less than 1
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4 or more



12. Have you seen *An Inconvenient Truth* by Al Gore?

- ☐ yes
- ☐ no

13. Do you believe that global warming/climate change is a problem?

- ☐ yes
- ☐ no

14. What are three common sources of air pollutants?

15. In your opinion, how do you think people can reduce their effects on the environment?

➡ **Collect all the surveys** you hand out, and analyze them following the method on the next page.

What Impact Are We Having?

Data Analysis:

1. Use the table below or create your own. If you are familiar with Excel you may want to use it for a faster analysis.
2. Count how many people responded to each answer of the question.
3. For open questions, fill in the answers given and note how many people gave the same answer. You should also make note of whether the answer is correct or not, if there is a right answer.
4. Once you have all the answers in the table, circle or highlight the most common answers. Are they the most common answers for everyone in the class? Why?
5. Do you think people in your community think they are having a big impact on their environment?
6. Make notes about why you think people answered the way they did. Why might people answer incorrectly? What does this mean for the environment? How can this problem be fixed?

Question	A	B	C	D	Comments
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					

Environmental Dictionary

Objective:

- ➡ Learn the vocabulary of an environmentalist.

Introduction:

There are a lot of big words used to explain the effects we are having on the environment and it is important to know what they all mean. Some of these words include:

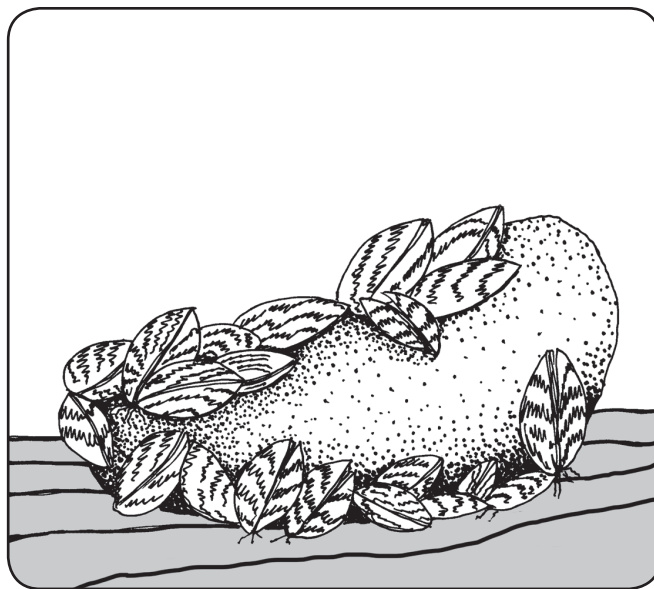
- | | |
|------------------------|-----------------------|
| ➡ acid rain | ➡ ecosystem |
| ➡ biodiversity | ➡ extinction |
| ➡ carcinogen | ➡ global warming |
| ➡ climate change | ➡ indigenous species |
| ➡ contamination | ➡ invasive species |
| ➡ deforestation | ➡ ozone |
| ➡ desalination | ➡ renewable resources |
| ➡ ecological footprint | ➡ sustainability |

Procedure:

1. Make an environmental dictionary using the above words and others that you might come across. Add at least one word each week and include its definition, an example, and an image. You can use the following example or come up with your own.

Invasive Species – a plant or animal that has been introduced to an area, where it could not have appeared on its own, from a different area.

Example: The zebra mussel was introduced to North America from Europe. It has no natural predators here. It can reproduce extremely fast and cause many problems.



2. At the end of the year create questions for a Jeopardy style game using the vocabulary you have learned. For the rules of Jeopardy see <http://en.wikipedia.org/wiki/Jopardy>.

Ecological Footprint

Objective:

➡ Learn about ecological footprints and how to reduce yours.

Introduction:

What is a footprint? It is the imprint you leave on the earth as you walk around. What is an ecological footprint? It is the imprint you leave on the environment as you live your life. The more water, electricity, living space, and food resources you use, the larger your ecological footprint.



Procedure:

Use the following quiz to find out your ecological footprint.

- How old are you?

☐ a. 10 years old or younger	☐ d. 21-25 years old
☐ b. 11-15 years old	☐ e. 26 years old or older
☐ c. 16-20 years old	
- How many people live in your town/city?

☐ a. Less than 1000 (small town)	☐ d. 100,001 – 1,000,000 (city)
☐ b. 1001-10,000 (average town)	☐ e. 1,000,000 or more (metropolitan)
☐ c. 10,001-100,000 (big town)	
- How often do you eat meat?

☐ a. None – I'm vegan (no animal products)	☐ d. Everyday
☐ b. None – I'm vegetarian (no meat)	☐ e. In almost every meal
☐ c. Once or twice a week	
- How much of the food you eat is processed (non-natural and packaged)?

☐ a. Almost none	☐ d. Three-quarters (75%)
☐ b. One quarter (25%)	☐ e. Most
☐ c. Half	
- How much garbage do you throw out?

☐ a. Less than 1 garbage bag per week	☐ d. 3 garbage bags per week
☐ b. 1 garbage bag per week	☐ e. 4 or more garbage bags per week
☐ c. 2 garbage bags per week	
- How many people live in your home?

☐ a. 2	☐ b. 3	☐ c. 4	☐ d. 5	☐ e. 6 or more
-------------------------------	-------------------------------	-------------------------------	-------------------------------	---------------------------------------

7. What kind of home do you live in?

- | | |
|---|-------------------------------------|
| ☐ a. Apartment Building (4 or more floors) | ☐ d. House |
| ☐ b. Apartment Building (3 floors or less) | ☐ e. Mansion |
| ☐ c. Row house (4 or 5 homes attached together side-by-side) | |

8. How much time do you spend on a bus to get to school?

- | | |
|---|--|
| ☐ a. 0 minutes | ☐ d. 41-60 minutes |
| ☐ b. 1-20 minutes | ☐ e. more than 60 minutes |
| ☐ c. 21-40 minutes | |

9. How much time do you spend in a car to get to school?

- | | |
|---|--|
| ☐ a. 0 minutes | ☐ d. 41-40 minutes |
| ☐ b. 1-20 minutes | ☐ e. more than 60 minutes |
| ☐ c. 21-40 minutes | |

10. How many hours have you spent on a plane in the past year?

- | | |
|--|--|
| ☐ a. 0 hours | ☐ d. 11-25 hours |
| ☐ b. 1-3 hours | ☐ e. 26 or more hours |
| ☐ c. 4-10 hours | |

To add up your ecological footprint follow the point chart below:

.....				
a = 1 point	b = 2 points	c = 3 points	d = 4 points	e = 5 points
.....				

- ➡ If you have 11-20 points – You have a very small ecological footprint. If everyone lived like you we would not have an environmental problem.
- ➡ If you have 21-30 points – You have a small ecological footprint. If everyone lives like you we would need two planets.
- ➡ If you have 31-40 points – You have an average ecological footprint. If everyone lived like you we would need five planets.
- ➡ If you have 41-50 points – You have a large ecological footprint. If everyone lived like you we would need 15 planets.
- ➡ If you have 51-55 points – You have a very large ecological footprint. If everyone lived like you we would need 25 planets.

If you were to divide up all the habitable land on Earth among all the people on Earth, each person would have 4.4 acres (1.8 hectares) of land that they could use. This amount of land is the average ecological footprint people on our planet should have. The average ecological footprint for North America, however, is 23 acres (9.3 hectares), and if everyone lived like we did we would need 13 planets.



Positive, Negative, or Neutral

Objective:

Learn how different impacts on the environment have different effects.

Procedure:

For the following human impacts write down what type of impact (positive, neutral, or negative) it is and why.

An example is provided for you:

Deforestation: negative, because trees that are cut down and used in factories can no longer create oxygen from carbon dioxide and they cannot provide shelter for plants and animals.

Air pollution: _____

Fishing: _____

Land Use: _____

Mining: _____

Waste Treatment: _____

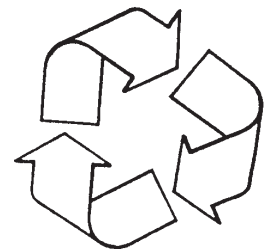
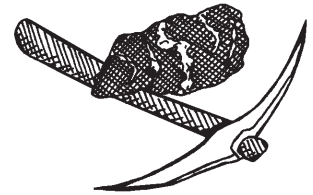
Water Treatment: _____

Recycling: _____

Tree Planting: _____

Hunting: _____

Dredging for Oil: _____



Ecological Footprint



Introduction to Human Impacts on the Environment

7. What kind of home do you live in?

- Apartment Building (4 or more floors)
- Apartment Building (3 or less floors)
- Row House (4 or 5 homes attached together side by side)
- House
- Mansion

8. How much time do you spend commuting to work?

- 0 minutes
- 1-20 minutes
- 21-40 minutes
- 41-60 minutes
- more than 60 minutes.

9. How much time do you spend on household chores?

- 0 minutes
- 1-20 minutes
- 21-40 minutes
- 41-60 minutes
- more than 60 minutes.

10. How many hours have you spent on household chores?

- 0 hours
- 1-3 hours
- 4-10 hours
- 11-25 hours
- 26 or more hours

To add up your ecological footprint:

a = 1 point b = 2 points

- If you have 11-20 points: You have a small environmental footprint.
- If you have 21-30 points: You have a medium environmental footprint.
- If you have 31-40 points: You have a large environmental footprint.
- If you have 41-50 points: You have a very large environmental footprint.
- If you have 51-55 points: You have a very large environmental footprint.

If you were to divide up all the habitable land on Earth, the average ecological footprint for North America, however, is 23 times the size of the land available. This would mean that we would need 23 planets to sustain our lifestyle.

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Introduction to Human Impacts on the Environment

Ecological Footprint

Objective Learn about ecological footprints and how to reduce yours.

Introduction What is a footprint? It is the imprint you leave on the earth as you walk around. What is an ecological footprint? It is the imprint you leave on the environment as you live your life. The more water, electricity, living space, and food resources you use, the larger your ecological footprint.

Procedure Use the following quiz to find out your ecological footprint.

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 - 11-15 years old
 - 16-20 years old
 - 21-25 years old
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 - 1001-10,000 (average town)
 - 10,001-100,000 (big town)
 - 100,001-1,000,000 (city)
 - 1,000,000 or more (metropolitan)
- How often do you eat meat?
 - None- I'm vegan (no animal products)
 - None- I'm vegetarian (no meat)
 - once or twice a week
 - every day
 - in almost every meal
- How much of the food you eat is processed (non-natural/ packaged)?
 - Almost none
 - one quarter (25%)
 - Half
 - Three-quarters (75%)
 - Most
- How much garbage do you throw out?
 - Less than 1 garbage bag per week
 - 1 garbage bag per week
 - 2 garbage bags per week
 - 3 garbage bags per week
 - 4 or more bags per week
- How many people live in your home?
 - 2
 - 3
 - 4
 - 5
 - 6 or more

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Learn about
Ecological
Footprints &
How to
Reduce Yours

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- When you're ready for your students to complete the assignment, you will share your downloaded copy with your students. Make sure that when you share the file, **you only allow viewing capability (not editing or commenting).**
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Students will...

- When your students begin working on the assignment, instruct your students to **make a copy of the file.** This is the copy that they will edit. I would recommend having a common filename that each student should use with their name or student ID.
- When they complete the assignment, they will need to then share their new copy with you so that you will have access to their writing. If you're familiar with Google Classroom, they can simply submit the file there.

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Ecological Footprint



Objective

Learn about ecological footprints and how to reduce yours.

Introduction

What is a footprint? It is the imprint you leave on the earth as you walk around. What is an ecological footprint? It is the imprint you leave on the environment as you live your life. The more water, electricity, living space, and food resources you use, the larger your ecological footprint.

Procedure

Use the following quiz to find out your ecological footprint.

1. How old are you?

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- c. 16-20 years old
- d. 21-25 years old
- e. 26 years old or older

2. How many people live in your town/city?

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- b. 1001-10,000 (average town)
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- d. 100,001-1,000,000 (city)
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3. How often do you eat meat?

- a. None- I'm vegan (no animal products)
- b. None- I'm vegetarian (no meat)
- c. once or twice a week
- d. every day
- e. in almost every meal

4. How much of the food you eat is processed (non-natural/ packaged)?

- a. Almost none
- b. one quarter (25%)
- c. Half
- d. Three-quarters (75%)
- e. Most

5. How much garbage do you throw out?

- a. Less than 1 garbage bag per week
- b. 1 garbage bag per week
- c. 2 garbage bags per week
- d. 3 garbage bags per week
- e. 4 or more bags per week

5. How many people live in your home?

- a. 2
- b. 3
- c. 4
- d. 5
- e. 6 or more

7. **What kind of home do you live in?**
 - a. Apartment Building (4 or more floors)
 - b. Apartment Building (3 or less floors)
 - c. Row House (4 or 5 homes attached together side by side)
 - d. House
 - e. Mansion
8. **How much time do you spend on a bus to get to school?**
 - a. 0 minutes
 - b. 1-20 minutes
 - c. 21-40 minutes
 - d. 41-60 minutes
 - e. more than 60 minutes.
9. **How much time do you spend in a car to get to school?**
 - a. 0 minutes
 - b. 1-20 minutes
 - c. 21-40 minutes
 - d. 41-60 minutes
 - e. more than 60 minutes.
10. **How many hours have you spent on a plane in the past year?**
 - a. 0 hours
 - b. 1-3 hours
 - c. 4-10 hours
 - d. 11-25 hours
 - e. 26 or more hours

To add up your ecological footprint follow the point chart below:

a = 1 point

b = 2 points

c = 3 points

d = 4 points

e = 5 points

1. **If you have 11-20 points:** You have a very small ecological footprint. If everyone lived like you, we would not have an environmental problem.
2. **If you have 21-30 points:** You have a small ecological footprint. If everyone lives like you, we would need two planets.
3. **If you have 31- 40 points:** You have an average ecological footprint. If everyone lived like you, we would need five planets.
4. **If you have 41- 50 points:** You have a large ecological footprint. If everyone lived like you, we would need 15 planets.
5. **If you have 51- 55 points:** You have a very large ecological footprint. If everyone lived like you, we would need 25 planets.

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