

**Lesson Creator: Ashley Grapes**  
**Grade: High School Biology**  
**Length: two 50 minute class periods**  
**Computer Lab Needed**

### Ecological Footprint Activity

**SOLs:**

- BIO.1 The student will plan and conduct investigations in which validity of data is determined and conclusions are formed based on recorded quantitative and qualitative data.
- BIO.9 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems; interactions within and among populations including carrying capacities, limiting factors, and growth curves, nutrient cycling with energy flow through ecosystems; and the effects of natural events and human activities on ecosystems; and

**NSES:** Skills necessary to become independent inquirers about the natural world; The dispositions to use the skills, abilities, and attitudes associated with science, Energy in the earth system, Personal and community health, Population growth, Natural resources, Environmental quality, Natural and human-induced hazards, Science and technology in local, national, and global challenges.

**Engage:** The students will create an interactive avatar and see how large their ecological footprint is.

**Explore:** At the end of this ecological footprint quiz, they will analyze their results. They will then explore the ecological footprints of different countries by sketching, comparing, and contrasting supply and demand graphs.

**Explain:** The students must answer the questions on the activity sheet which requires them to think about their own personal lives, the lives of others around the world. They must think critically about how the calculations are made, whether this is accurate, and how they are contributing to the footprint. They must discuss possible ways they may mitigate their footprint on an individual basis.

**Elaborate:** The students will work in groups, each of which is assigned an alternative energy to present to the class.

**Evaluate:** The students will be evaluated based on the completion and effort of the in-class activity sheet. They will be evaluated on their group PowerPoint presentation using the following rubric.

	<b>1 Poor Comments</b>	<b>2 Fair Comments</b>	<b>3 Ok Comments</b>	<b>4 Good Comments</b>	<b>5 Excellent Comments</b>
<b>Complete</b> Required length & components					
<b>Content</b> Relevant Strong Accurate					
<b>Organization</b> Thoughts and topics grouped Presentation flows logically					
<b>Writing Style</b> Grammar Spelling Punctuation Transitions					
<b>Presentation</b> Neat Easy on the eyes Not too wordy/busy Contains supporting graphics					
<b>Total Points</b>					

## Introduction

The upcoming generations have been coined “the green generations.” What does this mean? The environment’s health has become dire enough that it is a forefront issue, and people like you must help mitigate the problem by becoming environmentally conscious. In the United States we live like kings compared to the people of other countries. Electricity, cars, TV dinners, and the batteries for our many electronics are luxuries that many people in the world do not have. Unfortunately, our consumption rates are not balanced with the supply, meaning the earth’s resources are being depleted faster than they can be replenished.

Today, you are going to calculate your ecological footprint. This is the definition provided by The Footprint Network, the website we will use for the entire lesson:

**Ecological Footprint:** A measure of how much biologically productive land and water an individual, population or activity requires to produce all the resources it consumes and to absorb the waste it generates using prevailing technology and resource management practices.

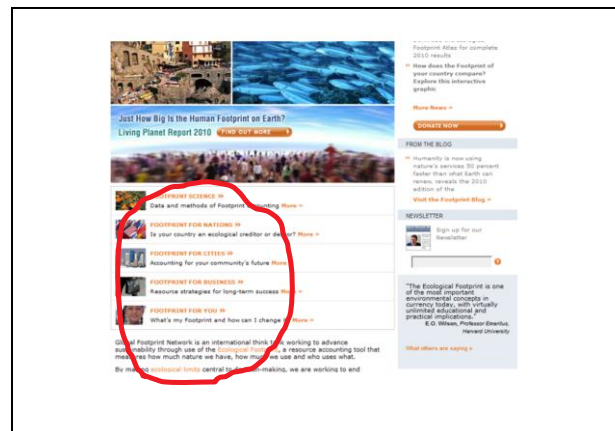
You probably do not associate many of your daily activities and purchases as using land and water. This is because it is sitting on the shelves of Target, Lowes, and the grocery store, but it had to come from somewhere!

Go to this website:

<http://www.footprintnetwork.org>

### PART A

The area I have highlighted in red will be where you will find the links to “Footprint for You” and “Footprint for Nations.” Click on “Footprint for You,” choose the United States as your country of residence, and complete the activity. It will give you a choice to enter “basic information” or “detailed information.” Always enter detailed so you can obtain a more accurate result.



When you are finished, leave the summary page up and answer the questions for part A on the activity sheet. DO NOT move on to part B until you have completed part A questions.

### PART B

Click on “explore scenarios” and read the simple ways you can reduce the impact you make on this planet. After reading this click “ok to continue” Click on “Learn more about your ecological footprint.” On the left hand side of the new screen is a blue box labeled “Country Trends.” Using this, answer the questions in part B.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Part A Questions

1. Name **three** things that the quiz asked you for when calculating your ecological footprint.
  
2. Name **three** things that the quiz did not ask you for, but that you believe should be included in the calculation. Defend why you chose these three things.
  - 1.
  - 2.
  - 3.
  
3. How many worlds would it take to support your lifestyle if everyone lived exactly like you? \_\_\_\_\_
  
4. In the bottom right square, it tells you how many global acres of the Earth's productive (useful) area must be used to support your lifestyle.
  - a. Was energy the greatest use of Earth's productive land? Name some things you use energy for in your everyday lifestyle.
  
  - b. What element do scientists associate with energy use? What environmental problems do scientists associate with the overproduction of this element?
  
5. What were your top two greatest factors in your ecological footprint calculation ( pie chart)?

### Part B

6. Name three things you could do to lower your ecological footprint. Will you actually do these things? What makes it difficult for you?
  
7. Look up the United States under the "Country Trends" list. A graph appears.
  - a. What does the red line mean *in your own words*?
  
  - b. What does the green line mean *in your own words*?

c. What does it mean that the red line has moved above the green line in recent U.S history?

8. Explore the graphs of different countries. Choose two “developed” and two “undeveloped” countries and sketch their graphs below. No title is required but don’t forget to label axis!

Developed Country 1 \_\_\_\_\_

Developed Country 2 \_\_\_\_\_



Undeveloped Country 1 \_\_\_\_\_

Undeveloped Country 2 \_\_\_\_\_



9. Compare and contrast the countries in terms of their line graphs. Explain why you think their graphs look the way they do in terms of how the people in those countries live.

**Project:**

You will be assigned to a group of three to research an alternative energy and give a PowerPoint presentation to the class. Topics may include any of the following:

Current energy (petroleum)  
Wind power  
Water power  
Solar energy  
Algae  
Hydropowered cars  
Ethanol

Your presentation should be approximately 15 minutes with each person in the group talking for approximately 5 minutes. Each group member should be responsible for one of the three main components and the entire group is responsible for the introduction and conclusion.

**INTRODUCTION**

1. How does the mechanics of your alternative energy source work?
2. Current uses of this alternative energy and how it is compared to energies we use today.
3. Issues concerning this alternative energy

**CONCLUSION**

Your grade from this presentation will be based on the rubric I have designed. Please review it to ensure you have included all the necessary components for that A!

Good luck!