



ESA21

Environmental Science Activities for the 21st Century

Ecological Footprint Calculator

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Ecological Footprint

Estimating your overall impact on the environment is a daunting task when you consider all the variables involved. Environmental scientists have developed a tool that does just this however, and presents the information in a manner that is easily visualized despite the underlying complexities. It is known as an “ecological footprint”, and it describes the area of land needed to supply the resources used and wastes



produced by each individual. Nature’s ability to provide resources and process wastes is known as “natural capital”, and the goal of sustainable living is to use resources wisely so as to avoid depleting natural capital, enabling it to be available to future generations. Ecological footprint analysis allows us to examine per-capita (per-person) utilization of natural capital (globally or by nation), the amount of natural capital available (globally or by nation), and the surplus/deficit in natural capital globally or in individual countries. We can then examine the impact of humans on the Earth’s natural capital on the whole or by individual nation.

Ecological footprints are calculated by examining the amount of land used for:

- (a.) Cultivating food crops
- (b.) Grazing livestock
- (c.) Growing timber
- (d.) Harvesting fish and other organisms from oceans
- (e.) Housing, infrastructure (roads, bridges), transportation, shopping, energy production
- (f.) Sequestering in trees the carbon dioxide produced by driving, electricity usage, etc.

By summing all of these land areas, an individual’s ecological footprint can be calculated. So how much natural capital is there per person? If we take the current global population and divide it by the number of acres (or hectares, in metric measurement) of biologically productive land, we find that there are currently 4.7 acres of productive land on the planet per person. Therefore, in order to live sustainably, each person on the planet should have an ecological footprint of 4.7 acres or less. While individuals in developing countries often have footprints at or below this value, citizens of highly industrialized countries often exceed it by sizable amount.

What is the connection between ecological footprints and biodiversity? In order for natural ecosystems to persist and support the diversity of other organisms on the planet, area must be set aside from development and utilization. As the human population grows and demands on resources become ever larger, the ability to preserve large areas of natural habitat become

more problematic, and biodiversity initiatives suffer. In addition to preserving biodiversity, reducing humanity's ecological footprint has a number of other positive results. To learn more about this, consult the materials below.

About the Ecological Footprint

A brief summary of the ecological footprint quiz.
Center for Sustainable Economy
http://myfootprint.org/en/about_the_quiz/

Ecological Footprint Accounts: Moving Sustainability from Concept to Measurable Goal

Information on ecological footprints with national values for footprints
Redefining Progress
<http://esa21.kennesaw.edu/activities/ecol-foot/ecol-foot-accts.pdf>

Tracking the Ecological Overshoot of the Human Economy (PDF) (157 KB)

Journal article examining ecological footprint of human race and available natural capital
Proceedings of the National Academy of Sciences (2002)
<http://www.pnas.org/cgi/reprint/142033699v1.pdf>

Activity: Determining Your Ecological Footprint

In this exercise, you will utilize an online calculator to examine your ecological footprint, compare it to the average footprint in your country and other countries, and critically examine ways to reduce it. Link to the calculator using the URL below, and follow the directions provided in the Activity Sheet.

Ecological Footprint Quiz

Online calculator for determining your ecological footprint
Redefining Progress and Center for Sustainable Economy
<http://www.myfootprint.org/>

ESA 21: Environmental Science Activities

Activity Sheet
Ecological Footprint

Name:

Instructor:

Calculating Your Ecological Footprint:

Begin by selecting your country and language from the map and select U.S. units for your results. Throughout the quiz, answer each question with the most accurate answer for your current lifestyle, selecting the “next” button at the bottom of each page to progress. After advancing from the final page, you will be provided with your ecological footprint for the categories listed below. Enter the results in the table below, and calculate the percentage for each category by dividing the value in each category by the Total Footprint and multiplying by 100 (to convert proportion to percentage).

	Footprint Area (acres)	Percentage of Total
Carbon		
Food		
Housing		
Goods/Services		
Total Footprint		

How did your Total Footprint compare to the average for your country? Did this surprise you?

How many Earths would be needed to support the human population if everyone lived like you?

Analyzing Changes:

Return to the Calculator, and use the **Back** button (or its equivalent on your browser) to go back to the questions. Make one reasonable change that would reduce your ecological footprint. Hit the “next” button at the bottom of that page and advance through the questions to the end, hitting the next button each time (hitting this records the change in the calculator). Describe the change and record the reduction in Total Footprint that resulted in the table below. Reset the calculator to your original values, and repeat the procedure for two additional changes.

Change	Reduction Total Footprint (acres)

Seeing the reductions in footprint that occur as a result of these changes, would you be willing to immediately implement any of them? Explain why or why not.

Consult the table in the linked brochure (*Ecological Footprint Accounts: Moving Sustainability from Concept to Measurable Goal*) showing average ecological footprints for various countries. Compare your country to three countries with similar standards of living (compare U.S./Canada to countries in Western Europe) and three countries with different standards of living (compare U.S./Canada to developing countries in South America, Africa, or Asia). List the per-capita ecological footprints (in acres), current natural capital capacity, and deficit/surplus value for your country and your six chosen comparison countries in the table below.

Country	Per-capita Ecological Footprint (acres)	Per-capita Current Capacity (acres)	Natural Capital Deficit (-) or Surplus (+)
Yours:			
Similar:			
Similar:			
Similar:			
Different:			
Different:			
Different:			

In today's global economy, goods flow from one country to another like never before, allowing the natural capital from one country to be utilized in many other countries. Some have argued that it is unethical for developed countries to fuel their consumptive lifestyles by using natural capital from poorer, developing countries. Do you agree with this viewpoint? Why or why not?