

## Estimating Your Environmental Footprint

Today's lab activity is meant to give us all a reality check – to let us see our personal effect on the environment...

In order to sustain ourselves, we need at a minimum clean water, food, shelter, and clothing. Beyond these necessities, we consume materials and goods that make our lives more convenient, satisfying, and entertaining. Each of us is responsible for the consumption of some raw materials – like crops, livestock, wood, plastic, oil, metals, gas, and coal. But do you have any idea how much of these materials you are personally responsible for? Do you know how the choices you make influence the abundance of these materials?



All of the resources that support our lifestyles are finite – that is they are not available in unlimited quantities. Thus, only a certain number of people can be supported by the earth's available materials – do you know how many people? Are we close to that limit? What will happen as we approach that limit?

### **Today's Activities:**

We will use an excel spreadsheet (developed by Mathis Wackernagel, Ritik Dholakia, Diana Deumling, and Dick Richardson, Redefining Progress, v 2.0, March 2000) to calculate our personal consumption of all kinds of raw materials. The spreadsheet expresses the totals as a "**footprint**" – literally a land area necessary to support your lifestyle. Someone who consumes more food, gas, and clean water for instance, will have a bigger footprint because more land is necessary to produce those products they are using.

Step 1: Go to the course webpage in the "Lab" section and open the link to "Environmental Footprint". Open the "Personal Environmental Audit". Click that. Then save the file on your computer or H drive folder. If your popup blocker is on, you may have to turn it off. Also open the "Environmental Footprint Instructions".

Step 2: Fill out the spreadsheet. There are categories of consumption along the left hand side of the spreadsheet, grouped into major categories like "transportation" and "food". *Column "D" is highlighted in blue – these are cells where you can enter estimates of your consumption.*

**Please take a few minutes to think about each category** – make a good estimate, not just a wild guess. If you need help, the corner of each blue box has a red flag.... If you move your cursor over this flag a comment box will appear with an average consumption rate for people in the US.

When finished, you should see two summary boxes below your consumption information. **The purple box contains the overall size of your footprint.** Below, in the yellow box, is a more detailed look at your footprint – the amount of arable (land where crops can be grown), forest, fossil fuel (mining, drilling), pasture, built-up, and sea area that are needed to support your consumption of each of the major categories. For example, if someone eats a tremendous amount of fish, their "sea area" footprint will be larger than someone who eats no fish.

take the information in the bright yellow "total" box for each of you and calculate averages.

The Ecological Footprint Distribution box includes a correction factor for U.S. citizens; review this and answer the questions below.

- 1) **Submit your completed Excel** spreadsheet to the **Assignment box in D2L**. Be sure your NAMES are on the document.
- 2) **Submit your completed questions as a Word.doc** (see questions below) to the **Assignment box in D2L**. Be sure your NAMES are on the document.

## QUESTIONS FOR THE ENVIRONMENTAL FOOTPRINT ASSIGNMENT

(THIS FILE SHOULD BE ***SUBMITTED AS A WORD. DOC OR WORD.DOCX FILE***; IF YOU USE A MAC, YOU WILL NEED TO SAVE IT AS FILE THAT WILL OPEN IN WINDOWS WORD.

1.) There are approximately 7,000,000,000 people on earth. If everyone on earth consumed the same amount of materials as you do, could the earth support them all? **SHOW YOUR CALCULATIONS!**

Helpful information:

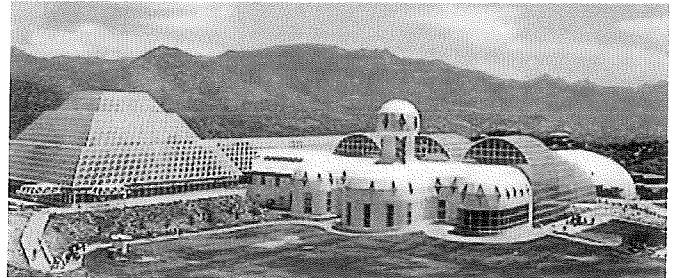
Land area on earth = 150,000,000 km<sup>2</sup>

100 hectares (ha) = 1km<sup>2</sup> (SO, divide your footprint (in hectares) by 100 to get your footprint in km<sup>2</sup>. Then what???) (HINT: Your footprint x # of people compared to...)

2.) Look at your personal environmental footprint. What activities contribute the most to your overall impact on the environment? What changes could you make to your lifestyle to minimize your environmental impact?

3.) Between 1984 and 1991, Columbia University Biosphere 2 Center was built in Oracle, Arizona, at a cost of over \$200 million. Biosphere 2 was a giant glass chamber sealed off from the atmosphere that contained living ecosystems including a tropical rainforest, ocean, savannah, desert, marsh, and agricultural landscape. It enclosed 13,000m<sup>2</sup> of land and a total volume of 204,000m<sup>3</sup>.

The original test of Biosphere 2 attempted to determine if these ecosystems could support the lives of eight people in perpetuity. Their only source of food was what they could grow in the agricultural sector. Their only source of oxygen was from plants and algae in the terrestrial and oceanic ecosystems. In 1991, the eight researchers were sealed in Biosphere 2, and the world watched.<sup>1</sup>



Imagine you are a team of senior research scientists at the initial planning phase of Biosphere 2. What size footprint per person (in hectares) would be required so that Biosphere 2 could support eight people? (GIVEN: 13,000m<sup>2</sup> land area/8 people; then convert m<sup>2</sup>/per person to ha per person (1 m<sup>2</sup> = 0.0001 ha). How many acres of land is this? (1 ha = 2.47 acres). **SHOW YOUR CALCULATIONS!**

What kinds of specific conditions would be needed in Biosphere 2 to make it possible to sustain eight people for the rest of their lives? Should the people living in the Biosphere eat a diet including meat or a vegetarian diet? Why? Should people drive cars? What plants and animals should be included?

4.) The environmental footprint of the average American is about 12 times larger than the average inhabitant of India. So the 4.1 million babies born in the U.S. this year will have almost the same impact on the earth as the 27.6 million babies born in India. How do you feel about that?

<sup>1</sup> from **Philip Camill**, Department of Biology, Carleton College  
(<http://ublib.buffalo.edu/libraries/projects/cases/footprint/footprint.html>)