

Name: _____

NOTE: You will submit this assignment electronically in the D2L Dropbox. It is due BEFORE 11:59 pm on TUESDAY September 14th when the Dropbox will be closed.

Assignment I-1 FOOTPRINTS & GLOBAL CHANGE -- PART B **(Individual Assignment worth 15 pts)**

Due in the D2L DROPBOX TUESDAY SEP 14th no later than 11:59 pm

*In this part of the assignment you will dig deeper into the three types of Footprints you calculated in PART A: **Ecological Footprint (EF), Carbon Footprint (CF) and Water Footprint (WF)**. You will also examine Ecological Footprints from different countries*

NOTE: In this (and future) Individual Assignments, those students who are striving for a top grade (which reflects a truly exceptional effort), the "TOP TWO" points (out of the 20 available for Part A + Part B) will require you to "go the extra mile" in order to earn them.

BACKGROUND INFORMATION

DEFINITIONS: Let's begin with a review of the definition of each type of footprint you've calculated. **[Remember: it is plagiarism to copy and paste from the web without putting the text in quotes and providing the URL source.]**

Ecological Footprint (def): "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. The Ecological Footprint is usually measured in global hectares. Because trade is global, an individual or country's Footprint includes land or sea from all over in the world. Ecological Footprint is often referred to in short form as Footprint (not footprint)."

SOURCE: http://www.footprintnetwork.org/gfn_sub.php?content=glossary#Ecologicalfootprint

Carbon Footprint (def.): "The Nature Conservancy's carbon calculator determines carbon dioxide and other greenhouse gas emissions for personal and household behaviors. . . . Carbon dioxide emissions are calculated from the weight of carbon. Other emissions, such as methane and nitrous oxide, are reported in carbon dioxide equivalents so that the emissions can be compared. Short tons (equivalent to 2,000 lbs) are the units used to report emissions in this calculator. . . . For this calculator, emissions attributed directly from individual behaviors, such as miles flown, as well as indirect emissions, such as the CO₂ emitted in building airports, are included in the overall emissions calculation."

SOURCE: <http://www.nature.org/popups/misc/art20625.html>

Water Footprint (def): "Water footprint – The water footprint is an indicator of freshwater use that looks at both direct and indirect water use of a consumer or producer. The water footprint of an individual, community or business is defined as the total volume of freshwater that is used to produce the goods and services consumed by the individual or community or produced by the business. Water use is measured in terms of water volumes consumed (evaporated) and/or polluted per unit of time. . . . The water footprint is a geographically explicit indicator, not only showing volumes of water use and pollution, but also the locations."

SOURCE: <http://www.waterfootprint.org/?page=files/Glossary>

BACKGROUND INFORMATION (cont.)

UNITS: Here are the units of measure in the 3 types of footprints you've calculated
(NOTE: /cap = "per capita" or "per person")

Ecological Footprint = Global hectares (gha) per year/cap (or global acres for U.S. calculations)

Carbon Footprint = Tons of CO₂ equivalent per year (CO₂ eq/yr)

Water Footprint = Cubic meters of water per capita per year (m³/cap/yr)

More information about the concept of a "global hectare" used in the Ecological Footprint:

(Source: <http://www.footprintnetwork.org/en/index.php/GFN/page/glossary/>)

global hectare (gha) : A productivity weighted area used to report both the biocapacity of the earth, and the demand on biocapacity (the Ecological Footprint). The global hectare is normalized to the area-weighted average productivity of biologically productive land and water in a given year. Because different land types have different productivity, a global hectare of, for example, cropland, would occupy a smaller physical area than the much less biologically productive pasture land, as more pasture would be needed to provide the same biocapacity as one hectare of cropland. Because world bio-productivity varies slightly from year to year, the value of a gha may change slightly from year to year.

hectare : 1/100th of a square kilometre, 10,000 square meters, or 2.471 acres. A hectare is approximately the size of a soccer field.

Planet Equivalent(s) : Every individual and country's Ecological Footprint has a corresponding Planet Equivalent, or the number of Earths it would take to support humanity's Footprint if everyone lived like that individual or average citizen of a given country. It is the ratio of an individual's (or country's per capita) Footprint to the per capita biological capacity available on Earth.

QUESTION #1: (1 pt)

In the bottom row of **TABLE 1** below, enter the 3 footprints that YOU COMPUTED for yourself for **PART A in global acres (ga)**. (NOTE: if you didn't save your results from Part A, just compute the 3 footprints all over again.) Also **compute the global hectare (gha) value for your Ecological Footprint** and the **# of Planet Earth's Needed**. (Conversions provided below the table)

TABLE 1 - YOUR USA FOOTPRINT COMPARISON

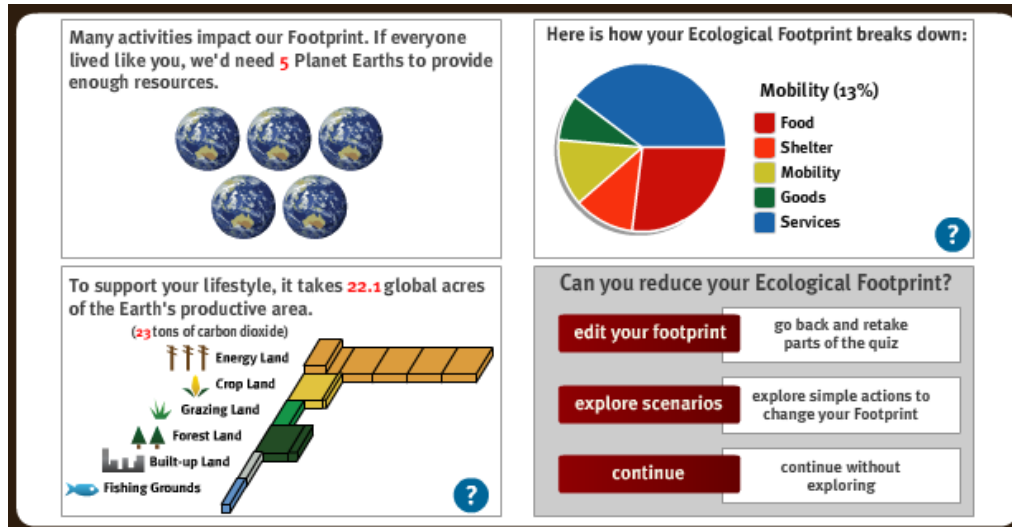
based on 2009 data	Ecological Footprint		Earth's Total Biocapacity		# Planet Earth's Needed ²	Carbon Footprint (tons of CO ₂ eq/year)	Water Footprint (m ³ /cap/yr)
	ga	gha ¹	ga	gha			
GLOBAL Avg	6.4	2.6	4.5	1.8	1.4	5.5	1240
USA Avg	22.3	9.0	4.5	1.8	5.0	27	2500
YOUR FOOTPRINT			4.5	1.8			

¹ To convert from global acres to global hectares multiply the global acres by .405

² # Planet Earth's Needed = Ecological Footprint ÷ Earth's Total Biocapacity

Here's a copy of the results graphs for the 2008 USA Average Ecological Footprint.

USA AVERAGE Ecological Footprint (based on 2008 data)



QUESTION #2: (3 pts)

For each type of footprint, write a few sentences that (a) describe how YOUR footprint compares with the USA average and (b) suggest possible reasons for the differences between your own footprint and USA average. You can do this by reviewing the "behavior breakdown" charts for each of the footprints you calculated for yourself to see which actions contribute most to each of your footprints – see the example above for the USA average Ecological Footprint. The behavior breakdown charts for the Carbon & Water Footprints are displayed in a different format than the Ecological Footprint graphic above,-- but you can still get an idea of the categories that contribute to these footprints.

Ecological Footprint:

- (a)
- (b)

Carbon Footprint:

- (a)
- (b)

Water Footprint:

- (a)
- (b)

QUESTION #3: (3 pts)

For each type of footprint, write a few sentences that (a) describe how YOUR footprint compares with the GLOBAL average and (b) suggest possible reasons for the differences between your own footprint and the GLOBAL average.

Ecological Footprint:

(a)

(b)

Carbon Footprint:

(a)

(b)

Water Footprint:

(a)

(b)

QUESTION #4: (2 pts)

Now go back to the **ECOLOGICAL FOOTPRINT QUIZ** link:

<http://www.footprintnetwork.org/en/index.php/GFN/page/calculators/>

Select one of the other countries available. (*Don't choose Calgary – it's a city in Canada, not a country*). **Compute your Ecological Footprint again – for the selected country -- by trying to answer with information that is roughly similar to what you entered for your USA footprint.**

NOTE: The quiz questions in other countries differ somewhat from those in the USA quiz. The questions may be phrased differently and because each country has different dwelling types, energy sources, or other attributes, the quiz might include one or two terms that are unfamiliar. *Just do the best you can to get a general idea of how your behaviors would transfer to those of your selected country.* Taking the quiz for another country will also give you some more practice with the metric system!

In the second to last row of TABLE 2 (next page), copy your USA Ecological Footprint information from TABLE 1 above. Then in the bottom row, enter the new **Ecological Footprint in global acres (ga) and global hectares (gha) and **# Planet's Needed** for your selected country.**

TABLE 2 – YOUR INTERNATIONAL FOOTPRINT COMPARISON

<i>based on 2009 data</i>	Ecological Footprint		Earth’s Total Biocapacity		# Planet Earth’s Needed
	ga	gha	ga	gha	
GLOBAL Avg	6.4	2.6	4.5	1.8	1.4
USA Avg	22.3	9.0	4.5	1.8	5.0
YOUR USA FOOTPRINT <i>(copy from Table 1)</i>			4.5	1.8	
YOUR FOOTPRINT for: <i>(enter country name)</i>			4.5	1.8	

QUESTION #5: (4 pts)

Write a thoughtful paragraph that speculates on why the country in which a person resides makes such a difference for the individual's Ecological Footprint.

Hint: To get a feel for how the average ecological footprint varies from country to country, as well as how the impact is distributed to “energy land,” (which is an indirect indicator of the **country’s carbon footprint**), “cropland,” “grazing land,” “forest land,” “built land” and “fishing ground,” view the results in the [Avg Country Footprints PDF](#) (*posted on the assignment webpage*) which shows charts for average ecological footprints in each country.

QUESTION #6 – The **“TOP TWO”** Points! (2 pts)

Explanation of the “TOP TWO”: *In this Individual Assignment, those students who are striving for a top grade (which reflects a truly exceptional effort), the “TOP TWO” points (out of the 20 available for Part A + Part B) will require you to “go the extra mile” in order to earn them.*

NOTE: *You may choose NOT to answer this question if you do not wish to go for the “TOP TWO” points. It is totally up to you!*

DIRECTIONS: Carefully read the following journal article which compares ecological footprint and water footprint analysis:

Hoekstra, A.Y. (2009) Human appropriation of natural capital: A comparison of ecological footprint and water footprint analysis, *Ecological Economics* 68(7): 1963-1974.

It is available at this link:

<http://www.waterfootprint.org/Reports/Hoekstra2008-Ecological-versus-WaterFootprint.pdf>

Based on what you learned in this article, write a thoughtful 1-page (about 500 words) essay that compares and contrasts the information provided by the Ecological Footprint and the Water Footprint. In your essay you should specifically refer to *your own* Ecological Footprint and *your own* Water Footprint (which you computed in PART A) and discuss what insights you gained from these two footprints about your impact on the Earth’s ecological “biocapacity” and fresh water resources. Use insights gained from the article to support your statements.

For truly exceptional work, your answer should be well written with a cogent argument, free of spelling and grammatical errors and -- of course -- expressed in your own words.

➡ NEW! Because of the extra time needed for the “TOP TWO” (Question #6), **you may have extended time to complete this question and turn it in to the Dropbox separately if you wish.** Answers to Questions #1 -5 are still due at the regular time (Tuesday Sep 14 by 11:59 pm.)

The extended deadline for Question #6 is **FRIDAY Sep 17 by 11:59 pm.**