YOUR ECOLOGICAL FOOTPRINT

I. INTRODUCTION

Before coming to class, fill out the table below to the best of your ability. You may estimate if an exact value is not known.

	Your Usage:	Average Ohioan Uses:
Miles Driven per Year / Car MPG:		9,700mi /
$ Spent on Electricity per Year:		$1,344
$ Spend on Natural Gas per Year:		
Square Footage of Your Living Space:		
Water Usage (gallons per day):		

Each of the more than seven billion humans on earth has an impact on the environment in which we live, but this varies greatly according to our habits, our lifestyle, and even where on the planet we live. For example, people living within the United States use roughly _____of the world's energy, even though we represent only _____ of the world's population. Why is this? The composite of our daily decisions impact the planet in a way that is usually very difficult to directly measure. Many decisions of our governments also influence the way in which we use resources, and aside from voting, we have relatively little control over how those resources are used and allocated on a day-to-day basis. One of the main non-renewable resources that humans use is fossil fuel. Fossil fuels (oil, coal, and natural gas) provide about _____ of all of the world's energy, but burning them emits carbon dioxide and other greenhouse gasses. Concentrations of carbon dioxide have increased by 74% in the past 200 years, and climatologists warn that if current trends continue, the earth's atmosphere will warm by approximately 3 – 9 ℉ (Intergovernmental Panel on Climate Change 2007). Although this may not seem like much, such increases in temperatures are predicted to melt polar ice caps and cause sea levels to rise, threatening millions of people that live close to coastal areas and endangering animals that live in the arctic. Most of our daily decisions, including what food we eat, where we live, how we get around, and what goods we consume influence the amount of fossil fuels that we use.

Factors that affect your footprint: Food, Mobility, Shelter, Goods, & Services

Food

Our food choices impact the environment in three main ways. First, the _____ of our food is important. Much of our food is grown in different regions of the country (e.g. wheat, oranges) or world (e.g. bananas, chocolate) and must be transported to local grocery stores. This transportation consumes energy in the form of fossil fuel. Therefore, if a higher proportion of our food is grown and sold locally (as is done at the Erie Street Farmer's Market) this will require less energy and reduce our ecological footprint. Furthermore, processing of raw food materials (e.g. wheat, tomato, mushrooms, and olives) into packaged food (e.g. a frozen pizza) takes energy. If the pizza factory is in Nebraska, the frozen pizzas must be shipped (in refrigerated containers) to Ohio, then transported from the store to our oven where it takes additional energy to cook the pizza. Second, our decisions for _____ (including fish), eggs, and dairy products influence the amount of energy and land area needed to nourish us. The concept of the energy pyramid explains why this is so. Plants capture energy directly from the sun in the photosynthetic process. As we move up the food chain to herbivores (e.g. cattle, chickens, deer), and carnivores (wolves, raptors), energy is lost. Plants only capture about 5% of the energy from the sun, herbivores capture 10% of energy in plants, and carnivores capture about 10% of the energy in herbivores. Thus carnivores only capture about 0.05% of the solar energy. Thus, it takes 200 kg of corn to make 10 kg of cow to make 1kg of wolf (Cunningham & Cunningham 2008). Because of this relationship, it takes much more land area to produce meat for consumption than it does to produce vegetable crops (roughly 7 times more land is needed for a meat-based diet than a vegetarian one). Furthermore, more energy is used to produce animal products because we first need fossil fuels to grow and harvest the grains that feed the animals, and need more energy to process and transport the meat. The third way in which our food choices impact the environment is based on the type _____ our food comes from (Kimbrell 2002).
Conventional agricultural production generally depends on farm machinery, fertilizers, and pesticides all of which require energy to produce. Furthermore, conventional practices generally deplete the soil resources and biodiversity on farms. Organic production generally strives to maintain soil quality and uses organic compost (manure and food refuse) to add soil nutrients requiring fewer external inputs. Thus eating organic food may limit our ecological footprint.

Mobility

Moving ourselves around takes energy. Many forms of transportation exist: trains, cars, motorcycle, planes, bicycles, horse carriage, and feet. Of course, each type of transportation uses a different amount of fossil fuel energy, and even the amount of gasoline needed by cars can vary with the model and year of the vehicle. Most people are aware of how much gas our cars use, but what about planes? Generally, air travel consumes a lot of fossil fuel energy and increases carbon emissions. A Boeing 747-200 carries a maximum capacity of 48,445 gallons of fuel, can travel up to 6100 miles, and at 75% capacity carries 339 passengers (http://www.boeing.com/). So how many miles per gallon does each passenger use? For per seat miles, the plane can travel 2,067,9000 miles, with 48,445 gallons which works out to about 85 gallons per person for the round-trip flight. Each of our travel choices and transportation decisions will thus matter. Of course, _____, _____, and moving around more by _____ and _____ can reduce your ecological footprint.

Shelter

The _____&_____ of home that you live in will influence your footprint, as will the number of people living in your household, the outdoor climate in your part of the world, and whether or not you have running water and electricity in your home. For most people in the US, water and electricity are luxuries available to all of use, but most people in developing nations still have limited access to these resources. Large empty houses in temperate climates will generally require much more fossil fuel energy to provide heat, and small houses in the tropics (usually without air conditioning) will not. The type of energy that you use to heat your home, the material your home is made of, the size and location of windows are all factors that may influence how your type of shelter impacts your footprint.

Goods and Services

Finally, the goods that we use and buy and the types of services that we are used to also influence how we impact the environment. In the developing world, we are used to buying electronics, clothing, toys, cell phones, furniture, and other household goods on a regular basis. Many of the things that we buy come in plastic packaging that cannot be recycled, and even if many of our goods (including food and drinks) come in recyclable packages, city programs do not always allow for curbside pickup to make recycling easy. In the United States, we also depend on an extensive _____, _____, _____, _____, and _____ to provide us with services – but each of these things requires resources and energy which impact our environment.

References:

Cunningham, W.P. and M. A. Cunningham. 2008. Environmental Science: A Global Concern. McGraw-Hill, New York. 618 pp.

Intergovernmental Panel on Climate Change. 2007. Climate Change 2007: Synthesis Report. IPCC Plenary XXVII (Valencia, Spain, 12-17 November 2007)

Kimbrell, A. 2002. Fatal Harvest: The Tragedy of Industrial Agriculture. Foundation for Deep Ecology, Sausalito, California, 384 pp.

LAB ACTIVITY: ECOLOGICAL FOOTPRINT CALCULATION

In this lab, you will use an online survey to calculate your ecological footprint, ecological footprint of your favorite celebrity, and the ecological footprint of people in your group. Following the instructions below, you will first calculate the average footprint of your zip code, then your own footprint, and then compare your footprint to the stars and to your classmates.

Supply list:

1. Computers connected to the Internet
2. Worksheets

Useful conversions:

1 square meter = 10.76 square feet
1 km = 0.62 miles
1 liter = 0.26 gallons
1 liter per 100 km = 235 miles per gallon

Useful facts:

- Efficiencies and dorm rooms are 200-500 square feet
- 1 BR apartments are 500-800 square feet
- An average sized 3 BR house is near to 2000 square feet

Procedure:

1. Form groups of 3 people.
2. Direct your Internet browser to: http://coolclimate.berkeley.edu/calculator
3. Select your: zip code, household size, and annual income.
4. Record the average estimated footprint for a similar household in your zip code on the data sheet.
5. Continue calculating your footprint. Record the total for each section and your final total footprint.
6. Have each person in your group calculate their ecological footprint based on their real life and record the information on the data table below.
7. Calculate the ecological footprint for a favorite celebrity (musician, sports star, actor, presidential candidate, *etc.*) of each group member. Search the web for information about their houses, cars, travel schedule, *etc.* Record the data on the table below.
8. Fill out the questions below.
9. Discuss results as a class.

Worksheet Exercise: Footprint Calculation & Analysis

Team members: Sajdah, Blane, Jordan

Data table (5 pts):

Name:	Ecological Footprint Score				
	Total Travel	Total Housing	Total Food	Total Shopping	Total Footprint *(tons CO_2/year)*
Zip Code Comparison					48.5
Sajdah (43615)	16	16	5	10	46.3
Blane (43615)	19	16	2	30	64
Jordan (45044)	15	15.5	5.5	14.5	49.6
Donald Trump	40	45	20	20	130.1

1. How did your Total Footprint compare to the average Total Footprint for your zip code? (3 pts)

2. Choose 3 realistic offsets. What are they? How much will they reduce your impact? How will you implement these changes? (3 pts)

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3. How did your total footprint compare to your classmates? Which parts of the quiz tended to make a bigger impact on the footprint that each person had? *Look over the scores for carbon, food, housing, and goods and services to see which ones varied the most.* Why do they vary? (3 pts)

4. How did your ecological footprint differ from that of your favorite celebrity? What aspect of their lifestyle do you think adds to their ecological footprint more than other aspects? (3 pts)

5. What would it take to have no impact? Is having a low ecological footprint desirable from all standpoints? Why or why not? (3 pts)