

FOOD FOOTPRINTS THROUGH TIME



OVERVIEW

This activity is designed to have students think about significant moments in American and world history that have affected today's food system. They will use their knowledge of different time periods and cultures to determine which foods people ate in the past. Then they will analyze how their food got to the tables, identify all the people involved in the process, and assess the size of the corresponding footprints. Students will see how the world's increasing interconnectedness resulted in increased footprint size. Events such as colonialism, the establishment of trade routes, the industrial revolution, and the green revolution shaped the food system and distribution of food as we know it today.

OBJECTIVES

Students will

- 1) identify food from certain time periods based on what they have learned in class and through readings
- 2) map foods from sources to sinks
- 3) compare and contrast Footprint sizes between time periods and nations
- 4) think about their own food Footprints and evaluate their sizes
- 5) discuss individual as well as large scale steps they can take to reduce food Footprints

MATERIALS

- Roll of butcher paper or enough chalkboard space for each group
- Readings on food during different time periods (some examples are included here)

PART I

Divide students into groups. Assign each group of students a reading that pertains to the culture of a specific time period and/or encourage them to use what they have already learned in class. Allow them time to research what food was eaten at the time and have them list at least 3 food items- main dishes and beverages. After they decide on which food comes from that time and culture, they must think of what resources were required to produce those foods and transport them to the dining area at that time. Have them map the paths that their food took from origination to the table on butcher paper or on the board. Have students draw diagrams, citing resources and sinks at each step. Put a box around the end products of each step (air pollution, contaminated river, etc.)



How many people do you think are involved in bringing you your food?
Which country and time period has the largest footprint? Why?

*** Refer to Handout 13- Sample EF Activities, pg. 5 for readings to use at this step***



PART II

Have students present their food to the class by first just describing the dishes. Then have them describe the Footprints of some of the items using their diagrams. Have students vote on which meals they would like to eat. Why did they choose certain ones over others?

DISCUSSION

Questions to ask students:

- Do you ever think about where your food comes from before you eat it?
- Do you ever think about how many people and resources it takes to get food to your table?
- How hard would it be if you had to milk a cow when you wanted milk for your cereal?

The largest contributor to the United States' footprint size is the fossil fuels sector. The largest contributor to low-income countries' footprint size is the agricultural sector. (Show footprint of nations charts) How would changing our eating habits and raising awareness on food systems help to reduce both of these footprints?

What are some steps individuals can take to reduce their own food footprint size?

- Buy organic food (the more we show support/demand, the cheaper organic food will become).
- Support local farmers by shopping at farmer's markets.
- Try to eat vegetarian meals when possible.
- Avoid purchasing processed and packaged foods.
- Compost kitchen waste and/or reduce the amount of food thrown away.

What are some steps governments and policy makers can take to reduce national food footprint size?

- Provide incentives for using organic farming methods.
- Use renewable energy sources in food production and transportation (solar power, horsepower, wind power).
- Stay away from intensive mono-cropping; instead encourage biodiversity.

EXTENSION

Read aloud to students or have them read on their own "Hamburger, Fries, and a Cola" or the excerpt from "Stuff- The Secret Lives of Everyday Things." One group should have already mapped the resources, but you may want to add anything they may have missed. This time have all students write down the origin of each product through history and how they got to America. Discuss significant events throughout history that allowed us to have a meal like this now (trade routes, steam engine, etc.) Are any of these products still made in other countries and transported to the US? How have these processes changed from then to now?



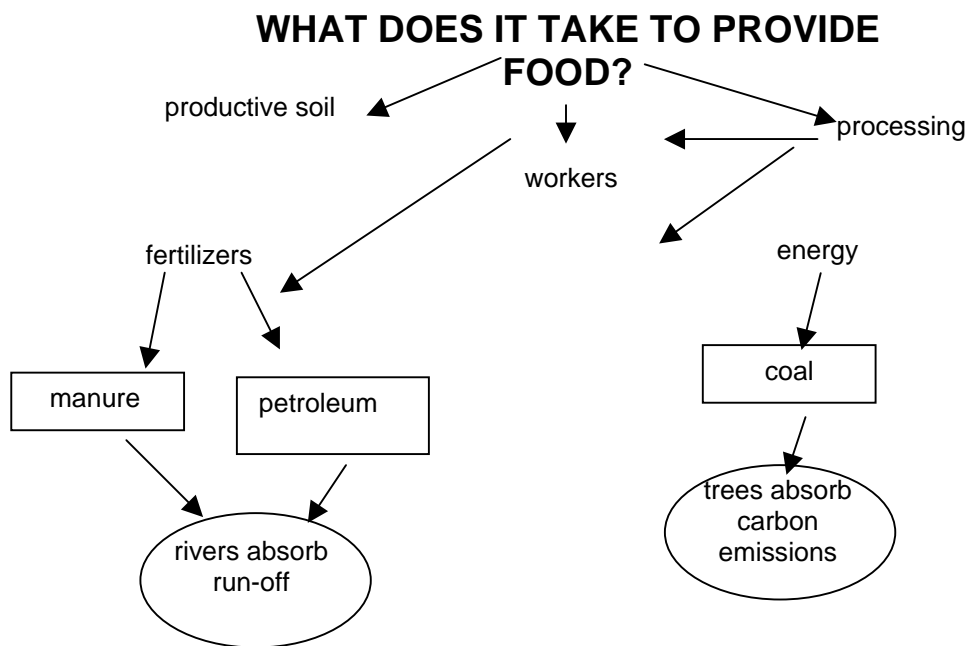
OTHER FOOD RELATED LESSON PLANS

Sustainability: Then, Now, Later- *Project WILD K-12 Curriculum & Activity Guide 2000* (pp. 436-442).

Compares resource use and distribution for the United States in 1900, 2000, and 2100. Students present skits from each time period in groups and realize how wants and needs have changed and will probably continue to change over time. They can act out the same event (such as Thanksgiving) in different time periods.

No Tomato Sauce 'Til 1492- *French Fries and the Food System, The Food Project* (pp.113-115).

Students physically move vegetables from one country to another to represent trade routes beginning with Columbus' voyages. Students discuss what factors caused these foods to move and where they are grown currently.



COLUMBIAN EXCHANGE ACTIVITY

GRADES 9-12

OVERVIEW: Students walk through the exchange of vegetables after the Columbus' arrival in the "New World."

LEARNING OBJECTIVES: To understand the origins of various "New" and "Old World" fruits, vegetables, and grains and to learn how the voyage of Columbus facilitated the exchange of these foods across continents. In the final discussion the group will trace these concepts into the modern globalized food system and discuss the ecological impacts associated with consumer food choices.

PREPARATION: Have a visual map of the world posted for reference in the classroom. Create five continent posters three on each side of the room to represent the three regions of the "Old" and "New" Worlds: North America, Central America and South America on one side; Europe, Africa and Asia on the other side of the classroom. Create crop name cards. Write each vegetable, fruit or grain listed in the table on number 2 below. Make duplicates if you have more than twenty-two students so that everyone will have a card. Prepare a large segment of chalkboard bisected into "Old" and "New World" and divide those two columns into three sections.

"New" World		"Old" World	
North America		Europe	
Central America		Africa	
South America		Asia	



PROCEDURE

1. Review the nomenclature for “Old” and “New” World and make sure students understand that Columbus really discovered another Old world. Since we realize that now we continue to use the traditional dichotomy of “New” and “Old” worlds but we put them in quotation marks.

2. Engage the students by asking them what fruits or vegetables are indigenous to the “New” World. If/when they get stumped have them reflect on the enduring ethnic cuisines of “New” World regions (ex. For Mexico, elicit basic responses such as corn, beans, chili peppers). Gradually fill in the “New” World list with the help of student suggestions, making sure you include at least the following foods:

North America	Sunflowers Corn (Mexico) Avocadoes
Central America	Peppers Beans Chocolate
South America	Potatoes Tomatoes Peanuts

3. Then ask the students to help fill in the “Old” World chart to include the following. Have them consider climate and enduring culinary legacies (though some of these, as we shall see, were established post-Columbus).

Europe	Wheat Beats Onions Cabbage Apples Peas Carrots
Africa	Radishes Watermelon Coffee
Asia	Rice Sugarcane Mangoes



THE ACTIVITY

4. Pass out the crop name cards. Everyone moves to their continent, as designated by the pre-posted signs on classroom walls.
5. When everyone has found the appropriate place, go around the “world” and have each student state where they are standing, describe the climate as best she can and show which crop she are representing. Have them reflect on the reason this food originated in this area, thinking back to the discussion and considerations of climate. Encourage people to help each other.
6. Now that everyone can visualize the state of the world in 1492, have students think back to the Columbian voyage and imagine a “world” of Europeans who had never tasted potatoes or beans, likewise indigenous Americans who had never seen wheat and tasted bread or pasta. Stress the tremendous nature of the historical influence of this Columbian Exchange – economically, socially, and environmentally.
7. Identify the student(s) representing five important crops: potatoes, sugar, corn, tomatoes, and coffee. Have all students consider the historical scope of each crop one by one and have the representative student walk from the continent of origin to other continents that have a historical connection to that food since the voyage of Columbus. To encourage thought as to where the crop went, ask students about what the cuisine is like in different countries. Use the summaries at the end of the lesson to help guide students.

The teacher may facilitate the journeys of as many crops as she wishes, making sure to keep in mind the role of climate and the environmental and social impacts of each move.

8. After having participated in a re-enactment of the far reaching global consequences of the Columbian Exchange, lead a discussion of the larger implications of the movement of vegetables around the world. Ask the questions:

Can these crops grow in the places where they have ended up as a result of trade?

How are these countries getting this vegetable?

Before the Columbian Exchange, how did people get food? Where did it come from?

What are the environmental impacts of trading food globally?

DISCUSSION

Lead the group in a discussion of the environmental impact of eating food that needs to be shipped extremely long distances.

California teachers can start by engaging students in California’s role as the supplier of half of this country’s fresh produce. Have the students consider the impact of buying grapes grown in Chile at a California supermarket while grapes



grown in California are shipped to South America. Outline all the inputs that increase with distance: trucks, processing, distribution, refrigeration, etc. Tie this lesson in with the potato diagrams.

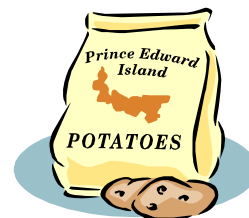
Have students reflect on how and why this global food system has evolved. You might want to bring up considerations of desire for exotic items, as throughout history peoples have developed cravings for luxury items not produced in their own lands, such as the Romans' desire for Asian spices.

Speculate with students about sustainable agriculture. Note how this is actually an old concept applied to the current food system. Before the Industrial Revolution, agriculture existed solely in small-scale, diversified farms that had many similarities with the current movement towards organic and sustainable agriculture. Engage students' understanding about farms and the processor side of modern food production.



POTATO

In the Andes Mountains of South America indigenous people, including the ancient Incas, survived on potatoes for the past 7,000 years. After the Spanish conquistadores arrived in South America in 1531, their sailors recognized the potato's nutritional value and adopted it as a food source for long voyages. By 1600 farmers in Spain were planting crops of potatoes and by 1800 the potato had become one of the most important foods in Europe due to its combination of essential vitamins, minerals and fiber and its easy adaptation to different climates. The potato was so productive and easy to grow in rocky soil that the people of Ireland developed an exclusive dependence on potatoes as a primary food source. The lack of alternative foods led to the Irish Potato famine when a potato blight began in 1845.¹ This precipitated a mass emigration to the United States where current Americans consume more potatoes than any other vegetable, mostly in the form of French fries.²



- *What was the social impact of famine in Ireland?*
- *What were the social implications of thousands of Irish immigrants in the eastern United States in the late 1840s?*

SUGAR

Sugar cane, though native to Polynesia, was first refined into sugar in India in about 700 BC. It made its way west for the next couple thousand years and finally, in the Middle Ages, to Europe, which had previously relied on honey for sweetener. Sugar is unnecessary to the human diet, and even becomes harmful in excess and addictive, but was prized for its medicinal use in making herbal concoctions more palatable. In 1400 it was still a very expensive commodity due to small production, and Europeans were just beginning to learn to grow sugar cane outside of the tropics. The Spanish had planted sugar cane in the Canary Islands, where Columbus acquired it for his second trip to the Americas in 1493. Sugar cultivation is very labor-intensive and the Spaniards set about enslaving the native inhabitants of Hispaniola to grow and process sugar for growing markets in Europe. In 1516 the first shipment of sugar arrived in Europe which fueled demand for sugar, especially among the British, as a sweetener for tea, coffee,



¹Davis and Hawke, Seeds of Change: The Story of Cultural Exchange after 1492. Menlo Park: Addison-Wesley, 1992.

²Schlosser, Fast Food Nation. New York: Houghton Mifflin, 2001.



and chocolate. Meanwhile the enslaved indigenous labor force in the Caribbean was dying off due to the introduction of “Old” World disease so sugar producers turned to Africa to supply labor. These producers cleared large swaths of land with slash-and-burn techniques, to great ecological detriment, to build plantations which depended on slavery to produce an adequate supply of sugar to satisfy the demand of the European upper classes. Some 12 million Africans were transported to the Americas as slaves between 1450 and 1900 as part of the triangular trade system.³ Demand for sugar remains high all over the globe, and causes tooth decay, digestive disease, and addictive dependence.

- *What are the social costs in terms of human lives caused by demand for sugar?*
- *What rich cultural traditions remain in the Americas as a result of the African slave trade?*
- *What environmental problems have ensued from sugar plantations, particularly monocropping?*

CORN

Corn, or as the indigenous Americans called it, maize, is native to the area around present day Mexico City. It was first cultivated 7,000 years ago and rapidly spread from Mexico throughout the Americas to become a staple of the Mayan, Aztec and Incan civilizations. These people relied heavily on corn for a primary source of energy and prepared it by boiling the ears or grinding the kernels into meal which helped preserve it through the winter. The Spaniards who arrived in the Caribbean saw corn growing everywhere but had never seen it before, since it was unknown in Europe, Asia, or Africa. Columbus introduced corn to Europe where it spread widely and then on to Turkey, Africa and Asia. Many Europeans did not develop a taste for the grain but they used it to feed livestock which increased the availability of protein sources throughout the continent. Corn continues to play a vital role in the Americas and it reigns supreme in the Midwestern U.S. where 40% of the world’s corn is grown. Most of our corn is not eaten but fed to livestock and used to make a variety of products, including explosives, paint, and gasoline additives. Plus, cornstarch processed into syrup (high-fructose corn syrup) has surpassed sugar as a sweetener and can be found in soda and almost every processed food.⁴



- *What are the environmental and social implications, in terms of world hunger, of growing so much corn and feeding most of it to animals?*

³ Hobhouse, Seeds of Change: Five Plants That Transformed Mankind. New York: Harper and Row, 1985.

⁴ Davis and Hawke, Seeds of Change: The Story of Cultural Exchange after 1492. Menlo Park: Addison-Wesley, 1992.



COFFEE

This shrub with red berries that can only grow in tropical climates originated on the mountainsides of Ethiopia under rainforest canopy, although it's now more commonly associated with Central America and the South Pacific isles. The demand for coffee began as a medicinal drink (prescribed at various times as an enema, aphrodisiac, nerve calmer and life-extender) for the elite but soon became a working-man's pick-me-up.⁵ In the 1870s industrialization of roasting technology and railroads facilitated the global spread of coffee consumption, though it has always been more popular in the West, as peoples in the East generally maintain a preference for tea. Coffee is the second most widely exported legal commodity (second only to petroleum) and Americans consume more coffee than any other nation.

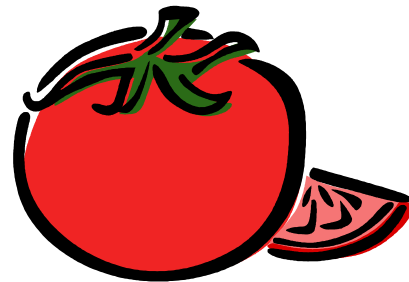


Over 20 million people in the world produce coffee, over fifty percent of them small, family farmers who mostly live in poverty, subject to the whim of constantly fluctuating commodity markets or large plantation owners who clear-cut rainforest. For example, coffee production in the hands of society's elite has led to the continued subjugation of Mayan Indians in Guatemala.⁶ Now consumers can buy coffee that has been certified as 'fair trade' which means farmers are paid a fair market price for their coffee and thereby ensured a sustainable future.

- *What has been the ecological cost of clear-cutting rainforests for coffee plantations in Brazil and Central America?*
- *What kind of biodiversity is lost when coffee is planted in open fields instead of under rainforest canopy?*

TOMATO

The Aztecs deserve the credit for introducing the world to the tomato, not the Italians as many people assume. The Spanish first encountered this fruit during their conquest of Mexico in 1519. The Aztecs ground tomatoes with chilis to make salsa to accompany a wide array of dishes. Though the Spanish in Mexico enjoyed tomatoes, many Europeans considered them poisonous upon arrival because they belong to the same family as



⁵ Pendergrast, Mark. Common Grounds. New York: Basic Books, 1999.

⁶ Conservation International, 2004.



the deadly nightshade. It wasn't until the early 1800s that the poisonous myth was debunked and the tomato was adopted in Europe, particularly Italy, for its versatility in sauces and soups. Today the tomato is one of the most popular fruits or vegetables across the globe, and the U.S. is the largest commercial producer of tomatoes in the world. Americans consume 12 million tons of tomatoes annually, both fresh and, most often, in processed foods like ketchup.⁷

⁷ Smith, [The Tomato in America](#). Columbia, South Carolina: University of South Carolina Press, 1994.



LET THEM EAT CAKE!



OVERVIEW

Through the cutting and distribution of a cake or other treat, students experience the inequitable distribution of resources around the world and see the interconnectedness of human economic and social activities.

KEY ISSUES/CONCEPTS

- Resource distribution
- Consumption patterns
- Environmental and structural scarcity

SUBJECT AREAS

- Social studies
- Geography
- Environmental studies
- Mathematics
- Economics

GRADE LEVEL: 5–12

INQUIRY/CRITICAL THINKING

QUESTIONS

- What are the results of unequal distribution of resources around the world?
- What feelings and behaviors result from such inequity?
- What can we do about inequity of resource distribution around the world to make it fair and just?

OBJECTIVES

Students will:

- **Experience** an inequitable distribution of resources.
- **Consider, write about, and discuss** the connection of resource distribution to hunger issues, and the underlying connections to human economical, environmental, and social activities.

NATIONAL STANDARDS CONSISTENCY

- NCSS: 2, 3, 7, 9
- NES: A, C, F
- NGS: 1, 3, 4, 5, 8, 9, 14, 18

TIME REQUIRED: 1 hour

MATERIALS

- A delicious cake, pie, or other baked item that can be cut into wedges
- Plates, napkins, and forks, 1 per student
- Spatula (or knife) to cut and serve the cake
- Overhead *Sharing the Cake Divided by World Population*
- Overhead *Sharing the Cake Divided by Per Capita GNI in PPP*

PREPARATION

1. Buy or make a cake or other baked item.
2. As a reference, read the chapters titled “Tracking the Trends” from our publication *Population, Poverty, Consumption, and the Environment*, and/or “Tracking the Trends: A Look at Key Indicators” from *Population: Issues, Impacts, and Solutions*.

ACTIVITY

1. Show the cake to the class and explain that you have brought it for them to share. (You might set the cake out in front of the class a while before you start the activity to pique the students’ interest.)
2. Ask the class if you should invite the class next door to join you in eating the cake. If the students say no, ask them why not. Explain that this represents the concept of environmental scarcity, in which there is just not enough of a resource for everyone who wants or needs it. In this case, if the class next door came over, there would be less cake per person.
3. Tell them that instead of inviting over the class next door, you will divide the cake for this class to share. Ask them to imagine that they represent all the people on the planet. Put up the overhead *Sharing the Cake—Divid-*

For a class of 30 form groups of	For a class of 20 form groups of	Representing	% of Earth's Population
4	3	Africa	13%
2	1	U.S. & Canada	5%
3	2	Latin America	9%
4	2	Europe	12%
17	12	Asia	61%

ed by *World Population*, showing how the cake would be cut if it were divided based on population. Physically separate the class into the groups as indicated in the table above.

- Ask each region how they feel about this distribution. (This distribution equally divides the cake among each region and represents the “fairest” distribution.)
- Tell the class that instead of dividing it by population, you will divide the cake to represent how resources are *actually* distributed in the world, based on per capita Gross National Income (GNI) adjusted for purchasing power parity (PPP). Put up the overhead *Sharing the Cake—Divided by Per Capita GNI in PPP*.
- Cut the cake into five unequal pieces, as indicated on the overhead, and distribute the pieces to each “region.” Be sure to hold up each piece so the class can see how much each region will get.
- Ask each region how they feel about their share of the cake. Ask Asia and Africa how they are going to divide the cake among their population. Will they try to divide their very small piece equally among the group or will one or two people decide to eat all of it? (Some students will likely begin eating the cake, while others may get agitated. Allow some stress to develop.)
- Ask each region what they are going to do about the situation. Some may choose to migrate to U.S./Canada and take their cake. You might see discrimination (only some people can have the cake), conflict (fighting over the cake), or “brain-drain” (only our “friends”—those with professional degrees or education—from another region can come over and share our piece of the cake). Make sure there is enough time for everyone to experience the feeling of having very little or of having more than everyone else.

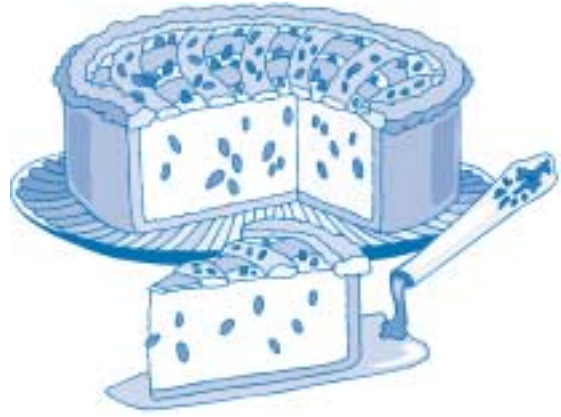
REFLECTION

- Have the students do a free-write about the activity. Give them the following prompts: “How did it feel when you saw how much other groups got? How did you divide the cake within your group? Did you do anything to get more cake, or give any away?” Begin a discussion by asking the students to read or summarize some of their free-writes.
- Use the following prompts to lead a discussion of the causes of unequal distribution in the world:
 - How does this game relate to the real world?
 - How would this have been different if they were really hungry and hadn’t eaten much, or anything, for a couple of days?
 - What are real examples of people trying to “get more cake”? Point out that there is also unequal distribution within countries, and brainstorm ten cases of unequal distribution in your community, state, or country.
 - How could a comfortable and fulfilling lifestyle be provided for all the world’s people? If this does not seem possible, what are some of the potential consequences of continued and increasing inequity between individuals and nations?
 - What are some of the ethical, social, and security implications of this inequity? Do you see examples of that occurring today? If so, what consequences are evident, and where? What underlies them?
- Discuss the differences between emergency solutions and structural solutions (food aid vs. job creation).
- Have the students brainstorm ways they could personally address the inequitable distribution of resources. Examples include: reduce, reuse, and recycle resources; buy energy-efficient and sustainable products; volunteer at nonprofit organizations working toward social justice; and talk about this issue with friends and family.

CLASS PROJECTS/ACTION IDEAS

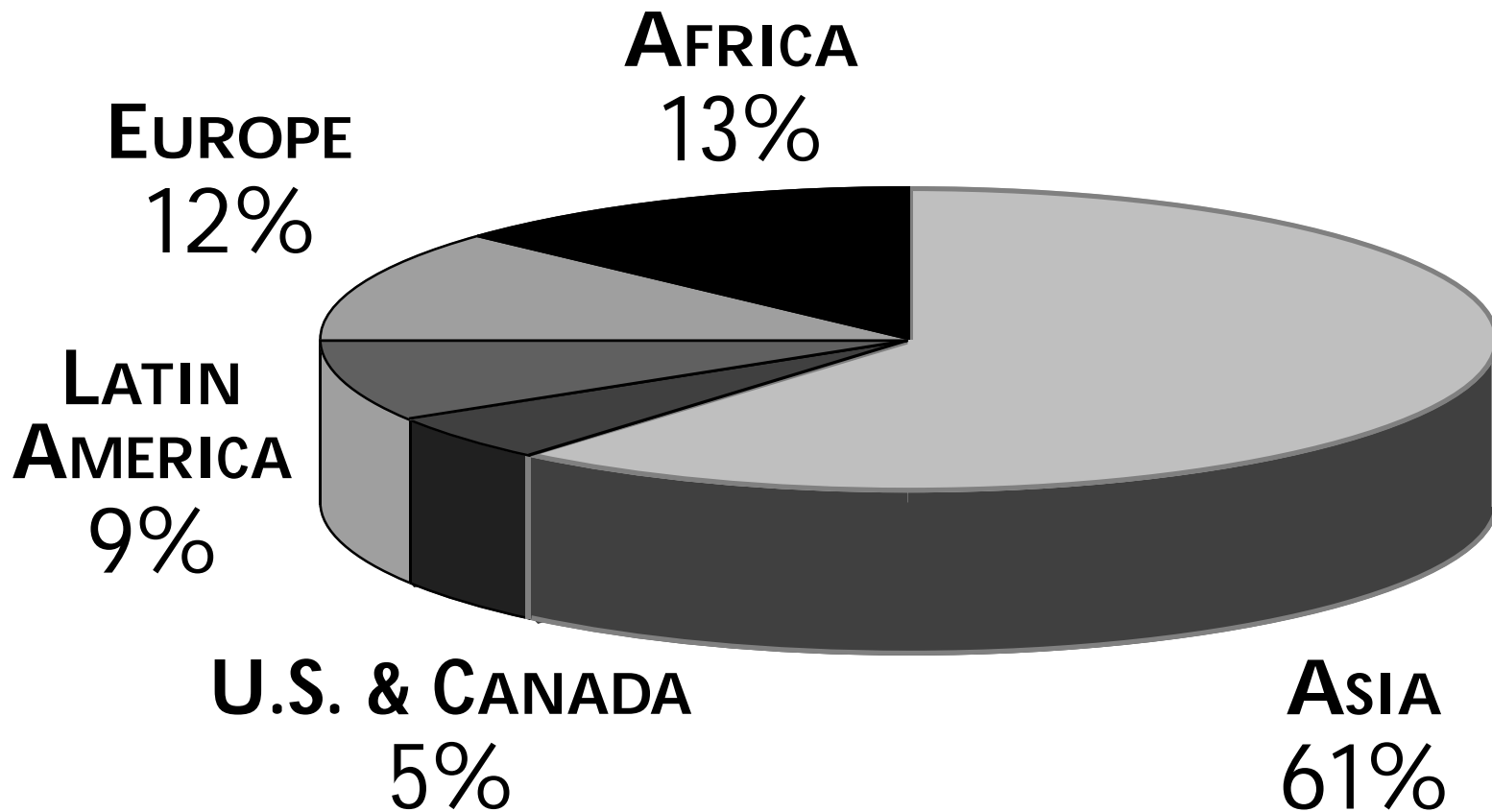
- Organize a “Hunger Banquet” in which a whole meal is served in proportion to the world’s food distribution. A Hunger Banquet can be done just in your class (for lunch one day), with parents, or as a school/community event. The Hunger Banquet is a project of Oxfam America. A complete manual on how to run a Hunger Banquet can be found at www.oxfamamerica.org.
- Visit our Creative Action website at www.creativeaction.org/create.html and click on the “help end poverty,” “end world hunger,” and “reduce consumption” links to learn more about poverty, hunger, consumption patterns around the world, and action projects to help solve global issues.
- Do a Heifer Project International Service Learning Project in which students raise

money to buy farm animals for poor families to help them become more self-sufficient. For a detailed description of this and other service learning projects, visit our Service Learning website at www.stickyteaching.org.



SHARING THE CAKE

DIVIDED BY WORLD POPULATION

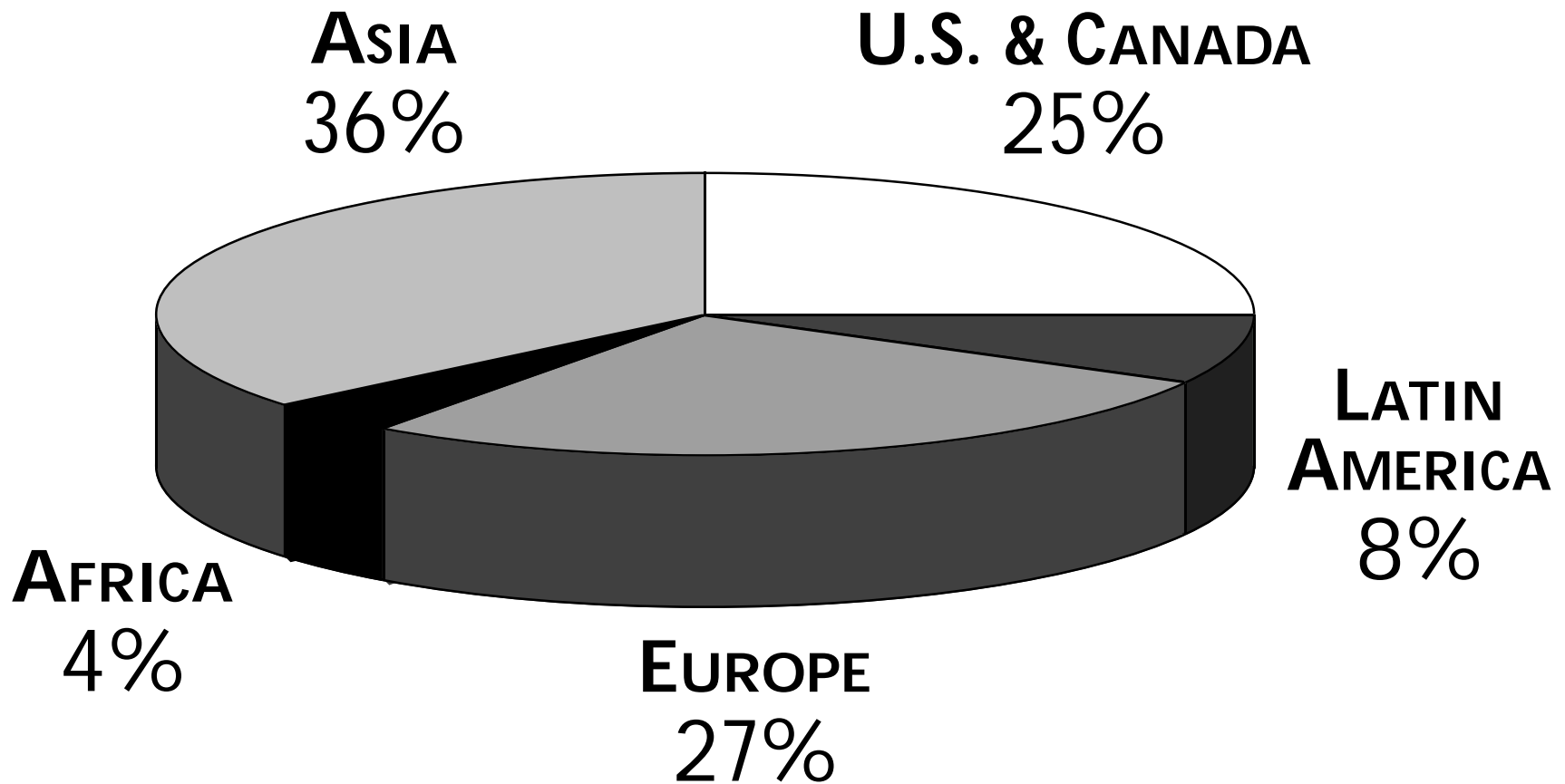


DATA FROM 2001 WORLD POPULATION DATA SHEET OF THE POPULATION REFERENCE BUREAU



SHARING THE CAKE

DIVIDED BY PER CAPITA GROSS NATIONAL INCOME, PURCHASING POWER PARITY ADJUSTED



DATA FROM 2001 WORLD POPULATION DATA SHEET OF THE POPULATION REFERENCE BUREAU



SHARING THE CAKE—DIVIDED BY PER CAPITA GNI, PPP ADJUSTED
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GUIDELINES “WHEN THE CHIPS ARE DOWN”



This game is a great way to show how the Ecological Footprint can be applied at a national level with political implications.

BEFORE THE GAME

- Have students take the Ecological Footprint quiz at www.myfootprint.org. Have students record their initial results, but ask them to retake the quiz and change answers to find out what happens when they change a part of their lifestyle to be more sustainable.
- The class may discuss different reasons for why their footprints were large or small, and what they can do to improve their sizes. Be sure to emphasize that an Ecological Footprint is a measure of *the area of land* required to provide one’s resources and to absorb their wastes.
- Tell the class that now they are going to see how population and consumption affect Ecological Footprints over time at national levels. They are going to create their own countries and see how natural as well as economic factors play a role in Ecological Footprint size and degradation of the land.

DURING THE GAME

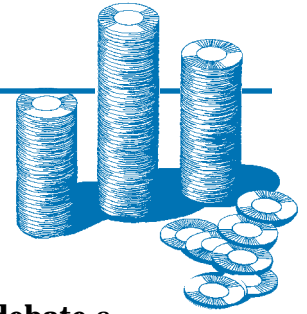
Guidelines to ensure a well-played, educational game:

- Cut pieces of butcher paper that are smaller rather than larger. The less room they have to place chips, the more likely the game will have effective results.
- Ensure that students fill in all the empty spaces on their countries with pictures, as all land may be used.
- Have students draw definitive borders on their countries.
- Include “Corporations” as a component for countries so as to build on “Infrastructure.” The more corporations a country has, the more affluence and consumption. This will make it easier to distinguish between the three groups.
- If students choose to use renewable energy sources, recycling plants, or any other sustainable practice in their country, allow them to stack chips on those resources (one per generation only). They may do so because sustainable practices can last from generation to generation with less impact on the land.

AFTER THE GAME

- Use the “Factors Affecting the Ecological Footprint” Handout to show how population and consumption/affluence play a role in ecological impact.
- Discuss different policies that countries may adopt to improve their Footprints. You may hand out the briefs “What about Population?”, “Footprints and Energy,” and “Eating up the Earth” as supplemental readings.
- Discuss examples from history of how various types of governments establish policies that affect national footprint size (ex. population limits in China vs. policies in Kerala).
- Discuss significant events in history that have led to structures that have caused some countries to be more/less populous and more/less industrialized.
- Technology may also play a role in environmental impact. It can either increase resource efficiency or be more use resources more intensively. What technologies can help countries decrease Ecological Footprints?

WHEN THE CHIPS ARE DOWN



OVERVIEW

Students model three patterns of ecological footprint growth over four generations, using poker chips to represent ecological footprints and maps to represent countries. The activity emphasizes the impact of changes in population-growth rates and consumption patterns over relatively few generations, and possible solutions to these impacts.

KEY ISSUES/CONCEPTS

- Ecological footprint
- Carrying capacity
- Geometric progression
- Resource scarcity and impacts (migration, discrimination, and conflict)

SUBJECT AREAS

- Social studies
- Geography
- Environmental studies
- Mathematics
- Economics

GRADE LEVEL: 6–12

INQUIRY/CRITICAL THINKING QUESTIONS

- What are the impacts of three ecological footprint-growth rates when carried out over four generations?
- How does an increase in ecological footprint impact countries?
- What personal and structural solutions could be implemented to address impacts identified in the activity?

OBJECTIVES

Students will:

- **Design** and **draw** maps of their ideal country.
- **Model** different ecological-footprint-growth rates over four generations.

- **Consider** and **discuss** impacts of the different ecological-footprint-growth rates.
- **Consider**, **discuss**, and **debate** a number of “structural” solutions to impacts associated with ecological footprint growth.

NATIONAL STANDARDS CONSISTENCY

- NCSS: 2, 3, 7, 9
- NSES: C, F
- NGS: 1, 2, 3, 4, 5, 8, 9

TIME REQUIRED: 1–1.5 hours

MATERIALS

- Butcher paper, 1 sheet per group (each sheet should be no larger than 25” x 30”)
- Marking pens, colored, 3–4 pens per group
- Poker chips, 500 for a class of 25 or fewer, 1,000 for a class of more than 25
- Overhead *Ecological Footprint*

PREPARATION

1. Count out the poker chips for each group and each generation according to the table below, and put the larger stacks in labeled plastic bags.
2. As a reference, read the chapters titled “Who Cares About Population, Anyway?” and “Does the USA Have a Population Problem?” from our publication *Population, Poverty, Consumption, and the Environment*, and/or the same chapter titles from *Population: Issues, Impacts, and Solutions*.

INTRODUCTION DISCUSSION

Use the overhead *Ecological Footprint* to discuss the concept of ecological footprint. Or, do our

NUMBER OF POKER CHIPS FOR CLASS OF 25 OR LESS			
Generation	Group 1 (doubling)	Group 2 (tripling)	Group 3 (quadrupling)
1 st	2	3	4
2 nd	4	9	16
3 rd	8	27	64
4 th	16	81	256
Total Chips	30	120	340

demonstration activity “Now Hear This” as an introduction to When the Chips are Down.

ACTIVITY

1. Explain the following directions:
“In groups, design and draw a map of your ‘ideal’ country, including the following components: farmland, housing, water, forests, recreation, energy sources, infrastructure, waste disposal, defense, and open space/wilderness. Decide on a name for your country and the type of government you want, and write those on the map.”
2. Divide the class into small groups: three groups for a class of 25 or less, six groups for a class of more than 25. (With six groups, you will need to double the number of chips indicated in the above table. You will have two groups model doubling, two groups model tripling, and two groups model quadrupling.)
3. Give each group a piece of butcher paper and a set of marking pens and have them brainstorm, discuss the components to be included, and then draw their country maps. Instruct them to draw their maps as if they were looking down on it from an airplane flying above (e.g., small squares for houses, areas for food cultivation, roads, et cetera). Encourage students to be creative and to think about everything they might want to include in their ideal country. Give them plenty of time to create their maps, so they are proud of their country and have an emotional connection to it.
4. When the groups are finished creating their countries, place the maps side by side (with edges touching) on a large table or on the floor, and have each group (or two or three representatives from each group) stand next to their country maps. Be sure that all the students can see the maps.
5. With the students gathered around, have each group briefly present their country map to the class.
6. Read (or paraphrase) the following directions to the students:

“You will model three different patterns of ecological footprint growth (based on population and consumption increase) over four generations, using poker chips to represent ecological footprints and the maps to represent countries. Each poker chip represents an ecological footprint—the area of the

Earth’s surface it takes to provide everything people need and use. Ecological footprints of individuals and nations vary depending on both population size and consumption habits. Larger populations have a larger footprint because more people require more resources to support them. Higher-consumption lifestyles have a larger footprint because they require more resources per person to support those lifestyles. For example, eating an animal protein–intensive diet requires much more farmland than a vegetarian diet. Automobile use requires roads, repair shops, and parking lots, thus eliminating habitat for other species.

You will place the ecological footprints (chips) on areas of the map where you want your impacts to be. For example, you might want to place the chips in areas designated for housing, roads, or farmland, since those are areas you have designed to be impacted. On the other hand, you probably don’t want to place ecological footprints in your wilderness areas, if you want to keep them undeveloped.”

7. Point to one map (ideally, choose the least technologically developed country for this one) and say, “This country represents a traditional agrarian society. They are doubling in population each generation, but their average consumption per person remains the same, so their footprint is doubling each generation.” Place **two** chips, representing the first generation, on this country.
8. Point to the next country and say, “This country represents a more-developed society that has reduced its population-growth rate, but is still experiencing a 50 percent increase in population and is doubling its consumption, so its total ecological footprint is tripling each generation. This is representative of some rapidly industrializing ‘Asian Tiger’ nations, such as Thailand.” Place **three** chips, representing the first generation, on this country.
9. Point to the third country (try to choose the most technologically developed country for this one) and say, “This country represents a society that is doubling both its population and its per capita consumption each generation. Therefore, its footprint will quadruple each generation. This is representative of the highly affluent societies, such as the United States since World War II.” Place **four** chips, representing the first generation, on this country.

10. Emphasize that chips cannot be placed outside the borders of countries and that chips cannot be placed on top of each other since an ecological footprint is the surface area of the Earth, and therefore cannot be stacked. (Be careful not to say that they must stay on their own country; invading other countries is allowed and even encouraged. However, it's best if you don't tell them to invade; let them figure it out on their own.)
11. Hand out the second generation of chips and have the groups (or their representatives) place the chips on their maps, modeling one "generation" of ecological-footprint growth at a time. After each cycle is complete, hand out bags of pre-counted chips (as indicated in the above table) for each generation. As you hand out the bags of chips, tell each group to decide where they want to place the footprints. As they progress through the generations, they will have to decide what resources they want to impact or "cover up" with the footprints.
12. Have the students briefly stop and observe the progression of the three models after each generation cycle. The group modeling a doubling of footprint size will finish their task quite soon, and with minimal difficulty. The group modeling a tripling of footprint size will probably take somewhat longer, and will confront decisions about how to handle growth and how to allocate impacts. The group modeling a quadrupling of footprint size will take much longer and need much more room. Allow enough time for students to consider alternatives, but force the play rapidly enough so there is a sense of urgency and stress.
13. Students modeling the faster growth patterns (tripling and quadrupling) will be forced to decide which resources to deplete to accommodate their needs, since all of the chips won't fit on their maps without overrunning the resource base. (You may need to remind students that the only rules are that they cannot stack the chips or place them off the paper; however, there is no rule about putting chips

on another country.) Situations that may arise include deforestation, loss of habitat, migration, border incursions, "brain drain," and invasion of neighboring countries to support population and consumption needs. Students may decide they need to impose draconian policies to halt population and consumption growth, and "suspend" democratic principles.



Some students may decide to build border walls and store nuclear

weapons to deter invasion of neighbors.

The game will likely end in frantic activity such as students pushing piles of chips across borders, other students throwing chips off the table, students trying to block invaders, et cetera.

REFLECTION

1. Use the following questions to lead a class discussion of the activity:
 - What two things can make a country's total ecological footprint bigger?
 - How did you feel when you saw how the other countries were dealing with their growth?
 - Which decisions made in the activity actually occur in real life? What are the real-life impacts of those decisions, and what effect might they have on quality of life and social institutions? Can democracy survive, for example, or might a totalitarian state emerge in response to the increased stress?
 - What would happen if the chips game continued for two more cycles? What other decisions might each country have to make?
 - What different choices would you have made in your country if you had known what was going to happen?

- How would careful planning have changed the outcome of the activity?
- 2. Discuss the difference between personal and structural solutions to the impacts that resulted in the activity. For example, a personal solution may be to reduce your own footprint size by using alternative transportation rather than individually driving a car to school or work everyday. Structural solutions may include helping people in developing nations become economically self-sufficient, providing access to reproductive and community health care, and developing sustainable technologies.

CLASS PROJECTS/ACTION IDEAS

- Hold a class council based on the following scenario: Imagine that you are an advisor to the president of a wealthy nation, and you must either (1) accept large numbers of immigrants from poor nations and at the same time spend significant sums of money to improve conditions in poor nations to help reduce their “push factors” or (2) spend large sums of money to seal your borders and keep out immigrants from poor nations drawn by the “pull factors” of social well-being and economic opportunity in your country. Each seems to threaten your citizens with an altered lifestyle due to significant economic reallocation. What recommendation would you make and how would you defend your position?
- Visit our Creative Action website at www.creativeaction.org/create.html and click on the “Promote Family Planning,” “Reduce Consumption,” and “Stop Rainforest Destruction” links to learn more about reproductive-health care and population growth, consumption patterns around the world, environmental degradation, and action projects to help solve global issues.
- Do a Trickle-Up Service Learning Project in which students raise money to provide small business grants for poor people in developing countries. For a detailed description of this and other service learning projects, visit our Service Learning website at www.stickyteaching.org.

EXTENSION

Population Growth and Resources: Use Population Reference Bureau’s *World Population Data Sheet* to determine the projected increase in global population in one year. Then identify one or more countries of approximately that size. Look at a world map and determine where a new country the size of the one identified on the map could be placed every year for 10 years. Have students write a response paper using the following questions on the feasibility of creating these “new” countries:

- What resources and infrastructure would be required to support this new country?
- What sort of geography and environment currently exist where you decided to place that country?
- How would the geography and environment change if a country of that size were placed there?
- Does the existing geography and environment offer the resources that you determined were necessary to support the new country?
- If not, how might those resources be provided?