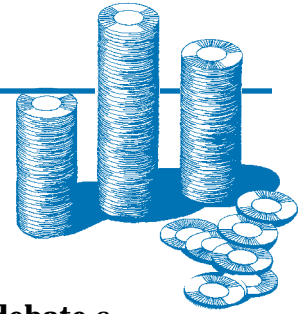


# WHEN THE CHIPS ARE DOWN



## 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 <sup>st</sup>	2	3	4
2 <sup>nd</sup>	4	9	16
3 <sup>rd</sup>	8	27	64
4 <sup>th</sup>	16	81	256
<b>Total Chips</b>	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](http://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](http://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?