Feeding the Global Family

Anyone who has ever driven through the endless amber waves of grain in America’s Midwest may find it difficult to believe that we may soon be in the midst of a global food shortage. Presently 841 million, or one out of seven, people worldwide do not have enough food to sustain a normal, active life. Around two billion people, or one out of three, are malnourished. That is they do not receive the proper balance of nutrients; many do not receive enough protein.

Today if a person or family goes hungry, whether in North America or sub-Saharan Africa, it is usually because of poverty; they do not have money to buy enough food. Poverty and restricted access to food can arise from many different causes, including unequal distribution of wealth or economic opportunities, environmental degradation, or discrimination based on race, gender or age. However, if the world’s population continues to grow faster than food production (as it does right now), not having enough food to go around may become a significant cause of hunger in generations to come. As more and more people must be fed on the food produced each year, what people eat, and how food is distributed will play a larger role in whether there will be enough for everyone.

According to Lester Brown, president of Worldwatch Institute, the world could support 2.5 billion people on a North American-style diet high in animal protein (well below half of the world’s present population), five billion on a “Mediterranean” diet, heavy in fruits, vegetables and grains, and ten billion people on an Indian-style diet, which consists mostly of a starchy staple food. Brown states that the healthiest of these three diets is the Mediterranean — however, at current grain production levels, world population has already outstripped the Earth’s ability to provide the amount of grain to allow all the world’s inhabitants to eat such a diet.

**People Outpacing Food**

Annual grain harvests have more than tripled since the 1950s, and recent years have seen record grain harvests. That’s the good news. What’s the bad news? Over the last decade, growth in the amount of grain harvested each year has slowed significantly, and is not increasing as fast as the world’s population. This means that the amount of grain per person is falling. In 1996, the amount of grain per person was 313 kilograms, down from the peak of 346 kilograms per person in 1984. Population growth is the primary cause of this drop.

Food to feed the Earth’s people comes from two sources: the land and the sea. Since 1988, the total pounds of fish taken out of the oceans each year has remained fairly constant, and no longer increases with increased investment. This indicates that we have reached the sustainable limit for harvesting fish. Since the human population is still growing, the amount of fish per person is already declining. We cannot count on this resource to meet the multiplying demand for food.

Meeting the increasing demand for food created by the 84 million people added to the world each year will depend on increasing grain yields, the amount of food that comes from the land. This depends on two primary resources — land and water, both of which are themselves strained by the pressures of a growing population.

**The Production Equation**

Mathematically, the amount of grain produced in the world each year depends on two variables: the area of land harvested and the amount of grain harvested per unit of land. In 1981, the amount of land harvested reached a peak at 732 million hectares. By 1996, the
amount of land area harvested had dwindled to 696 million hectares, a decrease of 3.7 percent. When taking population growth into account over the same time period, the decrease amounts to a 25 percent drop in land area harvested per person. Why is the total amount of farmland decreasing each year? The two major causes are urbanization and soil degradation.

Urban Growth

Not only is the world population growing, but each year a larger and larger percentage of those people are living in cities. All over the world, valuable cropland is being paved over as cities grow outward. For example, more than half of all U.S. agricultural production comes from counties on the edge of expanding cities. For each person added to the U.S. population, about one acre of land is required for urbanization and highways. An area the size of two New York Cities was paved over each year between 1982 and 1992. On the Indonesian island of Java, enough cropland was lost to urban expansion in 1994 alone to supply rice to over 300,000 people. Around the world, an area of cropland between the size of Virginia and Oregon is lost to urbanization each year. The ongoing trend of urbanization will continue to take more and more cropland out of agricultural use.

Blowing in the Wind

Soil degradation also reduces the area of land available for agriculture. The most common cause of soil degradation is erosion, the carrying away by wind and water of the thin layer of topsoil which holds all the nutrients
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necessary to grow crops. Eleven percent of the world’s cropland in 1989 was “strongly eroded” and was not able to be used for production. During the past 40 years, about 30 percent of the world’s arable land has been lost through erosion. Erosion is frequently caused by overgrazing, deforestation, agricultural mismanagement, and overharvesting of fuelwood. These activities, in turn, are frequently the result of poverty and the unequal distribution of land. As population growth increases the demand for land, poor farmers are forced to work marginal land, such as hillsides and land cut from tropical forests, which erodes easily.

Increased irrigation, which has allowed for greater crop production in past years, is also a cause of cropland damage. Whereas rainwater is essentially distilled, irrigation water contains salts which are left in the topsoil upon evaporation. This process, called salinization, removes 1.5 to 2.5 million hectares per year from agricultural production (an area larger than Connecticut). The remaining salinized area still uses produces lower yields, and will continue to produce even lower yields as salinization gets worse.

Wade in the Water

The yield per acre part of the production equation depends largely on the percent of land area under irrigation. The tripling of the world grain harvest since 1950 has been due not to great increases in land area harvested, but to the spread of irrigation. Irrigation improves yields in itself, but also enables crops to get the most nutrients from the fertilizers applied to them.

However, the amount of irrigated land per person has been falling since 1979. The major reason for this is that the amount of water available per person to use for irrigation is diminishing. More and more water that could be used for agriculture now has to be diverted to cities in response to rapid population increases in urban areas. Irresponsible use of water for irrigation, such as drawing water out of aquifers faster than it is being replaced, is another cause of diminishing water supplies.

Slow growth of both land area used in agriculture and grain yields per acre will make it increasingly difficult for increases in food supply to keep up with the rapid increases in world population.

An Unhealthy Diet

In order to satisfy the North American demand for meat and dairy products, much of the prime agricultural land in the U.S. is used inefficiently, feeding animals, rather than providing food for the world’s growing human population. One acre of prime land can produce 20,000 pounds of apples, 40,000 pounds of potatoes or 250 pounds of beef. American livestock consume 80 percent of the corn grown in the United States. It is estimated that 100 million people could be adequately nourished using the land, water and energy that would be freed from growing livestock feed if Americans reduced their intake of meat by just ten percent.

This reduction in meat consumption would save water as well, since about 1,000 liters of water are required to produce one kilogram of grain, versus 100,000 liters of water to produce one kilogram of beef. All of these facts amount to a compelling case that our diet choices have a substantial impact on land and environmental degradation, health, worldwide hunger and food distribution.

Rich farmland is also misused in many developing countries where large landowners grow cash crops, such as cotton, coffee or tobacco instead of food. To the owners, land becomes an investment, not a source of food for the people who live on it. Meanwhile, an estimated 40,000 people die each day in the world due to hunger or hunger-related causes.

Environmental Threats

Virtually all forms of global environmental degradation are adversely affecting food production. Damage to crops from air pollution and acid rain can be seen in industrial and developing countries alike. Global climate change, brought on by the production of greenhouse gases, poses other threats to crops. Scientists predict hot, dry summers ahead for America’s breadbasket in the Midwest as a result of climate change.

Just as industrial practices threaten farmland, modern agricultural practices often pose
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threats to other ecosystems. The water pollution attributable to U.S. agriculture, including runoff of soil, pesticides and chemical fertilizers, is greater than all municipal and industrial sources combined. While there are multiple ways to address the problem of global hunger, most experts agree that unless population pressures ease, a lasting victory over hunger will not be achieved. Feeding people adequately into the 21st century will depend on slowing world population growth to bring it in line with food production.

A Sustainable Future

If we hope to prevent a world food crisis, we must commit ourselves to sustainable agricultural practices. Sustainable agriculture means using the land in such a way as to safeguard its natural productive capacity for generations to come. It is not enough to focus on the most efficient and profitable way to grow food today. Ensuring that an ample amount of land will remain for tomorrow’s food supply must also be our concern. For example, destroying rainforest to create cropland provides productive land for only a few years before topsoil erodes. Leaving the rainforests intact and harvesting renewable products, such as fruits and nuts, ensures a steady stream of produce indefinitely.

With such finite cropland, we must use this precious resource judiciously. Diversification of crops, moderate irrigation and responsible land management are just a few ways to produce food more sustainably. Eating a wide variety of foods and not depending heavily on animal products (as recommended in the USDA’s Food Pyramid), will allow us to use land more efficiently to feed more people. Better distribution of available food is also essential in preventing mass starvation in poor countries.

Endnotes

6. Ibid.
9. Personal communication, David Pimentel, Professor of Agriculture and Life Sciences, Cornell University, April 27, 1998.
11. Ibid., p. 45-46.
17. Ibid., pp. 29, 31.
Introduction:

This luncheon-game is meant to simulate for students some of the inequities of the present socioeconomic world situation and some of the feelings of helplessness and frustration that result from these inequities. By enabling the participants to deal with a concrete experience of purchasing power, the exercise becomes a learning tool that explores global imbalances. Through this luncheon, students will become more familiar with the disparity of resources around the world and may then make the links to the disparity of resources in the United States.

Procedure:

Set-up:

The game is best played with at least 30 people in order to have a visible proportion of rich and poor. It is a good exercise to coordinate with other classrooms during lunch period or on activity night. You might use the following figures in proportioning your players and resources.

<table>
<thead>
<tr>
<th>Area</th>
<th>Population Distribution</th>
<th>Players</th>
<th>Resources Distribution</th>
<th>Chips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial/First World*</td>
<td>15%</td>
<td>4</td>
<td>80%</td>
<td>40</td>
</tr>
<tr>
<td>Transitional/Second World*</td>
<td>10%</td>
<td>3</td>
<td>15%</td>
<td>8</td>
</tr>
<tr>
<td>Developing/Third World*</td>
<td>75%</td>
<td>23</td>
<td>5%</td>
<td>3</td>
</tr>
</tbody>
</table>

* Economic classification based on per capita GDP as listed in the World Bank, World Population Projections 1994-2000, (First World: $4,300 or more; Second World: $2,000-$4,299; Third World: below $2,000).

You will have to adapt these figures if you have more or fewer players, but you can base this on the population distribution. The above figures are estimates drawn from multiple sources and therefore you may want to draw more precise figures on particular countries from the cited sources.

Facilitating the Activity:

1. Give each player his or her materials. If you know the students, it might be a good idea to place a vocal individual in each of the three “worlds.” Should you not know the players, simply give a set of materials to each player at random.

2. Tell the participants that:
   a) This is a simulation game approximating the distribution of wealth, population and food as it is in the real world.
   b) They are to deal with the situation as they see it, and enjoy the meal.
   c) There are no rules other than those on their role-identity sheet.

3. The dilemma of how to deal with the inequities of the food and wealth distribution may take various forms. The group may immediately take on a “just and humane” style and work toward providing every player with an equal or adequate share of food. This is “the ideal” and will not necessarily happen. It might happen that the game results in “confrontation” or “revolution.” In that case,

Concept:

Much of the world suffers from chronic hunger and malnutrition due to population pressures and the inequitable distribution of food and wealth.

Objectives:

Students will be able to:
   • Discuss their reactions to the inequities of the luncheon in a debriefing session.
   • Express their values as they respond to the global distribution of population, wealth and food.
   • Understand the global disparities of resources as well as the disparity of resources within their own communities.

Subjects:

Social Studies, Family Life Education

Skills:

Communication, negotiation, conflict resolution, strategic planning, writing

Method:

Students participate in a luncheon-game which simulates inequities in the global distribution of food and wealth.

Materials:

(For a class of 30 students)

Food (see menu for items needed — you will need larger quantities of the cheaper items, since most students will only be able to afford those)
3 tables (one buffet-style for food, two for eating)
1 tablecloth and table furnishings (centerpiece, etc.)
10 chairs
20 “chips” (small squares of cut paper)
30 “1/2 chips” (small squares of a different color cut paper)
15 visas (small cards marked “visa”)
4 Industrial/First World role-identity sheets*
3 Transitional/Second World role-identity sheets*
20 Developing/Third World role-identity sheets*
30 menus (or one large menu posted for the class)*

* = master is provided with this activity
The Hunger Banquet

Student Activity 14

it should be resolved by having the sides draw up a statement of “grievance” or “justification,” etc. This should express both their feelings and their plan to resolve the situation.

The facilitator should judge when the game has been played out and declare it over. At the finish, it is important to invite the players to drop the rules and share the food. However, you might want to let the inequality go unresolved. This would not be recommended if the session were to be lengthy. This is an exercise in exploring difficult issues, not frustrating students.

Debriefing:
The debriefing session is very important and the facilitator needs to draw out students’ reactions and synthesize their perceptions and insights. Also, after the group debriefing session, have students write about their personal experience and response. This should be a non-graded exercise that could either be handed in or shared in small groups. The debriefing should motivate students to study the complex problems of the global and local situations.

Discussion Questions:
1. What was your emotional reaction to the rules? To the rules of the other groups?
2. How did you feel toward the people in the other groups?
3. Did you agree with the manner in which your group resolved the problem? Do you think it was “realistic?”
4. Did your feelings change significantly during the experience? If so, when? Why?
5. Does the global situation make you think about your own community?
6. Is the distribution of resources in the North America equal?

Follow-up Activities:
1. Have students list 3 things they can do as individuals to work toward more equitable food and resource distribution worldwide. Have students extend this list to 3 more things they can do as individuals within their own communities.

2. Design an extra credit project for students to volunteer at a soup kitchen or at other community service projects.

3. Celebrate World Food Day on October 16th by facilitating this exercise in order to engage students with the issues and to heighten awareness around your campus. Contact the U.S. National Committee for World Food Day at 1001 22nd Street, Washington, DC 20437, phone (202) 653-2404.

Adapted with permission from the Americans Friends Service Committee. The original activity, “Simulation Game,” appears in Hunger on Spaceship Earth, The American Friends Service Committee, New York Metropolitan Regional Office.
Welcome to the First World…

You are a privileged citizen of countries such as Japan, Germany, Australia and the United States. You are part of the 15% of the world’s population who lives in the industrial world and you have an almost unlimited access to the goods of the Earth.

You are invited to enjoy the luncheon we have prepared for you. You have been given 40 chips, which entitle you and your fellow First World citizens to enjoy most of all that is being served because as a citizen of a high income nation you have control of almost 80% of the world’s wealth.

Because you enjoy a high level of well-being, health, literacy and wealth, you are granted an unconditional visa to travel anywhere you choose. However, each time you visit the Second World, you must donate 1 chip to the country, and each time you visit the Third World, you must donate a 1/2 chip.

Welcome to the Second World…

You are a member of the “transitional” peoples of the world, a citizen of one of the progressing industrialized countries — such as South Africa, Slovenia, Malaysia and Brazil — where you enjoy 15% of the world’s wealth. You are part of the 10% of the world’s people who have been given a relative buying power in your packet of 8 chips. Please feel free to purchase whatever you can from the luncheon table.

Since you enjoy a growing level of literacy, good health and wealth, you are free to travel to the countries of the First or Third World under these conditions:

1) You must travel in pairs.
2) Visa must be purchased at luncheon table. One chip must be deposited at luncheon table for each visa, and no more than 2 people may be issued visas at a time.
Welcome to the Third World...

You are hereby classified as a citizen of the developing world. Unfortunately, that will be of some disadvantage to your participation in this luncheon for you have only 5% of the world’s wealth.

Since you make up 75% of the world’s population, it is not quite possible for you to have full freedom in consumption of the Earth’s resources, or in fact, of our luncheon. You are entitled to a small fraction of the Earth’s goods and have been given a relative buying power of 3 chips. We encourage you to be creative in your efforts to increase your buying power, perhaps through combining your chips.

Due to your high level of disease and illiteracy as well as your lack of wealth, we regret to inform you that your ability to travel is restricted.

Cost: Visa to Second World - 7 chips
      Visa to First World - 9 chips  Visas may be purchased at the luncheon table.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>SIZE</th>
<th>COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat</td>
<td>1 slice</td>
<td>4 chips</td>
</tr>
<tr>
<td>Cheese</td>
<td>1 slice</td>
<td>4 chips</td>
</tr>
<tr>
<td>Salad</td>
<td>1 portion</td>
<td>3 chips</td>
</tr>
<tr>
<td>Bread</td>
<td>1 slice</td>
<td>½ chip</td>
</tr>
<tr>
<td>Pastry</td>
<td>1 portion</td>
<td>5 chips</td>
</tr>
<tr>
<td>Rice dish</td>
<td>1 portion</td>
<td>1 chip</td>
</tr>
<tr>
<td>Raisins</td>
<td>1 portion</td>
<td>½ chip</td>
</tr>
<tr>
<td>Cracker</td>
<td>1 portion</td>
<td>½ chip</td>
</tr>
<tr>
<td>Fruit</td>
<td>1 portion</td>
<td>3 chips</td>
</tr>
<tr>
<td>Tea</td>
<td>1 cup</td>
<td>1 chip</td>
</tr>
<tr>
<td>Juice</td>
<td>1 cup</td>
<td>2 ½ chips</td>
</tr>
<tr>
<td>Milk</td>
<td>1 cup</td>
<td>1 chip</td>
</tr>
<tr>
<td>Sugar</td>
<td>1 teaspoon</td>
<td>½ chip</td>
</tr>
<tr>
<td>Condiments</td>
<td>1 teaspoon</td>
<td>½ chip</td>
</tr>
</tbody>
</table>
Good News, Bad News—Where Do We Stand?

Student Activity 15

Introduction:
We hear all sorts of information about food issues from the media. Depending on what you read or hear at any one time, the situation related to population and food may seem good or it may seem bad. This activity allows data to be categorized as “good news” or “bad news.” Then, comparisons are made to determine some of the relationships between the data we often only evaluate piecemeal.

Procedure:
1. Ask the students if they are pessimistic or optimistic about the chances of feeding the world and slowing rapid population growth.
2. Tell them that you would like them to rate some statements of fact. Have them decide whether the statement is, in their own judgment, “good news” or “bad news.” Have students draw a line down the middle of a piece of paper and label one column “Good News” and the other column “Bad News.” They should then copy each statement or statement number in the appropriate column.
3. Have students discuss the ratings. You might identify some statements and discover to what degree the students agreed on the rating for that statement. Then, discuss these questions:
   a) Are there statements in one column that make another statement seem better or worse?
   b) What other statements make a statement seem much better or much worse?
   c) Take a statement and draw lines to the other statements on the list which affect it.
   d) Does the data confirm your pessimism or optimism? Why?
4. Ask the students if they have changed their minds about the ratings. Encourage them to collect more information that will help them evaluate the prospects for positive solutions to the population/food dilemma.

Follow-up Activities:
1. Have students write an opinion paper on the following statement: With modern technological know-how, the world will/will not succeed in feeding its people in the future.
2. Make a bulletin board with two sections—“Good News” and “Bad News.” Have students bring items such as articles and graphics to place on the board. Let the group discuss the new information as it becomes available. This points out the continual process of data collection and attitude evaluation.

Concept:
When studying global issues, such as population growth and food availability, we must refer to a number of data resources to get a clear picture of the situation.

Objectives:
Students will be able to:
• Identify current events which have implications for food availability.
• Develop a better understanding of issues by balancing opposing facts and information.
• Defend a position on an issue using relevant facts.

Subjects:
Social studies, environmental science

Skills:
Evaluating and ranking data, critical thinking, research, writing

Method:
Students determine whether given statements on population growth and food issues are “good news” or “bad news.” They then compare data to identify relationships and shape their evaluation of population/food issues.

Materials:
Duplicate the list of statements on the following pages for each student.
1. Some countries are paying their farmers not to produce food.
2. Fifty-one nations are more than three times as crowded as the United States.
3. Much potentially arable land must be irrigated.
4. Tropical land receives greater solar radiation and multiple crops could be raised each year on this land.
5. The soil in many tropical areas is very poor and erodes easily.
6. Infant death rates are dropping in almost every country in the world.
7. Most nations of the world now have family planning programs.
8. Many of the new high-yield varieties of grains have lower protein content than pre-World War II varieties.
9. Research is now concentrating on developing and testing grain varieties with higher protein content as well as possible additives to enrich the present varieties.
10. One out of every seven people worldwide do not have enough food to sustain a normal, active life.
11. Life expectancy has increased in most parts of the world.
12. There are more hungry mouths in the world today than ever before in history.
13. The use of improved seed lines, water control, more fertilizer, and disease and pest controls have together brought about sharp increases in grain production around the world.
14. The United States has less than five percent of the world's people and consumes almost 30 percent of the world's resources.
15. A map of the cultivated land on our planet shows the Eastern and Central United States, Europe, the Russian plains, India and China to be the major cropland areas; the most adequate soils, by far, are those of the American Midwest.
16. Most countries, including the United States, are running out of land that can be converted to cropland.
17. Land not under cultivation will require immense inputs of money for clearing, irrigation, and fertilization to make it productive.
18. Much productive land is diverted to non-nutritive crops such as tobacco and coffee.
19. The food that is annually lost in India to pests, poor storage and bad transportation could feed 50 million persons.
20. Less than five percent of the soils of the tropics are potentially fertile cropland.
22. There's a booming trade in the United States in vegetarian and low-meat cookbooks.
23. It takes 400 billion dollars to build up an inch of topsoil.
24. If Americans reduced their intake of beef by 10 percent, 100 million people could be fed using the land, water and energy that would have been used for livestock feed.
25. 70 percent of U.S. grain production is fed to livestock.
**Good News, Bad News—Where Do We Stand?**

**Statements**


27. Between 1990 and 1996, the grain harvest per person dropped 10 percent.

28. In China between 1987 and 1992, 60 percent of farmland was returned to forest and pasture.

29. Cropland expansion will most likely come at the expense of rangeland, forests, wetlands and other areas that are both economically important and ecologically fragile.

30. Average global grain consumption per person, per year is 300 kilograms. In the United States, it is 800 kilograms.

31. 21 percent of U.S. irrigated cropland is being watered by drawing down underground aquifers.

32. Some U.S. farmers are cutting back on chemicals and adopting alternative farming practices that are both economically and environmentally beneficial.

33. The total annual marine catch has remained constant since 1988.

34. India more than tripled its grain harvest between 1965 and 1983. Since then grain production has not increased.

35. By the year 2000, India is expected to have approximately one billion inhabitants.

36. Waterlogging and salinity are lowering productivity of one-fifth of the world’s irrigated cropland.

37. Each year, the world’s farmers lose an estimated 24 billion tons of topsoil from their cropland in excess of new soil formation.

38. Many widely used pesticides and herbicides are toxic. The runoff of these chemicals can contaminate groundwater and endanger wildlife.

39. Cropland lost to urban growth on the Indonesian island of Java in 1994 could grow rice for 300,000 people.

40. 40,000 people die each day due to hunger or hunger-related causes.