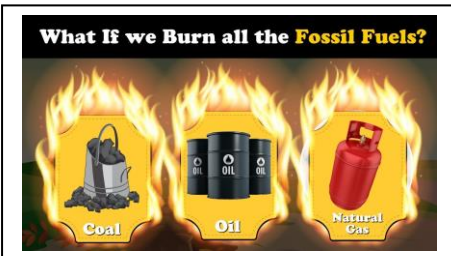
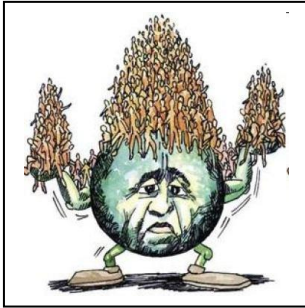
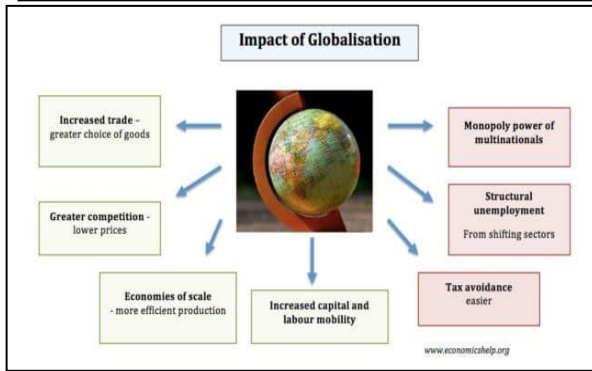
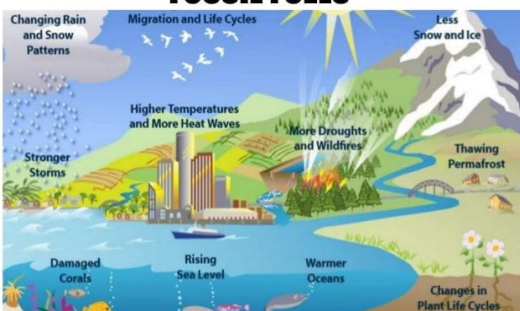


Aim #25c: How does globalization and population growth affect the environment?



ENVIRONMENTAL IMPACT - FOSSIL FUELS



Mini Lecture

- The issue of **overpopulation**, (the growth of population in a region high enough to cause serious social or environmental problems), urbanizations, and industrialization affected each other. They created strain on the natural environment and human welfare.
- Human population has been growing at an exponential rate, raising the risk of famine & refugee crises. However, this growth is not equally distributed, it has caused more problems in some areas of the globe more in others.
- From the beginning of humanity, the hunting & gathering way of life naturally limited population growth. With the advent of agriculture, human societies became more settled & capable of sustaining larger numbers of people.
- By 1 C.E., Earth's population was 200-300 million and by 1600, it doubled to 600 million. When the Industrial Revolution began in the 1700s, many people's standard of living increased as new crops & agricultural methods increased the amount of food available. By 1800, the world's population increased to 1 billion and to 1.6 billion by 1900.
- The 20th & 21st centuries have seen world population increase at even a faster pace because of advancements in sanitation & medical care and continually rising living standards for more people. Infant mortality rates continue to decrease while life expectancies continue to rise. From 1900-1960s, the world population doubled to 3 billion. By 2004, it had doubled again, hitting 6.4 billion. In 2018, it reached 7.6 billion.
- This enormous growth in human population during the past 100 years was not evenly distributed. Most of it occurred in less-developed countries, where the tradition of having large families remained strong. In the 47 least developed countries, the fertility rate is 4.3 births per woman, compared to below 2.0 in developed countries. This rapid growth in the countries least prepared to deal with it puts pressure on natural resources, land, food, & water. However, globally, most resources are consumed in prosperous countries.
- To feed the world's growing population, people have developed innovative ways of increasing & intensifying food production.
- Use of natural **fertilizers** have been used for thousands of years. In the 18th century, people discovered that ground-up ones and bird guano help revitalize soil & boost crop production. Researched in the 19th century identified nitrogen, phosphorus, & potassium as key elements found in guano with essential nutrients for food production.
- In the mid-20th century, the **Green Revolution** emerged as a possible long-term solution to food shortages for growing populations. Scientists developed new varieties of wheat, rice, & other grains that had higher yields & greater resistance to pests, diseases, & drought. These new varieties were first developed by cross-breeding to create a hybrid. Recently, scientists have used genetic engineering, more irrigation, chemical fertilizers, & pesticides.
- Green Revolution solutions were not free of problems. These problems were economic, social, & environmental:
 - Many small farmers could not afford the new fertilizer or pesticides & were forced to sell their farms.
 - Mechanized equipment replaced farm laborers.
 - A genetic modification designed to give a plant resistance to insects might cause a decline in the population of pollinating insects (bees).
 - The loss of old seed varieties as new genetically engineered plants were adopted might cause the loss of plants to could be valuable in the future.
- Industrialization & new technology helped feed & care for the world's ballooning population. However, they have been costly for the environment. Chemical use in agriculture & industry have polluted soil & water. **Fossil fuels** (coal, oil, natural gas) have harmed air & water quality and contributed to global climate change. This has caused the extinction of many species of plants & animals. Also, land development, deforestation, & desertification threatened wildlife.
- **Acid rain**, which is a combination of moisture & airborne chemicals from factories & cars, has damaged the forests of industrialized nations. Even more harm has been done by **deforestation**, the clearing of forests for timber or for land use. The most dramatic example is the destruction of the Amazon rain forest.
- Drought, overgrazing, & excess removal of trees & bushes caused **desertification**, the process by which farmland or grassland becomes desert. The roots of trees & bushes held down the topsoil so that it could not be blown away. This problem is common in Africa, where the Sahara expanded at an alarming rate into the Sahel, a grassland on its southern border.

Review Questions:

1. What problems did overpopulation create and what methods were used to solve them?
2. Explain 3 ways how the environment has been negatively impacted in recent times.

Enduring Issue: Globalization; Environment; Population

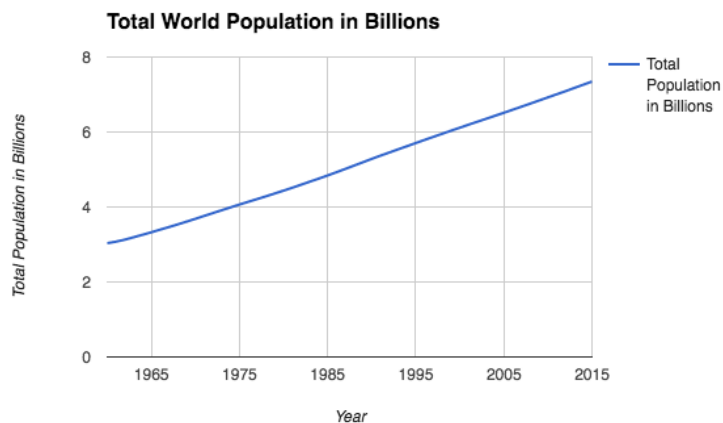
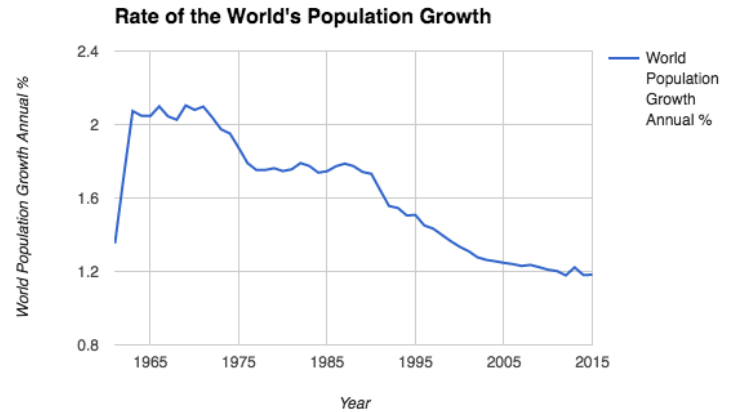
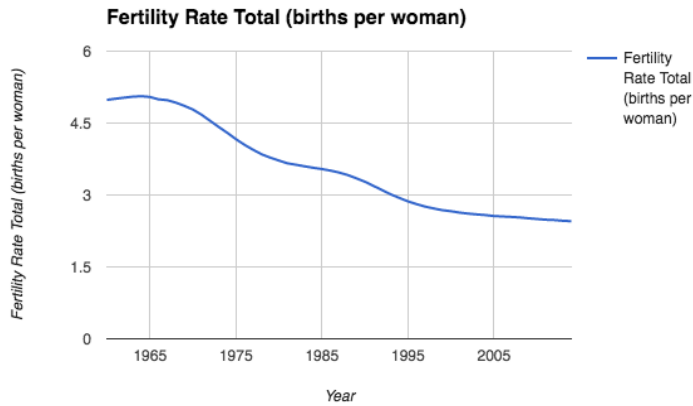
Why has the world population increased? Will it continue?

Directions: Watch this video from In a Nutshell, entitled, [“Overpopulation- The Human Explosion Explained.”](#) and answer the questions.

1. Before the Industrial Revolution, why did the population in Europe “hardly grow?”
2. What effects did the Industrial Revolution have on the lives of people in the United Kingdom?
3. What were the characteristics of the second transition stage? What effect did this have on the United Kingdom’s population?
4. Why did people have fewer children in the third transition stage?
5. Based on this video, what are the characteristics of the fourth stage of transition?
6. Why does the world’s population keep increasing if people are having fewer children?
7. What has been different about the process of moving through the stages of transition in developing nations versus developed nations?

How is population growth and its eventual decline linked to globalization?

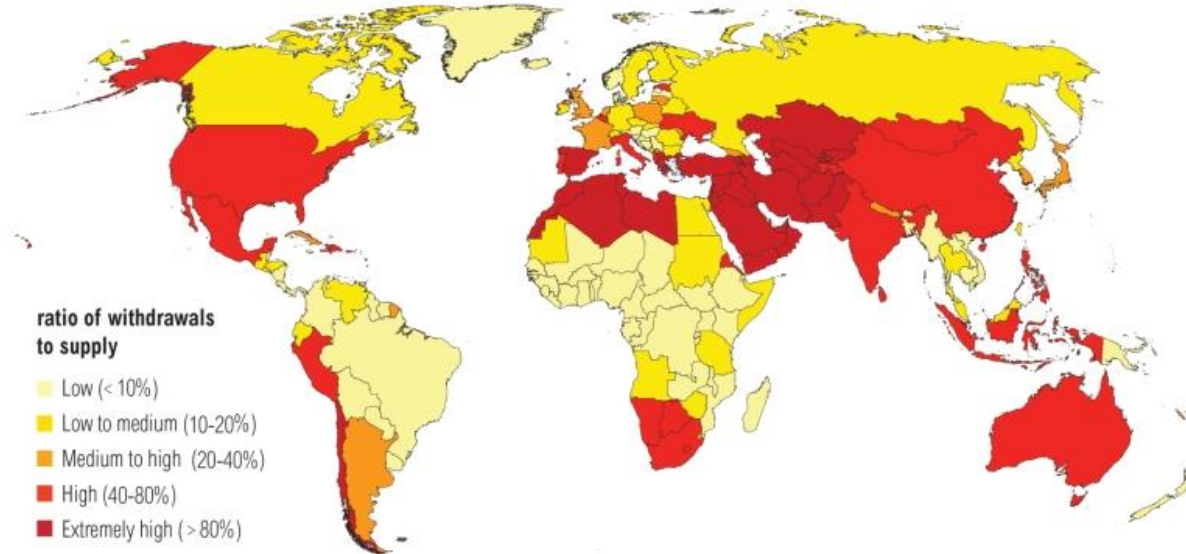
The population growth and eventual decline demonstrated in nations that first experienced the effects of the Industrial Revolution show the power that increased wealth, education, and improved health care have had on population trends. Through globalization, the world’s wealth has increased (though unevenly), and the innovations in healthcare and higher quality education that developed countries have enjoyed has become more available to those living in developing countries through improvements in technology and the work of international organizations, like the United Nations, whose mission is to improve the quality of life for people around the world.



Issue #2: Water Scarcity

Watch this video from the World Bank, entitled, "[High and Dry: Climate Change Increases Water Risks, Hampers Growth](#)", examine the map, & answer the questions that follow.

Water Stress by Country: 2040



NOTE: Projections are based on a business-as-usual scenario using SSP2 and RCP8.5.

For more: ow.ly/RiWop

 WORLD RESOURCES INSTITUTE

A 2016 World Bank Group report entitled “High and Dry: Climate Change, Water, and the Economy,” notes that “growing populations, rising incomes, and expanding cities will converge upon a world where the demand for water rises exponentially, while supply becomes more erratic and uncertain.” The report states that the freshwater needs of an expanding population that uses more energy and requires the expansion of agriculture to feed it “could reduce water availability in cities by as much as two thirds by 2040” if water management strategies continue as they are today. All of this, according to the report, is affected by climate change which can cause “water-related shocks” where there is very little water in some regions and too much water in others, causing massive flooding. In addition, the report cautions that changes in water availability and variability could lead to migration to places with more fresh water and conflict over freshwater sources, stating that “in a globalized and connected world, such problems are impossible to quarantine.”

Source: World Bank Group, “High and Dry: Climate Change, Water, and the Economy,”

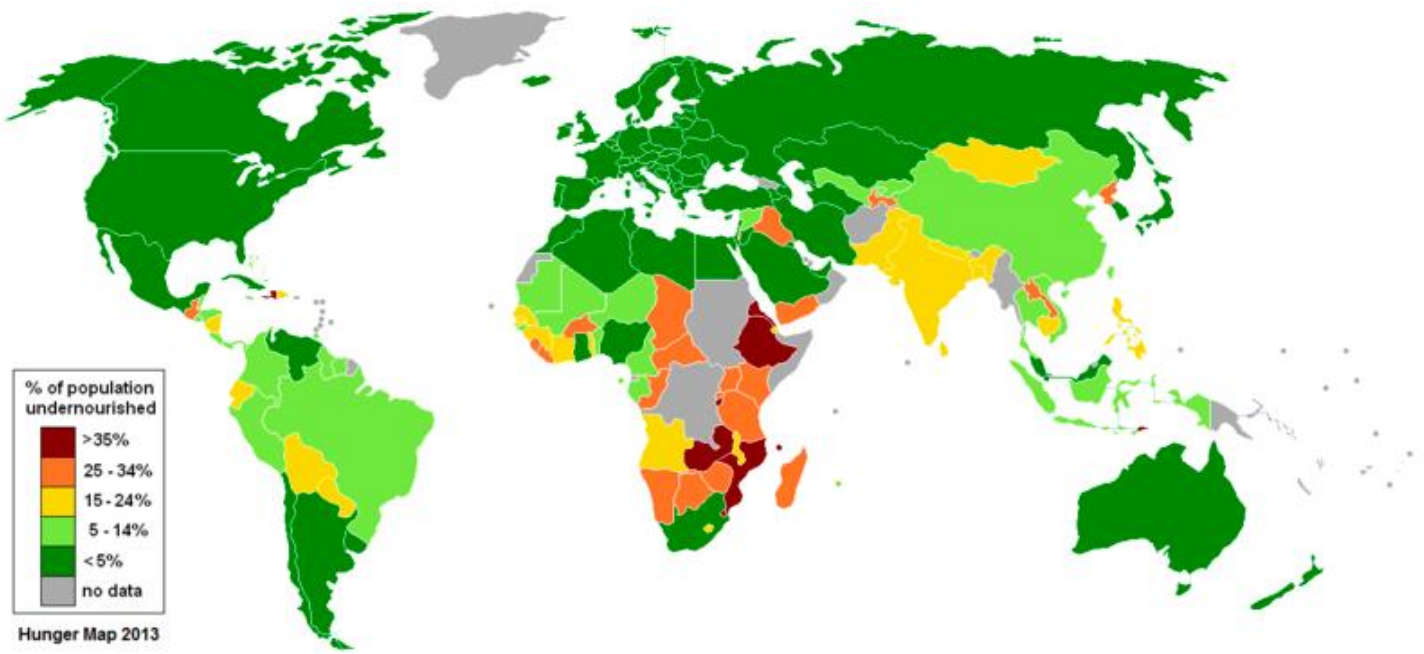
- 2a. Based on the video and text above, why might there be water scarcity in the future?
- 2b. Based on the map above, which regions of the world might be most affected by water stress in 2040? Which regions might be less affected?
- 2c. What might be the effects of water scarcity in the future if water management methods are not improved?
- 2d. Explain the link between water scarcity and population growth.
- 2e. Explain the link between water scarcity and globalization.

Issue #3: Food Security

In a report last updated in March, 2016, the World Bank expressed the need for food that the world will face as a result of population growth in the face of the environment effects of globalization and climate change:

The world needs to produce at least 50% more food to feed 9 billion people by 2050. But climate change could cut crop yields by more than 25%. The land, biodiversity, oceans, forests, and other forms of natural capital are being depleted at unprecedented rates. Unless we change how we grow our food and manage our natural capital, food security—especially for the world’s poorest—will be at risk. Already, volatile food prices—and the price spikes that can result—are the new normal. When faced with high food prices, many poor families cope by pulling their children out of school and eating cheaper, less nutritious food. This can have severe life-long effects on the social, physical, and mental well-being of millions of young people. Malnutrition contributes to infant, child, and maternal illness; decreased learning capacity; lower productivity, and higher mortality. One-third of all child deaths globally are attributed to under-nutrition.

Source: The World Bank Group, “Food Security



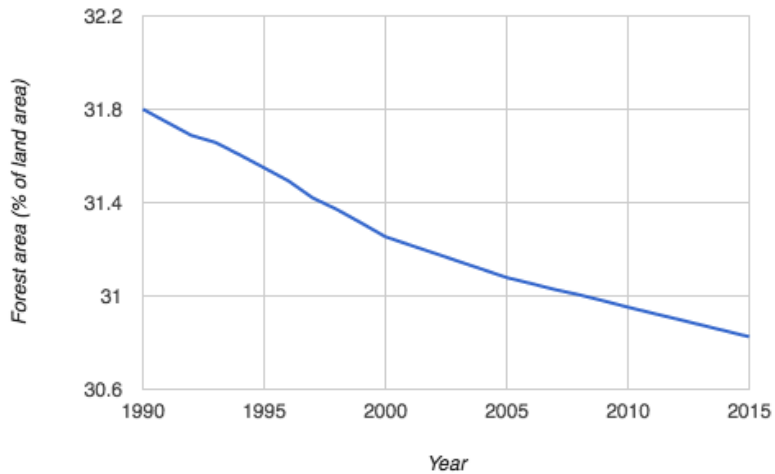
- 3a. Based on the excerpt from the World Bank report above, why might food security “be at risk” in the future?
- 3b. What have been the effects of a lack of food security in the world thus far?
- 3c. Based on the map above, which regions of the world are most prone to under nourishment? Which regions are not?
- 3d. Explain the link between a lack of food security and population growth.
- 3e. Explain the link between a lack of food security and globalization.

Issue #4: Deforestation

Deforestation is the process of cutting down forests.

Watch this video from CNN, entitled, ["CNN Explains: Deforestation"](#)

Forest Area in the World (% of land area)

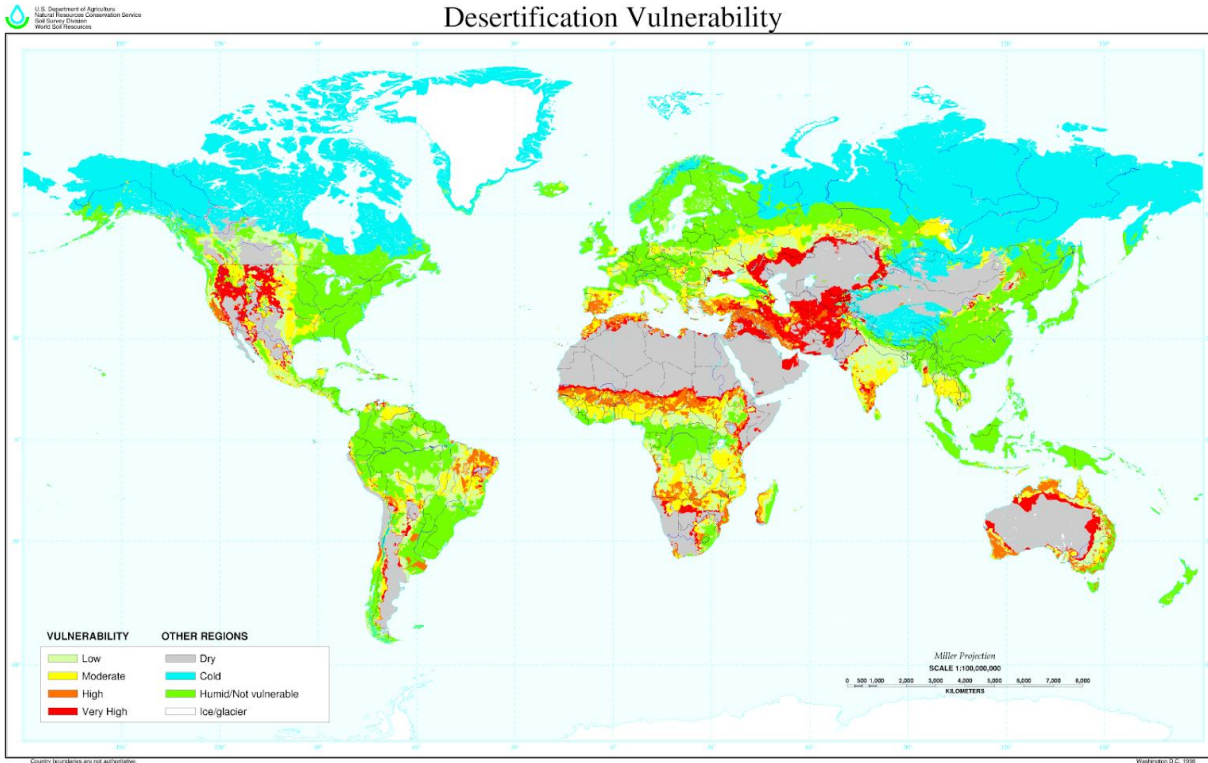


- 4a. Based on the graph to the left, describe the trend in forest area in the world.
- 4b. Based on the CNN video, what are the causes of deforestation?
- 4c. Based on the CNN video, what are the effects of deforestation?
- 4d. Explain the link between deforestation and population growth.
- 4e. Explain the link between deforestation and globalization.

Issue #5: Desertification

Desertification is the process that turns fertile land in arid (dry) climates into soil that cannot be used to farm, like a desert. Desertification is caused by human activities and climate change.

Watch this video from the Good Planet Foundation, entitled, "[Desertification](#)"



- 5a. What is desertification?
- 5b. What causes desertification?
- 5c. Explain the link between desertification and population growth.
- 5d. Explain the link between desertification and globalization.
- 5e. The narrator in the Good Planet Foundation video states that “desertification affects all mankind.” Why is that?
- 5f. What can people do to prevent desertification in the future?

Issue #6: Migration

Watch this video from Seeker Stories, entitled, "[The World's First Climate Refugees](#)"

Throughout history, people have migrated in pursuit of better ways of life, for more food, and for safety from wars and disasters. Many believe that as a result of the environmental effects of population growth and globalization, there may be even more migrations in the future. People might be migrating from places where desertification has destroyed the land to places where the land is more fertile. They may migrate from places with little fresh water to places where there is much of it, or they may be migrating to escape conflicts caused by others fighting over fertile land and freshwater. A new category of migrant is being called a “climate refugee,” which is a person migrating from a place that has been affected by climate change and that people can no longer live in. The video linked below includes the stories of some of the first climate refugees who have to leave their island nations in the Pacific Ocean because the rise in sea water levels caused by climate change are putting their homes under water.

If migration continues to increase because of the environmental effects of globalization and population growth, those regions where the migrants want to settle will have to make decisions about who to admit, how many people will be permitted to enter, and how to provide for them and integrate them into their societies.

- 6a. Why might there be more migration in the future?
- 6b. What effects might migration have on the migrants and those who live where they are migrating to?
- 6c. Explain the link between migration and population growth.
- 6d. Explain the link between migration and globalization.

What was the Green Revolution? What effect has it had? What lessons can we learn from it to address global needs in the 21st century?

What was the Green Revolution?

Watch [this video on the Green Revolution](#) and read the text below.

Throughout history, there have been many revolutions that have occurred and changed human lives, such as the Neolithic Revolution and the Industrial Revolution.

After World War II, population increased greatly around the world, especially in areas outside of Europe and North America. There was concern that the agricultural techniques used in the regions with the greatest population increase would not produce enough crops to keep up with the demand.

The **Green Revolution** was a period from the 1940s to the late 1960s when the production of crops increased drastically as a result of new technological advances such as mechanical equipment, new farming techniques, and chemical fertilizers.

The Green Revolution had mixed results. There were benefits for some and disadvantages for others.



New varieties of crops like wheat and corn that produced more food and were resistant to pests and disease were an important part of the Green Revolution.



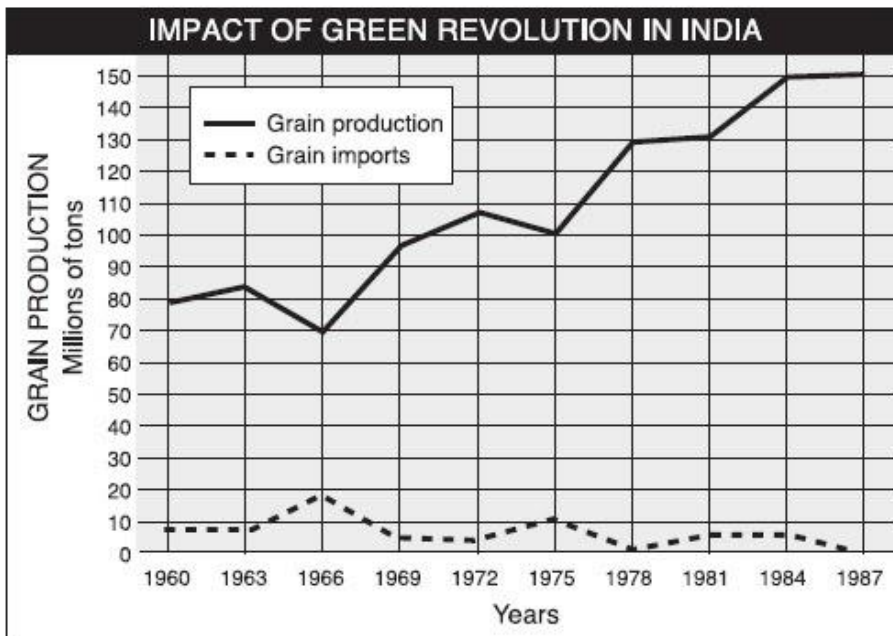
Using pesticides, herbicides, and fertilizers, like the ones being sprayed on fields by the plane above, helped reduce natural threats to crops and creating larger crop yields.

1. What problem did the Green Revolution attempt to solve?
2. Was the Green Revolution successful?

Document Analysis Activity: What effects did the Green Revolution have?

Directions: Read each of the documents below and answer the accompanying questions.

Document 1



Source: James Killoran et al., *The Key to Understanding Global History*, Jarrett Publishing Co. (adapted)

1a. According to the graph, what impact did the Green Revolution have on grain production in India?

1b. According to the graph, what impact did the Green Revolution have on grain imports to India?

Document 2

. . . The [implementation of the] first green revolution—from the early 1960s to 1975— introduced new varieties of wheat, rice, and maize that doubled or tripled yields. The new varieties were highly susceptible to pest infestation and thus required extensive chemical spraying. But they were also responsive to high rates of fertilizer application under irrigation. So, large- and medium-scale farmers in regions with adequate irrigation facilities, easy access to credit, sufficient ability to undertake risks, and good market integration adopted the new varieties. But these requirements meant that the new technology bypassed most poor African farmers.

Another reason that Africa did not benefit from the first green revolution was the research strategy used. To shortcut the process of varietal improvement, researchers introduced improved varieties [of crops] from Asia and Latin America rather than engaging in the time-consuming exercise of identifying locally adapted germ plasm and using this as the basis for breeding new varieties.

After the early euphoria with the high-yielding varieties, several problems became evident. First, the need for significant use of pest and weed control raised environmental and human health concerns. Second, as areas under irrigation expanded, water management required sophisticated skills that were in short supply. As a result poor farmers growing staple food crops in Africa could not adopt the new varieties. What was crucial for Africa was to develop crop varieties that could thrive in water-stressed regions without heavy use of fertilizers. . . .

Source: "Realizing the Promise of Green Biotechnology for the Poor," Harnessing Technologies for Sustainable Development, United Nations Economic Commission for Africa (adapted) from the NYS Global History and Geography Regents Exam, January 2010.

2. According to the authors of this passage, what was one problem countries in Africa faced in attempting to adopt the Green Revolution?

Document 3

. . . It is not clear which are greater—the successes of modern high-intensity agriculture, or its shortcomings. The successes are immense. Because of the green revolution, agriculture has met the food needs of most of the world’s population even as the population doubled during the past four decades. But there has been a price to pay, and it includes contamination of groundwaters, release of greenhouse gases, loss of crop genetic diversity and eutrophication [pollution] of rivers, streams, lakes and coastal marine ecosystems (contamination by organic and inorganic nutrients that cause oxygen depletion, spread of toxic species and changes in the structure of aquatic food webs). It is unclear whether high-intensity agriculture can be sustained, because of the loss of soil fertility, the erosion of soil, the increased incidence of crop and livestock diseases, and the high energy and chemical inputs associated with it. The search is on for practices that can provide sustainable yields, preferably comparable to those of high-intensity agriculture but with fewer environmental costs. . . .

Source: David Tilman, "The Greening of the Green Revolution," Nature, November 1998 from the NYS Global History and Geography Regents Exam, June, 2004.

3. According to David Tilman, what are two effects of the Green Revolution?

Directions: Using the readings above, complete the chart below.

| What were the positive effects of the Green Revolution? | What were the negative effects of the Green Revolution? |
|---|---|
| | |