# OUR EARTH, OURSELVES

EARTH matters
Studies For Our Global Future

## introduction

We're all familiar with environmental messages to "Save the Earth." This makes us think about the importance of natural, wild places, an abundance and variety of plant and animal life, scenic vistas, and pristine waterways. Yet, these are not just aesthetic pleasures. Our very existence as a species depends upon healthy **ecosystems**. For instance, polluted bodies of water can taint the fish we eat and the water we drink, causing us to become sick. Fuel combustion can create smog, creating respiratory problems for many vulnerable populations. That same fuel combustion, along with deforestation, releases greenhouse gases that lead to climate change, which increases the spread of infectious diseases.

Some of the stresses on our environment are caused by a high-consumption lifestyle in **more developed countries** and rapidly developing countries. Other environmental stresses result from the consequences of impoverished lifestyles in **less developed countries**. Understanding the links between human footprints on the Earth and the growing health risks around the globe helps students appreciate why our current consumption trends are unsustainable from a human health perspective.

**Vocabulary:** ecosystems, less developed countries, malnutrition, more developed countries

## materials

- Assignment Sheet (provided)
- *Earth Matters* Background Reading: "To Our Health"
- Poster board or personal computers/tablets

## procedure

1. Explain to students that many threats to human health (infectious disease, respiratory illnesses, cancer, heart disease, **malnutrition**, etc.) are related directly or indirectly to the ways humans have altered the Earth, and they will be tracing connections between some of these relationships by creating flowchart diagrams. (You may wish to have students create 2-3 flowcharts so that they can clearly appreciate the many interconnections between environmental health and human health.)

### concept

Human health is inextricably linked to the health of the planet's ecosystems, and environmental stresses lead to many public health challenges.

### objectives

Students will be able to:

- Conduct research to analyze the impacts of environmental issues on human health.
- Diagram the links between environmental stress factors and a variety of threats to human health.
- Effectively communicate to classmates how a particular environmental issue leads to a specific health issue.

### subjects

Environmental Science (General and AP), AP Human Geography, Geography, English Language Arts, Health

### skills

Researching, synthesizing research, understanding cause and effect, public speaking

### method

Students create flowcharts that link environmental issues with human health issues.

2. Distribute an Assignment Sheet to each student. For each flowchart they create, students should follow the steps below:

    a. Place one of the listed threats at the top of the chart (as in the sample, Climate Change).
    b. Create their flowchart, working down and out, to show the connective steps between the environmental threat and one or more human health problems (see suggested list).
    c. To provide an overview of the topics, students can read the *Earth Matters* Background Reading "To Our Health," which outlines some of these connections. They may also refer to the Background Notes on page four of this lesson and to other *Earth Matters* readings such as "Women: The Critical Link," "Gasping for Clean Air," or "Man vs. Wild: Biodiversity at Risk." Suggested resources are also listed on the Assignment Sheet.

3. Students can create flowcharts on poster board or can use one of the many free online tools. Two online options include www.lucidchart.com or www.spiderscribe.net (both have either free trials or free subscriptions for educators). Online charting tools allow students to upload images and source documents to their charts, include relevant web links, and be creative in how they use color and shapes to organize and communicate their ideas. Microsoft Word also has a basic charting function.

    **Note:** If you chose to have students create their flowcharts on the computer, spend a few minutes showing them how to use the program and its features.

4. Have students present their flowcharts to the class and allow plenty of time for discussion. Students should be prepared to explain their connections to classmates and back up their explanations with evidence if necessary.

## discussion questions

1. What are the advantages of using a flowchart to show the connections between environmental health and human health? What are the limitations?

    *A flowchart can be a useful visual in showing cause and effect relationships. It does have limitations in providing a full picture of a situation. For instance, the sample flowchart shows how drought can lead to malnutrition, but doesn't show other variables that may lead to malnutrition in a community.*

2. How do you think a country's affluence impacts its ability to combat the public health challenges that arise because of human impacts on the environment?

    *Countries with fewer financial resources are less equipped to deal with public health challenges. Affluent countries have more resources for health care, water treatment, and other infrastructure measures that keep the public healthy.*

3. Were there any environmental issues that led to more potential health risks than others?

    *Answers will vary. Some environmental issues, like climate change or human population growth are overarching and lead to other environmental issues (e.g. erosion, loss of biodiversity, water scarcity, etc.). These broader issues, therefore, have a larger impact on human health.*

4. Not all communities are affected equally by environmental health risks. What are some risk factors that can disproportionately affect the populations of some communities more than others? Can you think of any examples?

   *Communities located in or near areas with greater environmental health hazards, such as industrial complexes emitting pollutants, contaminated waterways or highways with increased auto emissions, face greater environmental health risks. Members of these communities are often low-income and people of color. Local governments have an easier time zoning areas to house hazardous sites when they are made up of more marginalized communities who may lack the political or economic power to stop construction or move to less hazardous areas.*

5. Are there environmental causes that can be linked to the coronavirus (SARS-CoV-2) responsible for the global COVID-19 pandemic?

   *Probably. The novel (new) coronavirus first appeared in China in 2019. Epidemiologists (scientists who study disease) investigating in the area determined that the virus possibly came from an animal sold at a market. Bats may have been the original hosts of the virus. They, in turn, could have infected other wild species sold at markets (for food or traditional medicine) that eventually transmitted the virus to humans. Expanding human settlements over the centuries have exposed more people to viruses that would normally be confined to wildlife populations. Other modern examples include Ebola and HIV/AIDs.*

## assessment

Review students' flowcharts and class presentations using the following criteria:

- Does the flowchart represent a holistic rather than narrow view of the connections between human health and the environment?
- Does the student go beyond class readings and discussions in what he or she chooses to include?
- Do the connections follow logical, orderly ways of thinking?
- Is the flowchart legible and comprehensible to other students?

# OUR EARTH, OURSELVES | background notes

Throughout the Background Readings in *Earth Matters*, there are explanations of how the unit topics impact human health. Here are some highlights you may want to share with students if they need help getting started with their flowcharts.

| Public Health Connections to *Earth Matters* Topics | |
|---|---|
| Population Pressures | Are a root cause of human impact on the environment; population densities aid the spread of communicable diseases (especially in areas of poor sanitation); population growth is high where there is a lack of good reproductive health care services (this also leads to high maternal mortality, low birth-weight babies, spread of STDs, etc.). |
| Air Pollution | Contributes to and exacerbates respiratory diseases (asthma, lung cancer, emphysema). |
| Water Scarcity/Pollution | Spreads waterborne illnesses (cholera, typhoid, dysentery, diarrhea); algal blooms; water pollution can taint reservoirs used for drinking water; water scarcity can affect agricultural output, which can lead to malnutrition. |
| Climate Change | Warmer temperatures can lead to spread of malaria and other tropical diseases; affects agricultural output, especially in poorer areas, which can lead to chronic malnutrition; stronger storms and sea level rise can lead to displaced people and the spread of disease. |
| Deforestation | Removing the "lungs of the Earth" (tropical rainforests) increases greenhouse gases accelerating climate change; changes insect vectors, which helps spread diseases like malaria and Lyme Disease; changes weather patterns (can lead to more drought). |
| Biodiversity Loss | Losing potential new pharmaceuticals to treat diseases; losing key species (like pollinators) which can affect agricultural production. |
| Solid Waste Generation | Leaching of toxins from landfills; air pollution from incineration; ocean dumping affects our food supply and biodiversity; production of goods requires use of fossil fuels. |
| Energy Use (Fossil Fuel Consumption) | Fossil fuel emissions lead to air/water pollution and climate change. |
| Food Production | Farming practices with inorganic chemicals leads to runoff in waterways; processing and transporting food emits fossil fuels; overgrazing and land mismanagement can lead to soil erosion; animal protein requires lots of water, land, and energy to produce. |
| Stresses on our Oceans | Overfishing affects healthy food supply; fish farming can cause ecosystem problems; ocean pollution affects the health of different species we might depend upon; swimming in polluted waters can cause waterborne diseases; red tide; coral reefs endangered, threatening an important source of pharmaceuticals. |
| Urban/Suburban Sprawl | More time commuting leads to greater stress and more accidents; less walking/more driving reduces exercise; air pollution in metro areas. |
| Poverty | People living in unsafe, unsanitary conditions with poor health care, inadequate diets, greater exposure to environmental/industrial toxins (social justice issue). |
| Gender Discrimination | When girls/women's status is low, they get inadequate nutrition and healthcare, leading to chronic health problems and premature death; low birth-weight babies creating cycles of poor health. |
| Personal Consumption | Obesity from high-fat diet; higher fossil fuel emissions from increased production, more solid waste/air pollution generated. |

# OUR EARTH, OURSELVES | assignment sheet

Many threats to human health (infectious disease, respiratory illnesses, cancer, heart disease, malnutrition, etc.) are related directly or indirectly to the ways humans have affected the Earth. You will be tracing some of these connections by creating flowchart diagrams.

1. Below is a list of environmental threats. Choose one as the starting point for your flowchart (this item will be the top "bubble").

2. Using more bubbles (or text boxes), work down and out from your starting point to show the chain of events that can lead from environmental damage to threats to human health. Below is a list of some human health problems that can result from human impacts on the Earth. You may use this as a guide.

3. To provide an overview of the topics, read "To Our Health," which outlines some of these connections. There are also a number of useful online resources that explore connections between environment and health. Some suggested resources include:

   **CDC's National Center for Environmental Health** – www.cdc.gov/nceh/
   **World Health Organization** – www.who.int/health-topics/environmental-health
   **National Institute of Environmental Health Sciences** – www.niehs.nih.gov

4. Be prepared to share your flowchart with the class and explain the connections.

### Environmental Threats

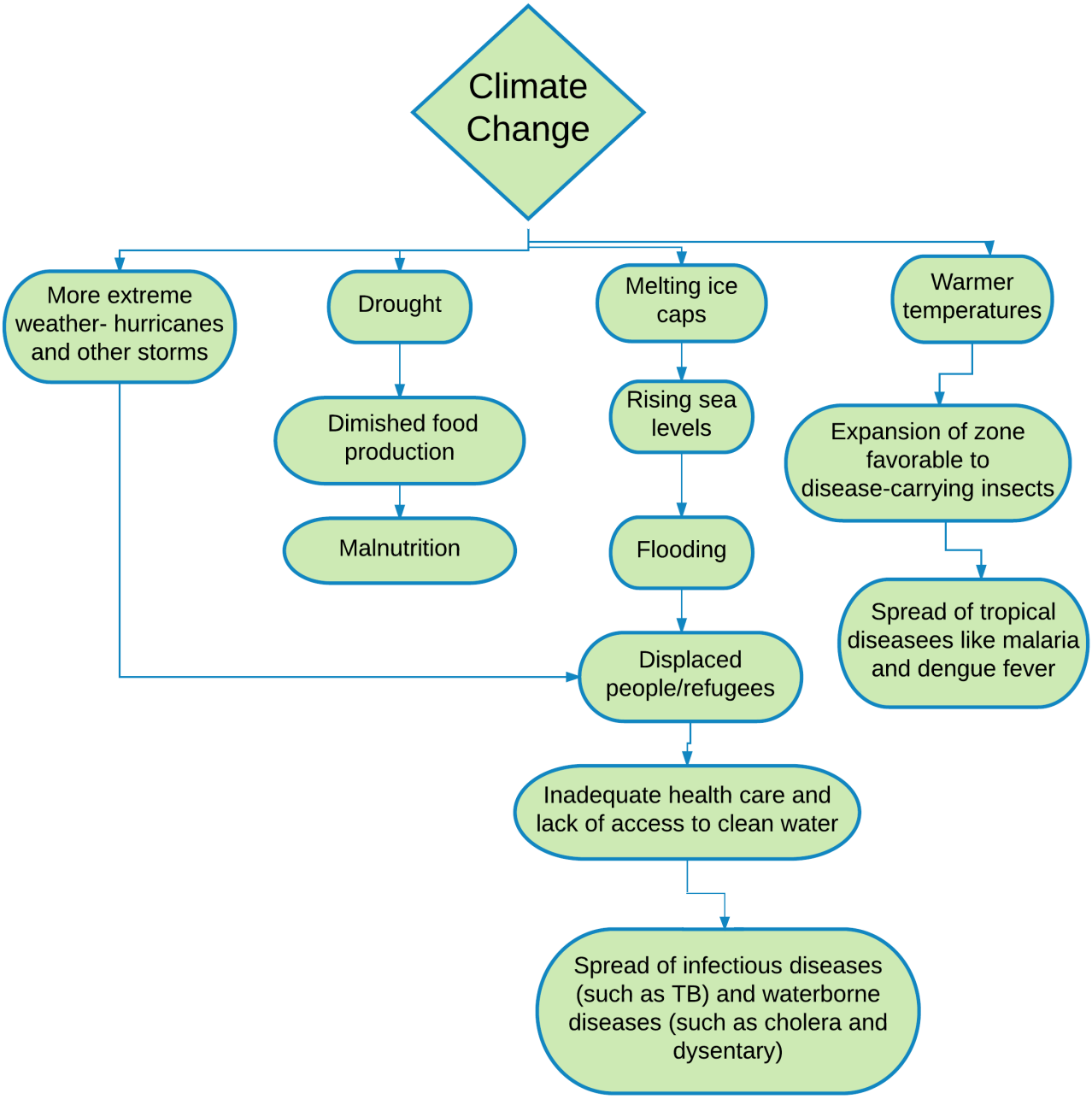
Deforestation
Air Pollution
Climate Change
Water Pollution
Human Population Pressures
Soil Erosion
Urban/Suburban Sprawl
Rise in Fossil Fuel Consumption
Solid Waste Generation/Disposal
Overharvesting the Oceans
Loss of Biodiversity
Water Scarcity

### Human Health Problems

Cholera
Typhoid
SARS
Asthma
Emphysema
Lyme Disease
Cancer
Dysentery
Malaria
Tuberculosis
HIV/AIDS
Malnutrition
Obesity
Mental Stress
West Nile Virus
Dengue Fever
Heart Disease
Diabetes
Yellow Fever
Avian Flu
Zika Virus
Hepatitis A Virus
Ebola Virus
Parasitic Diseases

# ENVIRONMENTAL THREATS AND THEIR LINKS TO HUMAN HEALTH

## sample flowchart: climate change

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