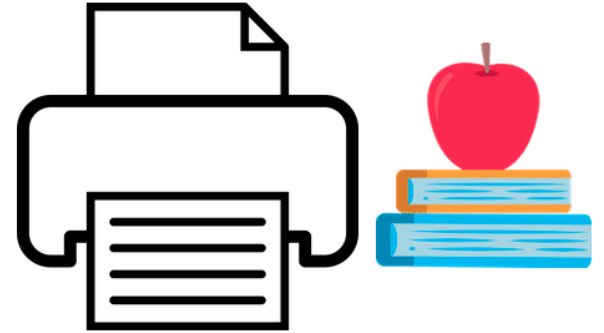


CLIMATE CHANGE AND FOOD: WHY A CHANGING CLIMATE MATTERS TO YOU

Module 7 Teacher Print Kit



Instructions: Print one copy of this document as a reference *for the Teacher*. You can print double- or single-sided. Additionally, print the Student Handouts for Module 7.

OPTIONAL TEACHER BACKGROUND READING

“Why Should We Care About Climate Change?”

The Yale Program on Climate Change Communication

"Having different perspectives about global warming is common, but the most important thing that anyone should know about climate change is why it matters. It matters because humans have basic needs, including clean air, fresh water, food, and shelter, which we have developed complex systems to provide. We require that cars capture the pollution that they emit in order to keep our air clean, for example, and we build reservoirs to hold fresh water for cities. We have also built roads, bridges, and tunnels for transportation, and grow specific crops in particular places well-suited for them in terms of temperature and precipitation.

"The many systems our societies depend on were built on the assumption that our weather patterns would be fairly stable -- that we would have sunny and cloudy days, wet and dry days, hot and cold days, but that our local climate (the average of all that weather) -- would always come back to ‘normal’" (1).

OPTIONAL TEACHER BACKGROUND CONTINUED...

“Unfortunately, when we started to learn about the immense power that we could gain by burning fossil fuels (coal, oil, and gas, which come from ancient plants buried deep underground), scientists also discovered a problem about this power. They discovered that when we dig these materials up and burn them, they produce an powerful, invisible, odorless gas, called carbon dioxide. And they also discovered that this gas acts like a blanket around the planet, trapping heat in the atmosphere. In scientific terms, Earth transforms sunlight’s visible light energy into infrared light energy, which leaves Earth slowly because it is absorbed by greenhouse gases. When people produce greenhouse gases, energy leaves Earth even more slowly—raising Earth’s temperature.

"It took over 100 years for enough gases to build up to a level where we would notice it, but unfortunately we are now able to notice it quite strongly. Scientists have taken thousands upon thousands of measurements using thermometers on land, balloons and airplanes in the air, and buoys and other devices in the oceans. They have determined that our global temperature has risen almost 2 degrees F in the last century, and that most of the extra heat being trapped is going into the oceans, causing them to expand, which increases sea levels along the coast, while causing fish to migrate and sea ice to melt. The increased land temperature is causing glaciers to melt, heat waves and droughts to become more extreme, and it is causing more wildfires to grow out of control.”

OPTIONAL TEACHER BACKGROUND CONTINUED...

“Extreme weather is challenging for all of us no matter where we live, but it is also a major problem for all of the systems we have built to provide ourselves with clean air, fresh water, food, and shelter. Heat makes asthma and allergies worse, for example, and flooding from storms causes drainage systems to break down, which can lead to toxic spills and pollution of our fresh water. A changing climate is also very stressful for the crops and irrigation systems that we depend on. Some plants also respond directly to higher carbon dioxide levels in the atmosphere by reducing the nutrients that they take up from the soil. There are countless impacts of a changing climate on our infrastructure, food systems, and our everyday lives, which is why a stable climate matters to all of us, no matter where we live” (2).

WEATHER: day to day range



CLIMATE: long-term average

WEATHER

Tells you what to wear each day



CLIMATE

Tells you what types of clothes to have in your closet



ACTIVITY #2: GREENHOUSE GAS EFFECTS: A CAR EXAMPLE



ACTIVITY #3: DROUGHT



Image credit: Bob Nichols, 2013. Texas drought affecting corn crops. USDA. Creative Commons CC BY 2.0. Food Span.

ACTIVITY #3: CLIMATE CHANGE IMPACTS TEACHER GUIDE

Loss of topsoil

- Extreme heat: Heat dries out soil, making it more vulnerable to wind erosion.
- Extreme weather events: Hurricanes and flooding can damage crops and wash away soil.
- Changing rainfall patterns: Periods without rainfall can dry out soil, making it more vulnerable to wind erosion. Heavy rainfall can wash soil away.
- Rising sea level: Rising tides along coastal waterways can wash soil away.

Fungus invasion in corn crop

- Changing rainfall patterns: Long periods of heavy rain create ideal circumstances for fungal diseases to flourish and damage crops.

Saltwater contamination of freshwater supply

- Rising sea level: A higher ocean tidal range can introduce saltwater into groundwater supplies.

Increased cost to fight weeds

- Extreme heat: Temperatures rise and hardier weeds can outcompete more sensitive crops.

Increase in a crop's water needs

- Extreme heat: Heat dries out soil.
- Changing rainfall patterns: Periods with low rainfall can dry out soil.

Higher food prices

Explain to students that reduced crop yields often lead to higher food prices.

- Extreme heat: Damage from heat-tolerant weed species can lead to crop losses.
- Extreme weather events: Droughts, hurricanes, and flooding can erode soil and damage crops.
- Changing rainfall patterns: Dry periods and heavy rains can erode soil and damage crops.
- Rising sea level: Rising tides can erode soil and higher salinity can damage crops.

Depletion of freshwater sources for irrigation

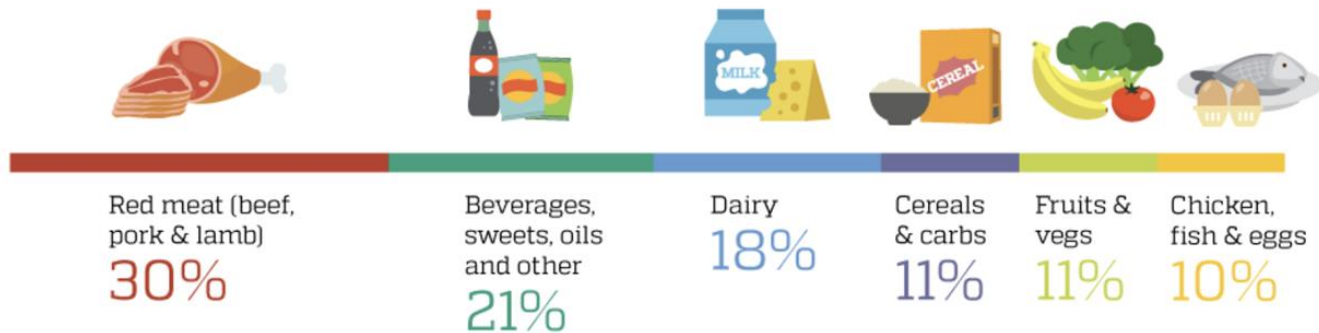
- Extreme heat: Higher temperatures increase the evaporation rate. Freshwater in rivers, lakes, and groundwater may become depleted if it evaporates faster than it is replenished.
- Changing rainfall patterns: Periods with low rainfall can cause freshwater sources to dry up.

ACTIVITY #3: CLIMATE CHANGE IMPACTS ON AGRICULTURE

- Loss of topsoil
- Fungus invasion in corn crop
- Saltwater contamination of freshwater supply
- Increased cost to fight weeds
- Increase in a crop's water needs
- Higher food prices
- Depletion of freshwater sources for irrigation

ACTIVITY #5: FOOD SYSTEM GREENHOUSE GAS EMISSIONS

GHG emissions by food type



GHG emissions by supply chain stage



Production:
83%



Transport:
11%



Retail:
6%

ACTIVITY #5: IS YOUR DIET WARMING THE PLANET?

Teacher Notes and Disclaimer on “Climate Food Cards

Health Warnings/Data details:

- Please seek professional advice before making significant changes to your diet. Take into account your own personal circumstances and the necessary balance of many essential vitamins and minerals. For example, it is recommended for vegans to take vitamin B12 supplements.
- Greenhouse gas emissions and water footprints from food production vary significantly depending on the production method and country of origin.
 - For example, see 'Poore, J. & Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers. Science.' You can [download here](#) (including all data).
- The conversion between greenhouse gas emissions (g CO₂e) and car time depends on the efficiency of the car and the car speed.
- To calculate the number of minutes driving from the g CO₂e we had to assume a type of car. Note that cars vary in their emissions per mile. For climate food flashcards version 2, we assumed a typical UK car which causes 155 g CO₂e / km.
- We also needed to assume a car speed. In this version we assumed the car is driving at 40 mph.
- For extreme enthusiasts and data geeks, you can see the full information used to make the cards [here](#).



TAKE A **BITE** OUT OF
CLIMATE CHANGE