



Acterra

YOU(TH)
BE THE
CHANGE

YOU(TH) BE THE CHANGE PROGRAM

Welcome to the You(th) Be the Change Program! This program was created by Acterra for middle schoolers. With climate change being talked about everywhere you go, it's helpful to have an understanding about it.

WHAT YOU WILL LEARN

1

Climate change science

2

Climate change impacts, like:

- sea level rise
- fire
- drought

3

Agriculture and food systems

4

Climate justice, climate change communication, and solutions

LESSON 1: CLIMATE CHANGE SCIENCE

INTRODUCTION

Time	60 Minutes Additional 20+ minutes for pre-program survey
Course Intro	<p>Welcome to the You(th) Be the Change Program! This program was created by Acterra for middle schoolers. With climate change being talked about everywhere you go, it's helpful to have an understanding about it.</p> <p>What you will learn:</p> <ol style="list-style-type: none"> 1. Climate change science 2. Climate change impacts like; 3. Sea level rise 4. Agriculture and food choice roles 5. Climate justice, climate change communication 6. Solutions
Next Generation Science Standards	<p><u>Next Generation Science Standards</u></p> <p>MS-LS2 Ecosystems: Interactions, Energy, and Dynamics</p> <p>MS-ESS3 Earth and Human Activity</p> <p>HS-ESS3-6 Earth and Human Activity</p> <p><u>Disciplinary Core Ideas</u></p> <p>MS-LS2.B: Cycle of Matter and Energy Transfer in Ecosystems Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. (MS-LS2-3)</p> <p>MS-ESS3.C: Human Impacts on Earth Systems Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (MS-ESS3-4)</p> <p>MS-ESS3.D: Global Climate Change Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend</p>

on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities. (MS-ESS3-5)

HS-ESS2.D: Weather and Climate

Current models predict that, although future regional climate changes will be complex and varied, average global temperatures will continue to rise. The outcomes predicted by global climate models strongly depend on the amounts of human-generated greenhouse gases added to the atmosphere each year and by the ways in which these gases are absorbed by the ocean and biosphere. (secondary to HS-ESS3-6)

Vocabulary

Carbon cycle, Atmosphere, Photosynthesis, Producers, Consumers, Decomposers, Carbon pools, Carbon source, Carbon sequestration, Fossil fuel, Greenhouse gas, Greenhouse effect, Carbon Dioxide (CO₂)

Materials

[Session 1 PowerPoint](#) 

Topics Covered

1. Icebreaker Introduction & Survey
2. All things carbon
3. Carbon pools, and sequestration
4. Humans and the carbon cycle

Enrichment:

Greenhouse gases

Greenhouse effect activity

Evidence for climate change

Ecological Footprint Quiz

Learning Goals

Students will learn...

1. Basics of the carbon cycle
2. How greenhouse gases temporarily trap heat within Earth's atmosphere, warming our planet via the greenhouse effect
3. That human activities can create an increase in carbon dioxide concentrations (emissions & land conversions)
4. About carbon dioxide as a greenhouse gas which increased concentrations in the atmosphere contributes to global warming

Enrichment options:

(a) hands on greenhouse effect activity

(b) key discovery to climate change and how other types of evidence is collected for studying climate change

(c) ecological footprint measurement tool

INTRODUCTION

Engage Explore, Explain, Elaborate, Evaluate



ICEBREAKER INTRODUCTION

First explain what students should expect while going through the curriculum by outlining the program details below. Then, go through today's agenda. Highlighted in blue, you will find enrichment components to add into the curriculum for a more advanced course experience.

After the course introduction, you will go through 2 activities during the introduction piece. #1: icebreaker activity. #2: pre-program survey.

Program introduction:

Outline the 6 lessons and their topics:

1. Climate Change Science
2. Impacts of Climate Change
3. Sea Level Rise
4. Agricultural Systems and Food Choice
5. Climate Justice and Communication
6. Climate Change Solutions

Today's Agenda:

1. Icebreaker Introduction & Survey
2. All things carbon
3. Carbon pools, and sequestration
4. Humans and the carbon cycle

Enrichment:

1. Greenhouse gases
2. Greenhouse effect activity
3. Evidence for climate change
4. Ecological Footprint Quiz



ICEBREAKER QUESTION & SURVEY



#1 Have students introduce themselves and share what superpower they would like to have OR what kind of animal they would be for a day

#2 Have students take the pre-program survey. This survey will help us understand where students are in their knowledge of these topics. They will take the same survey at the end of the course.

WHAT HAVE YOU HEARD ABOUT CLIMATE CHANGE?

Your students have probably heard about climate change - from their parents, from the media, or from their peers. If they haven't had a proper lesson about it, they are probably confused and don't know how to process the information, or engage with it when it comes up. Start the lesson off by listing on the board what they have heard about climate change.

SAY

" It can be really overwhelming to hear about this topic and not really know what's going on. We're going to take a look at what scientists have to say about climate change so that when you hear about it, you can understand what people are saying.

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