



YES! Project Guide

Category: Water Quality and Conservation	
Project Title: Carbon, Water, and Climate Change	
Approximate Cost: \$100	
Desired Results	
<p>Project Goal: The goal of the “My Carbon Footprint” curriculum is to educate youth about the science of climate change as well as empower students to examine the environmental impact of their actions.</p> <p>Connections to Water Quality and Conservation: Balance of cycles (water and carbon cycle), weather patterns (increased precipitation and flooding), CO₂ and pH influence on ocean water, water usage and impact on Carbon Footprint, alternative energy and value of hydroelectric energy</p>	
<p>UNDERSTANDINGS</p> <ul style="list-style-type: none"> ● Importance of the carbon cycle and the balance of carbon emissions and carbon storage ● How CO₂ changes the pH of water quality affecting the flora and fauna ● How carbon emissions contribute to climate change and extreme weather patterns ● Understanding personal impact through a carbon footprint analysis ● How to use models and understanding of impact to take action on climate change ● Implement solutions to climate change through carbon trading and alternative energy sources 	<p>ESSENTIAL QUESTIONS</p> <p>What is the carbon cycle?</p> <p>Why is it important to balance greenhouse gases and carbon the atmosphere?</p> <p>How does carbon change the pH of the ocean and what effect does that have on ocean life?</p> <p>How does climate change affect weather patterns?</p> <p>What is the water cycle and what role does it play in climate change?</p> <p>What is my individual carbon footprint and how does that compare to others like me and/or to other countries in the World?</p> <p>How is scientific modeling used to predict climate change?</p> <p>How do we understand, measure, and visualize the quantity of CO₂ emissions?</p> <p>What is carbon trading and how does that impact CO₂ emissions?</p> <p>What actions can we take to affect CO₂ emissions with alternative</p>

	<p>energy sources? What are the advantages and disadvantages of alternative energy sources?</p> <p>Why is hydroelectric power advantageous to climate change?</p>
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Knowledge and Skills Acquisition

<p><i>Students will know...</i></p> <ul style="list-style-type: none"> ● Carbon Cycle ● Water Cycle ● Greenhouse Gases and Carbon Emissions ● pH and how it affects water quality in ocean ● Weather and how the increase and decrease in precipitation affect the climate ● Factors contributing to climate change ● Factors mitigating climate change ● Carbon Footprint ● Measurements of metric tons ● Carbon Trading ● Types of Energy ● Alternative Energy Sources 	<p><i>Students will be skilled at...</i></p> <ul style="list-style-type: none"> ● Understanding cycles in nature ● Visualizing the impact of climate change ● Understanding the chemistry of pH and how it affects the ocean ● Recognizing weather patterns and how they change with the climate ● Visualizing the impact of carbon emissions by visualizing the metric ton ● Understand how each individual impacts the climate and how they can mitigate behaviors to affect climate change ● Understand how others impact climate change and they can mitigate behaviors on a community scale ● Understand how to take action on climate change
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Data

Impact Evidence: Students will acquire both qualitative and quantitative data through observations and experiments to enforce learning objectives.

Qualitative (observations and descriptive data):

- Carbon Cycle Jenga (Jenga set \$50 on Amazon)
- Carbon Cookies (any cookie recipe ingredients \$10)
- Ocean Acidification (understanding pH activity \$10)
- Pressure and Cornelius Effect Demonstration (\$20)
- Water Cycle Lab
- Carbon Footprint Comparison
- Hydroelectric Power Activity (\$20)

Quantitative (numerical data):

- Carbon Footprint Comparison Activity
- Scientific Modeling Activity (\$10)
- Understanding the Metric Ton Activity
- Carbon Trading Activity

Timeline

All Modules can be found at https://nysci.org/wp-content/uploads/MCF_HS_Final.pdf

Module 1 – Cycles : Total 8 hours

Activities: Carbon Cycle Jenga (1 hour), Carbon Cookies (1-2 hours), Ocean Acidification (1-2 hours), Water Cycle and Weather (1-2 hours),

Module 2 – My Carbon Footprint: Total 6 hours

Activities: Carbon Footprint Comparison (2 hours), Scientific Modeling (2 hours), One Metric Ton (2 hours)

Module 3 – Taking Action: Total 4 hours

Activities: Carbon Trading (1 hours), Hydroelectric Power (3 hours)

Process

This project can be done as individual activities, one module at a time, or as an entire curriculum with all three modules. Each activity does require some background knowledge that may need to be added to the timeline. This curriculum is a product of the New York Hall of Science.

Resources

My Carbon Footprint High School Curriculum

https://nysci.org/wp-content/uploads/MCF_HS_Final.pdf

My Carbon Footprint Calculator

<https://www.carbonfootprint.com/calculator.aspx>