Climate Change 101

Competency

Educators will learn about and share the causes, impacts, and solutions of climate change.

Key Method

Educators will learn and read about climate change—its causes, evolution, and impact, and the policies, approaches, and movements to combat it.
Educators will then make connections between a worldview and local actions. They can also create a project-based learning experience to develop ecological awareness or research a policy or movement related to climate justice, climate change, and the protection of nature or natural resources.

Method Components

Use the following glossary of climate change terms as you read the Method Components section: ABC's of Climate Change.

Climate Awareness

"Climate change refers to long-term shifts in temperatures and weather patterns. Such shifts can be natural, due to changes in the sun's activity or large volcanic disruptions. But since the 1800s, human activities have been the main driver of climate change, primarily due to the burning of fossil fuels like coal, oil, and gas."[1]

Our atmosphere acts as a heat-trapping blanket, which has created a stable climate for life to thrive; however, our greenhouse gas emissions are changing the material of that blanket, trapping more heat, and destabilizing our climate. All of this leads to not only an increase in average global temperatures but also the intensification and frequency of droughts, floods, fires, storms, and extreme weather events.

Climate change is and will continue to impact our health, well-being, environment, security, social institutions, and economy. Although climate change impacts everyone, it disproportionately impacts vulnerable populations, including communities of color, Indigenous peoples, and under-resourced rural and urban communities. An awareness of climate change—its causes, impacts, and solutions—and the opportunity to act can help build a path to a more sustainable, resilient, and equitable future.

Carbon dioxide and methane are the primary greenhouse gases that result in climate change. These gases are a result of many human activities that take place on a daily basis, such as driving a car, burning coal, or flying a plane. Other activities - such as cutting down forests or increasing livestock farming - also contribute to rising emissions. Three primary sources of methane emissions include agriculture, oil, and gas operations. While individual human activity does contribute to climate change, industries at large play the largest role. Industries such as energy (and power), transportation, the construction of buildings, agriculture, and changing land use are considered the primary sectors contributing to greenhouse gas emissions.

Human Responsibility for Global Warming

"Climate scientists have shown that humans are responsible for virtually all global heating over the last 200 years. Human activities, like the ones mentioned above, are causing greenhouse gases that are warming the world faster than at any time in at least the last two thousand years."[1]

These are the main drivers of climate change:
- Generating power;
- Manufacturing goods;
- Cutting down forests;
- Using transportation;
- Producing food;
- Powering buildings; and
- Consuming too much.

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Review this United Nations (UN) report to learn more about the causes of climate change: [Causes and Effects of Climate Change](#).

According to UN findings, our planet is growing hotter. "The average temperature of the Earth's surface is now about 1.1°C warmer than it was in the late 1800s (before the Industrial Revolution) and warmer than at any time in the last 100,000 years. The last decade (2011-2020) was the warmest on record, and each of the last four decades has been hotter than any previous decade since 1850."[1]

The Impact of Climate Change on People

The effects of climate change can impact our lives in many ways, including our health, our ability to grow food, housing stability, personal and property safety, and our opportunity and ability to join and/or remain in the workforce. Many communities are especially vulnerable to climate impacts - including communities of color, under-resourced urban and rural communities, and communities in small island nations and other developing countries. These communities typically bear the greatest burdens from negative climate impacts such as sea-level rise and saltwater intrusion. In some cases, entire communities have had to relocate and elongated droughts are increasing famine risk. The amount of humans that become "climate refugees" is expected to continue to rise as time continues.

While many people associate climate change strictly with warmer temperatures, the consequences are much more complex. The consequences of climate change include warmer temperatures, droughts, water scarcity, severe fires, rising sea levels, food scarcity, increased health risks, flooding, melting polar ice, an increase in people living in poverty, displacement, catastrophic storms, and declining biodiversity.

Increase in Global Warming

"In a series of [UN reports](#), thousands of scientists and government reviewers agreed that limiting global temperature rise to no more than 1.5°C (34.7°F) would help us avoid the worst climate impacts and maintain a livable climate. Yet, policies currently in place point to a 2.8°C (37.04°F) temperature rise by the end of the century."[1]

Climate change emissions come from all around the world, but in 2020 (the year of most recent data available) nearly half of all global greenhouse emissions came from seven countries: China, the United States, India, the European Union, Indonesia, Russia, and Brazil.

Everyone can do their part to help save the environment and mitigate the impact of climate change, but the people, industries, and countries creating the largest share of the problem have a greater responsibility to act first.

Climate Change Solutions

"Many climate change solutions can deliver economic benefits while improving our lives and protecting the environment. We also have global frameworks and agreements to guide progress, such as the [Sustainable Development Goals](#), the [United Nations Framework Convention on Climate Change](#), and the [Paris Agreement](#). Three broad categories of action are: cutting emissions, adapting to climate impacts, and financing required adjustments."[1]

Emissions Reduction

Transitioning from fossil fuels to renewable energy sources, such as solar or wind, is a key tool in helping to reduce the emissions responsible for climate change. Changing electricity generation is also a viable way to cut and decrease emissions. There are also other ways to achieve this goal but change and action is urgently needed.

Adaptation to Climate Change

While working to reduce the impact of climate change is imperative, it's also critical as communities to be able to adapt to the consequences of climate change. Proper adaptation protects people, homes, businesses, infrastructure, and natural ecosystems. This is another area where communities with the most vulnerable populations and fewest resources are prioritized.

Required Financial Adjustments

Taking adequate climate action requires significant financial investments by both government and industry. While costly, inaction on climate change will be more expensive and deadly. If we refuse to act properly now, the consequences and cost in the future will be significantly higher. Additionally, to advance climate justice across the entire globe, one step that industrialized countries can take is to provide funding for developing countries so they also have the opportunity to adapt and move toward green economies.

Advanced Education Solutions

The education sector plays an important, yet often overlooked, role in addressing climate change. Efforts to promote climate action in our public schools can also create opportunities to teach at least 50 million students about climate change and solutions firsthand. This kind of engagement will help to build our societal capacity to address climate change now and into the future.

Here are ways that K-12 schools can lead climate action:

- **Mitigation:** Climate mitigation strategies help us reduce our impact on climate change and the environment. Schools are one of the largest public-sector energy consumers, operating the largest mass transit fleet in the country and serving 7 billion meals every year. But school districts can lower their carbon emissions by using renewable energy and sustainable infrastructure, transitioning to electric school buses, and reducing food waste. These efforts also promote student health, save districts money, and create learning opportunities for students.
- **Adaptation:** Climate adaptation strategies help schools build resilience to the potential impact of climate change. Climate change will bring more frequent and intense extreme weather, including flooding, wildfires, hurricanes, and high heat. These events can cause schools to close, disrupting student learning and school-based support. School districts can plan for extreme weather by identifying local climate risks, creating plans for disruptions to learning, supporting the mental health of students, transitioning to green school yards, and serving as sources of energy and food during disasters. By taking this approach, schools will be more resilient to the impacts of climate change and can better support students and families.
- **Climate Education:** Teaching and learning about climate change, its causes, consequences, and solutions, can help empower children and youth to lead sustainable, resilient, and equitable societies. Districts can help teachers engage students in teaching and learning about climate change, climate solutions, and sustainability into their existing curricula, across all grades and subject areas. Districts can also support career and technical education programs that prepare students for jobs in a clean economy.
- **Equity:** People of color, the disabled, and other marginalized groups, disproportionately feel the negative consequences of climate change. To advance equity and environmental justice, climate action should prioritize communities that are most impacted by climate change and ensure that students and families in those communities are at the center of decisions by districts and schools.

Educators can learn more about each of these areas in subsequent micro-credentials.

Talking About Climate Change

To move toward climate solutions and environmental justice, it is imperative that people know how to most effectively communicate about climate change. Although it shouldn't be divisive, climate change is a topic that many people may shy away from. It's important that we learn to effectively communicate about climate change, while educating and preparing others to learn how to take action.

Read this United Nations resource, Communicating on Climate Change, to learn some tips and tricks on how to effectively communicate about climate change, its impacts, and solutions to various audiences.

Five Key Messages

Although talking about a weighty and complex topic like climate change may be challenging, these are five key messages, outlined here in the Five Facts, Ten Words resource from the Yale Program on Climate Change Communication, to help center those conversations.

It's real.
- Without new, more ambitious climate policies, the world is headed for a level of climate change that would put an estimated two billion people at risk of extreme heat by the end of the century, a May 2023 study found. Along with such policies, a drastic reduction in greenhouse gas emissions is needed for the survival of vulnerable communities and ecosystems.

It's us.
Human activity is the main culprit.
- Farming/conventional agriculture
- Transportation/travel
- Manufacturing
- Building and construction
  Using electricity, energy, and fossil fuels

It's bad.

Scientists agree.
- The science is clear, and we are getting closer to the irreversible tipping point.

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There's hope.
- The outcome is not inevitable; society's view of the problem and subsequent actions matter a great deal, especially when it comes to bringing climate change awareness to K-12 public education.
    - [What are the Solutions to Climate Change?](#)
    - [Project Drawdown's Table of Solutions](#)

A Worldview

How we look at the earth determines how we look at climate change. In the colonial worldview, the earth was defined at worst as dead, inert matter, and at best, as resources that only have value once they have been extracted as resources.
- Example: A living forest is not seen as valuable to the economy. However, if the forest is bought and the timber is sold commercially, the forest contributes to the GDP, and is therefore deemed "valuable."
- Privatizing land for resources is termed to be "development" whether it is best for local ecosystems and communities.
- This has created a separation between the natural, living economy that functions within ecological limits, and the economy of capital and finance.

Fundamental change will come when we reimagine our relationship to the earth, to Indigenous Peoples, and to the web of life. Educators can empower students to be agents of change for the next generation.

Equity, Climate Change, and Climate Justice

The history of colonization and the history of climate change are intertwined. Understanding this relationship is critical to addressing the global climate crisis and achieving a just and sustainable future.

People of color, individuals with disabilities, and those living in under-resourced communities disproportionately bear the burden of climate change—things like extreme heat, weather and pollution. To achieve climate justice, conversations, actions, and solutions must prioritize, elevate, and engage these communities and population groups.

Learn more about this topic in the **Climate Justice Micro-Credential**.

[1] United Nations. (n.d.). *What is climate change*?. United Nations.
https://www.un.org/en/climatechange/what-is-climate-change

Supporting Rationale and Research

Agrawal-Hardin, N., & Green, M. (October 10, 2022). "STUDENT VOICES: Why education must lead in addressing climate change." The Hechinger Report. https://hechingerreport.org/student-voices-why-education-must-lead-in-addressing-climate-change/

Akopian, N., Faggert, M., & Schifter, L. (2022). "K12 Education and Climate Provisions in the Inflation Reduction Act." The Aspen Institute: Washington, DC. https://www.thisisplaneted.org/blog/school-climate-provisions-in-the-inflation-reduction-act

GRAIN. (2016). "Food sovereignty can stop climate change and feed us all." GRAIN https://grain.org/%20article/entries/5390-food-sovereignty-can-stop-climate-change-and-feed-us-all

Katz, E., Neuberger, J., & Schifter, L. (2022). "Education and Climate Provisions in the Infrastructure Investment and Jobs Act." The Aspen Institute: Washington, DC https://www.thisisplaneted.org/blog/education-and-climate-iija

Katz, E., Schifter, L. & La Pinta, A. (2020). "A State Policy Landscape: K12 Climate Action". The Aspen Institute: Washington, DC. https://www.thisisplaneted.org/blog/state-policy-landscape-2020

K12 Climate Action Commission. (2021). The Aspen Institute: Washington, DC. https://www.thisisplaneted.org/blog/climate-action-plan-2021

Resources

Ideas for Taking Action

Climate Solutions 101

Greener School Playgrounds Are an Overlooked Climate Solution

Green Schoolyards America

Katharine Hayhoe: The most important thing you can do to fight climate change: talk about it

K12 Climate Action Plan for Advancing Equity

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[Question to Help You Start Taking Action/](#)[K-12 Climate Action Plan](#)

[Ten Strands](#)

[The Most Important Thing You Can Do to Fight Climate Change: Talk About It](#)

[What Is Climate Change? | United Nations](#)

Teaching About Climate Change

[ABC's of Climate Change](#)

[Fast Facts on Climate Action from the United Nations](#)

[Our Climate Our Future](#)

[SubjectToClimate™](#)

[Ten Strands: K-12 Environmental Literacy](#)

Learn More About Climate Change

[Children & Nature Network](#)

[Climate Literacy](#)

[EcoWatch](#)

[Probable Futures](#)

[Research and resources from the Harvard Center for Climate Health and the Global Environment](#)

[United Nations: What Is Climate Change?](#)

[Yale Program on Climate Change Communications](#)

Climate Change Policy

[President Joe Biden Issues Five New Initiatives at the White House Tribal Nations Summit](#)

[United Nations Declaration on the Rights of Indigenous People](#)

Submission Guidelines & Evaluation Criteria

To earn this micro-credential, you must receive a passing score in Parts 1 and 3 and be proficient in all components in Part 2.

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Part 1. Overview Questions (Provides Context)

(300-500 words)

Do not include any information that will make you identifiable to your reviewers.

Please answer the following questions:
1. Describe your local environment using an ecological worldview. What were the agricultural traditions native to the land where your school community resides? Or what do you imagine the land was like in its pristine, wild state?
2. In what ways has your community been forced to live beyond ecological limits? In what ways is your community contributing to climate change? How have systems and structures contributed to climate change in your community?
3. What opportunities can be created for students to connect with nature and understand the interrelationships between the earth, animals, food, and humans?

Passing:
- Responses such as, "I live in a city, but there are forests/deserts/mountains around me." If they describe something they know that grows in the area, wildlife, or a custom of people, or if they reflect on the question about tradition, community, and land in a sincere way that pertains to their experience.
- Passing answers refer to something the learner identifies as unsustainable in their community, some contributing factors, and how the problem is experienced.
- Answers may range from taking students outside, to learning about the nutrition cycle, to any idea that seems to engage with the idea of students understanding the relationship between the earth and their lived experiences.

Part 2. Work Examples/Artifacts/Evidence

To earn this micro-credential, please submit the following two artifacts as evidence of your learning. See the rubric for the passing score.

Do not include any information that will make you or your students identifiable to your reviewers.

Artifact 1: Worldview

Choose and read thoroughly three of the resources provided above. After reading and reflecting, develop a mission and vision statement that addresses the importance of educating others about the potential impacts of climate change and actions that can be taken to combat climate change.

Here are some resources to support writing a mission and vision statement:
- [How to Write School Mission and Vision Statements](#)
- [How to Write a Personal Mission and Vision Statement (40 Examples)](#)
- [Developing Your Personal Mission and Vision](#)

Artifact 2, Option 1: Climate Awareness Project (with students)

Create a project-based learning experience where you and your students explore practices that develop climate awareness. These are examples of projects that can be conducted by a large or small group or an individual:

- **Waste reduction campaign:** Students can design and implement a waste reduction campaign within the school or local community.

- **Sustainable living challenge:** Students can participate in a sustainable living challenge where they need to make conscious choices to reduce their ecological footprint.

- **Upcycling project:** Students can work individually or in small groups to collect and repurpose waste materials to create useful and artistic products.

- **Sustainable food project:** Students can form small groups and initiate a sustainable food project, such as starting a school or community garden, establishing a composting system, or organizing a farm-to-table event.

- **Energy conservation initiative:** Students can conduct an energy audit of their school and identify areas where energy consumption can be reduced.

- **Sustainable transportation campaign:** Students can promote sustainable transportation options—such as biking, walking, or carpooling—within their school campus or community.

NOTE: If your plan is to provide students with a choice of projects, you only need to submit one project plan.

The project-based learning experience should be in-depth. It should also include opportunities for students to record the steps they took to complete the project, including identifying the problems they encountered along the way, their solutions to those problems, and documentation of the completed project.

Before starting this project, connect with someone in your community who can provide an ecological perspective on why it is important to raise awareness about human actions and their impact on our planet's environment. Arrange for this person to be a guest speaker for your students, either in person or via videoconference.

To prepare your artifact, submit a project plan that includes:
- A brief description of the plan (like above);
- Your learning objectives;
- The standards associated with your objectives;
- A timeline and outline to complete the project;
- A description of the formative assessments you will use throughout the project to support students staying on track;
- Links to the digital resources you will share with students;
- A list of at least three people in your community who you might connect with and a description of their role in your student's projects; and
- Your rubric for the final assessment of the project.

A template has been created for you. You can use the template as is or adapt to your needs if the requirements described above are met. The template also contains clarifying information, so even if you plan to use your own, open the link to see the clarifications.

Make your own copy of the template here: Project Plan Template

Download a PDF copy of the template here: Project Plan Template PDF

Artifact 2, Option 2: Research a Policy or Movement (without students)
Research a policy or movement related to climate justice, climate change, and/or protection of nature or natural resources.
1. What is/was the issue?

2. What steps were taken to raise awareness, build capacity, and create action/implement policy to respond to the issue?
3. Have there been any attempts at "greenwashing"?
4. What was the result, or what is the status of that issue now?
5. What can be learned from the movement or policy you studied that could be applied to your local context?

Examples of policies, agreements, and movements: The Chipko movement in India, the Zapatista movement in Mexico, Standing Rock and Oak Flat in the United States, work by Indigenous activists in Brazil, the work that has evolved from Rachel Carson's 1962 book "Silent Spring," the Earth Day movement, the United Nations' Sustainable Development Goals, and the Paris Agreement

- Summarize the issue. Write in a way that responds to each of the five questions above.
- Include sources.
- Target length: 500-750 words

Part 2. Rubric

	Proficient	**Basic**	**Developing**
Artifact 1:	The learner develops a mission and vision statement that describes the importance of educating others on the impact of climate change and the actions that can be taken to combat climate change.	The learner develops a mission and vision statement that somewhat describes the importance of educating others on the impact of climate change and what can be done to combat climate change, but the mission and/or vision strays from the main message and	The learner develops a mission and a vision statement that describes the importance of educating others about the impact of climate change or what can be done to combat climate change, but not both.

		purpose of educating others.	
Artifact 2, Option 1:	**Template:** The project plan template contains all required elements. **Project Plan Description:** The description clearly outlines the project's purpose. **Learning Objectives:** The learning objectives are clearly stated, specific, measurable, and aligned with the project's purpose. **Standards Alignment:** The standards associated with the learning objectives are clearly identified, relevant, and aligned with the project's purpose. **Timeline and Outline:** The timeline and outline for completing the project is detailed and effectively organized. **Formative Assessments:** The formative assessments for the project are clearly described,	**Template:** The project plan template is missing all required elements. **Project Plan Description:** The description is brief but clearly outlines the project's purpose. **Learning Objectives:** The learning objectives are vague or incomplete, lack specificity, or are not aligned with the project's purpose. **Standards Alignment:** The standards associated with the learning objectives are not clearly identified or aligned with the proper learning objectives. **Timeline and Outline:** The timeline and outline for	**Template:** There is no organized project plan. **Project Plan Description:** The description lacks clarity. **Learning Objectives:** The learning objectives are vague or missing, and if present, they lack specificity or alignment with the project's purpose. **Standards Alignment:** The standards associated with the learning objectives are not identified and they are not aligned with the learning objectives. **Timeline and Outline:** The timeline and outline for completion is

	aligned with the learning objectives, and will effectively support students in staying on track throughout the project.	completing the project lacks details or is unorganized. **Formative Assessments:** The formative assessments for the project are briefly described but not fully aligned with the learning objectives or they will not support students in staying on track throughout the project.	missing or lacks details and evidence of an organizational structure. **Formative Assessments:** The formative assessments for the project are missing or are not described.
Artifact 2, Option 2:	The learner cites a policy or movement that sought climate justice. They make a connection between the movement and possibilities for other scenarios. They write in a way that responds to each of the five questions and all sources are included.	The learner cites a policy or movement that sought climate justice. The connection between the movement and possibilities for other scenarios is not clear or they write in a way that responds to some of the five questions and includes some of their sources.	The learner cites a policy or movement that sought climate justice. The connection between the movement and possibilities for other scenarios is not clear. They write in a way that does not respond to the questions posed and/or they do not include their sources.

Part 3. Reflection

(250-500 words)

For tips on writing a good reflection, review this resource:
How Do I Write a Good Personal Reflection?

Do not include any information that will make you identifiable to your reviewers.

Answer all the following questions:
1. How does your relationship to nature develop your understanding of climate change?
2. What was challenging about the experience of embodying ecological practice?
3. How does participating with nature cultivate hope?

Passing:
- Responses should be personal. Learners are free to express how they understand and relate to nature and the meaning of climate change.
- Answers should convey that hope is made possible through action because nature is alive, a relationship to it matters, and cultivating solutions is possible.