CODING FOR CLIMATE

Action Guide

2024
Welcome to Coding for Climate

We are thrilled to welcome you and your class to the Coding for Climate Global Challenge! Over the next few weeks, you will join classrooms from around the world to take action on climate change. Classrooms will be introduced to computer science foundations then will use skills of problem-solving, computational thinking, creativity, and digital literacy to create solutions for our planet.

Overview
- Brought to you by Take Action Global and EarthDay.org
- 3-6 week project (flexibility for holidays, school schedules, and testing)
- all ages, all content areas
- free, open to all
- 3 phases of action to be completed from March 11 - April 22

Primary Resources
Website: www.coding4climate.org
Hashtag: #Coding4Climate

Supporting Resources
TAG website: www.takeactionglobal.org
EarthProject App: www.earthproject.org
EDO: www.earthday.org/campaign/climate-environmental-literacy/

Communications
- Watch your email inbox for weekly emails
- Join the Educator Whatsapp group to connect and share
- Visit the www.coding4climate.org website for materials and resources

Online Global Celebration
- Thursday, April 18th 8am ET
- Special guests
- Recognition of learning and action
- Meet the Leagues with student presentations
3 Phases of Action

Phase I: Environmental Topics Exploration
Approximately 1-2 weeks
Establish foundations by research climate change
Work with your students to select your League
Join the Educator Whatsapp Group to connect

Review the 4 Climate Topics of:
- Water
- Energy
- Oceans
- Land

Phase II: Coding for Climate
Approximately 1-3 weeks
Meet your League
Select your Climate Challenge
Select your coding path
Start to code

Phase III: Climate Action Collaborations
Approximately 1-2 weeks
Finalize your coding solution
Connect to a global classroom for “coding collab”
Share and celebrate

Earth Day Celebration
Save-the-Date: Thursday, April 18, 2024, 8am ET
Join us for an online global collaboration event celebrating all our classrooms. We will welcome special guests, showcase Leagues, host student presentations and coding challenges, and create our Calls to Action to the world as we look ahead to Earth Day 2024!

Meet our #Coding4Climate Leagues

Examples:
- water scarcity
- drought
- water pollution

Examples:
- solar energy
- wind energy
- energy efficiency

Examples:
- plastic pollution
- conservation efforts
- marine ecosystems

Examples:
- loss of biodiversity
- air pollution
- deforestation
What is climate change?
Climate Change is defined by the long-term shifts in temperatures and weather patterns.

The average temperature of the Earth's surface is now about 1.1°C warmer than it was in the late 1800s and warmer than at any time in the last 100,000 years. The increase has created global impacts (IPCC).

Globally,
- Sea level has risen - In 2020, global mean sea level hit a new record high
- Exponential increase of CO2 in atmosphere
- Increase of greenhouse gasses by 49 percent in last 3 decades

Supporting document: https://www.ipcc.ch/2021/08/09/ar6-wg1-20210809-pr/

Climate Change Data Points
A few high level data points

According to NOAA's 2023 Annual Climate Report the combined land and ocean temperature has increased at an average rate of 0.11° Fahrenheit (0.06° Celsius) per decade since 1850, or about 2° F in total.

The rate of warming since 1982 is more than three times as fast: 0.36° F (0.20° C) per decade.

Climate Action
We see the power of education as a solution to climate change. The collective impact of students and teachers can create measurable change in terms of
- modifying behaviors
- advocacy and awareness
- proposing creative and unique solutions
- adaptation and mitigation
- unified voices for the planet
- focus on hope, joy, and optimism

Climate action in education can look different. It can be personal. It can be small. It can be quiet. It can take the form of:
- art installations
- storytelling
- science experiments
- invention
- advocacy campaigns

We believe coding with collaboration, problem-solving, creativity, and communication can be used to propel classrooms forward as stewards of climate action.
Water League

#Coding4Climate Leagues

Classrooms participating in the Coding for Climate project are invited to select and join a #Coding4Climate League.

The four Leagues are complimentary not competitive to support a systems-level approach to climate action.

Please review the four Leagues and work together with your students to select your League. Leagues will align their coding project with one topic challenge.

Why water?

Water scarcity and drought is an issue that already affects billions of people and will only be exacerbated by climate change. Even more so, the most vulnerable populations are the ones who are most at risk of losing access to clean drinking water. It is imperative to solve the water scarcity crisis as this precious resource becomes more and more sparse.

- An estimated 2.4 billion people lived in water-stressed countries in 2020, of which almost 800 million lived in high and critically high water-stressed countries. [1]
- Around 66% of the global population live in a water basin that encounters water stress for at least part of the year. [2]
- 85% of people affected by droughts live in low- or middle-income countries. [3]

More than 6 out of 10 people currently live in areas that encounter water stress for at least part of the year

Source: Mekonen and Hoekstra, 2016
The Water League will be working to develop and present solutions through coding to take on the issue of water.

Here are a few water challenges we face globally to select from, however classes can select any water challenge they wish.

- conserving water
- water pollution
- infrastructure in developing countries
- water scarcity due to weather and drought
- safe and affordable clean drinking water
- water harvesting and desalination
- gender issues related to water

Recommended resources

Water Scarcity Lesson
Fact Sheet: Micro plastics and drinking water
United Nations Sustainable Goal 6: Clean Water and Sanitation
World Bank Droughts and Deficits

Ready to join the Water League?

Phase I: Explore water topics. Consider making connections to your local community members. Research water challenges -- locally and globally. Select one challenge to take on.

Phase II: Select your “coding tool of choice” to help you create solutions for your water challenge.

Phase III: Connect with other classrooms in the Water League and/or other Leagues. Share your challenge and coding solution, request feedback, and gain new perspectives.

Join us to celebrate all the Leagues and the coding for climate in our Online Earth Day Celebration on April 18th at 8am ET.

Be sure to share your progress by using the hashtag #Coding4Climate.
Energy League

#Coding4Climate Leagues

Classrooms participating in the Coding for Climate project are invited to select and join a #Coding4Climate League.

The four Leagues are complimentary not competitive to support a systems-level approach to climate action.

Please review the four Leagues and work together with your students to select your League. Leagues will align their coding project with one topic challenge.

Why energy?

Providing affordable, reliable, and sustainable energy is a critical issue that is already affecting millions of people today. Today much of our energy is sourced from fossil fuels which is not only unsustainable but is contributing to the climate crisis. It is imperative to come up with a solution that provides an alternative to the toxic fossil fuels we currently use.

The world is beginning to make progress towards sustainable energy targets -- though we are moving too slow. At the current pace, by 2030 we will see that close to 700 million people will lack access to electricity and nearly 2 billion people still use polluting fuels and technologies for cooking.

According to the United Nations, we must accelerate efforts for electrification and increase investments in renewable energy. Modern renewables power nearly 30% of all electricity, but remain low in heating (10.4%) and transportation (4%). https://sdgs.un.org/goals/goal7

675 million people

still live in the dark with 4 out of 5 of that group living in sub-Saharan Africa (UN, 2021)
Energy League Challenge Examples

Are you interested in taking action on energy challenges?
The Energy League will be working to develop and present solutions through coding to take on the issue of energy.

Here are a few energy challenges we face globally to select from, however classes can select any energy challenge they wish.

- solar energy options
- wind power
- energy efficiency
- clean energy technology
- energy services for developing countries
- universal access to affordable, modern energy services

Recommended resources

- Take the Clean Energy Quiz
- NASA Climate Kids: Energy.
- What is renewable energy?
- World Bank Information on Sustainable Energy
- United Nations Sustainable Development Goal 7: Access to affordable, sustainable, reliable, and modern energy

Ready to join the Energy League?

Phase I: Explore energy topics. Consider making connections to your local community members. Research energy challenges -- locally and globally. Select one challenge to take on.

Phase II: Select your “coding tool of choice” to help you create solutions for your energy challenge.

Phase III: Connect with other classrooms in the Energy League and/or other Leagues. Share your challenge and coding solution, request feedback, and gain new perspectives.

Join us to celebrate all the Leagues and the coding for climate in our Online Earth Day Celebration on April 18th at 8am ET.

Be sure to share your progress by using the hashtag #Coding4Climate.
Ocean League

#Coding4Climate Leagues

Classrooms participating in the Coding for Climate project are invited to select and join a #Coding4Climate League.

The four Leagues are complimentary not competitive to support a systems-level approach to climate action.

Please review the four Leagues and work together with your students to select your League. Leagues will align their coding project with one topic challenge.

Why oceans?

The ocean covers approximately 70% of Earth’s surface. It’s the largest livable space on our planet, and there’s more life there than anywhere else on Earth.[1]

As of 2020, only a small percentage of the ocean floor has been mapped,[2] leaving so much to still be discovered.

The ocean provides a variety of things, including food and freshwater, renewable energy, health and wellbeing, cultural values, trade and transport. [3] A rise in sea level is a concern because more than 30% of the population lives in a coastal area. [4]

30 Years of Sea Level Rise

This graphic shows rising sea levels (in blue) from data recorded by a series of five satellites starting in 1993.

The solid red line shows the trajectory of rise from 1993 to 2022.

By 2040, sea levels could be 3.66 inches (9.3 cm) higher than today.

Credit: NASA/JPL-Caltech
Ocean League Challenge Examples

Are you interested in taking action on ocean challenges?

The Ocean League will be working to develop and present solutions through coding to take on the issue impacting our ocean waters.

Here are a few ocean challenges we face globally to select from, however classes can select any ocean challenge they wish.

- marine pollution
- ocean acidification
- conserve coastal and marine areas
- protect and restore marine ecosystems
- sustainable fishing practices
- research efforts and innovative marine technology
- sustainable marine tourism practices
- aquaculture

Recommended resources

Plastics in the Ocean Tool Kit

The ocean – the world’s greatest ally against climate change

Ready to join the Ocean League?

Phase I: Explore ocean topics. Consider making connections to your local community members. Research ocean challenges – locally and globally. Select one challenge to take on.

Phase II: Select your “coding tool of choice” to help you create solutions for your ocean challenge.

Phase III: Connect with other classrooms in the Ocean League and/or other Leagues. Share your challenge and coding solution, request feedback, and gain new perspectives.

Join us to celebrate all the Leagues and the coding for climate in our Online Earth Day Celebration on April 18th at 8am ET.

Be sure to share your progress by using the hashtag #Coding4Climate.
Land League

#Coding4Climate Leagues

Classrooms participating in the Coding for Climate project are invited to select and join a #Coding4Climate League.

The four Leagues are complimentary not competitive to support a systems-level approach to climate action.

Please review the four Leagues and work together with your students to select your League. Leagues will align their coding project with one topic challenge.

Why land?

Deforestation refers to the widespread clearing of forests, primarily for agricultural expansion, logging, and urban development. This process leads to the loss of crucial habitats for countless plant and animal species, contributing significantly to biodiversity decline.

As forests are cleared, diverse ecosystems are disrupted, causing species extinction and reducing overall biological diversity.

Deforestation exacerbates the global environmental crisis impacting climate regulation, water cycles, and the overall health of the planet.

100,000,000 hectares

of healthy and productive land was degraded every year from 2015 - 2019 -- equivalent to 2x the size of Greenland. Source: www.un.org
The Land League will be working to develop and present solutions through coding to take on the issue impacting our land waters.

Here are a few ocean challenges we face globally to select from, however classes can select any ocean challenge they wish.

- deforestation
- land degradation
- degradation of natural habitats
- conservation of mountain ecosystems
- biodiversity and protection of priority/keystone species
- air quality
- invasive species
- forest management
- access to clean and safe green public spaces

Recommended resources

- Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss
- United Nations Sustainable Goal 15: Life on Land
- World Bank: Biodiversity
- Earth Day Canopy Project and biodiversity

Ready to join the Land League?

Phase I: Explore land topics. Consider making connections to your local community members. Research land challenges -- locally and globally. Select one challenge to take on.

Phase II: Select your “coding tool of choice” to help you create solutions for your land challenge.

Phase III: Connect with other classrooms in the Land League and/or other Leagues. Share your challenge and coding solution, request feedback, and gain new perspectives.

Join us to celebrate all the Leagues and the coding for climate in our Online Earth Day Celebration on April 18th at 8am ET.

Be sure to share your progress by using the hashtag #Coding4Climate.
A network of support.
A community of action.

What happens when you bring together committed individuals from the worlds of coding + climate + education?

Over the next few weeks, we are ready to take on the challenge of coding for climate and will be welcoming in leaders in climate, coding, and education. We look forward to introducing them to students and for students to share their solutions for change.

Need support? We've got you covered:
- Educator Whatsapp Group: join for collaboration idea sharing, support, and encouragement
- Webinars and videos: join for our webinars and access videos to learn more about the project, coding solutions, and climate topics
- Online resources: www.coding4climate.org
- Earth Day support with the EDO team
- Program support and instructional practice with the Take Action Global team

Program Coordinators
Koen Timmers, koen@takeactionglobal.org
Jennifer Williams, jennifer@takeactionglobal.org
Your solution

There are several tools you can use to work on solutions for the global issue you identified with your students. We provided more information and lesson plans for every tool at the website.

- **Minecraft**  
  Example: build an eco-friendly world in Minecraft

- **Scratch**  
  Example: Create a simple game to visualise the concepts of climate change

- **AI**  
  Example: generate a painting or comic about deforestation

- **Micro:bit**  
  Example: use your device to detect air pollution

- **LEGO Fortnite**  
  Example: work on climate mitigation & adaptation in a virtual world

- **App prototyping**  
  Example: make a prototype of how an app could solve drought.

- **Unplugged coding**  
  Find a lesson plan with grid at the website

- **Web design**  
  Example: share your findings about plastic pollution at your own web page

- **Python**  
  Example: create a tool which is showing the impact of 1.5, 2, 2.5 and 3 degrees warming

The choice is all yours! We cannot wait to see what you and your students will come up with. Please don’t forget to submit your solution at coding4climate.org.