# CODING FOR CLIMATE

## Action Guide

2024

tag

# 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/

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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

1

# 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
- Oceans
- Energy
- 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

**WATER LEAGUE**

Examples:
- water scarcity
- drought
- water pollution

**ENERGY LEAGUE**

Examples:
- solar energy
- wind energy
- energy efficiency

**OCEAN LEAGUE**

Examples:
- plastic pollution
- conservation efforts
- marine ecosystems

**LAND LEAGUE**

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 $CO_2$ 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 moreso, 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

# Water League Challenge Examples

## Are you interested in taking action on water challenges?

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.

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# Energy League

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## 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

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# Ocean League

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## 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]
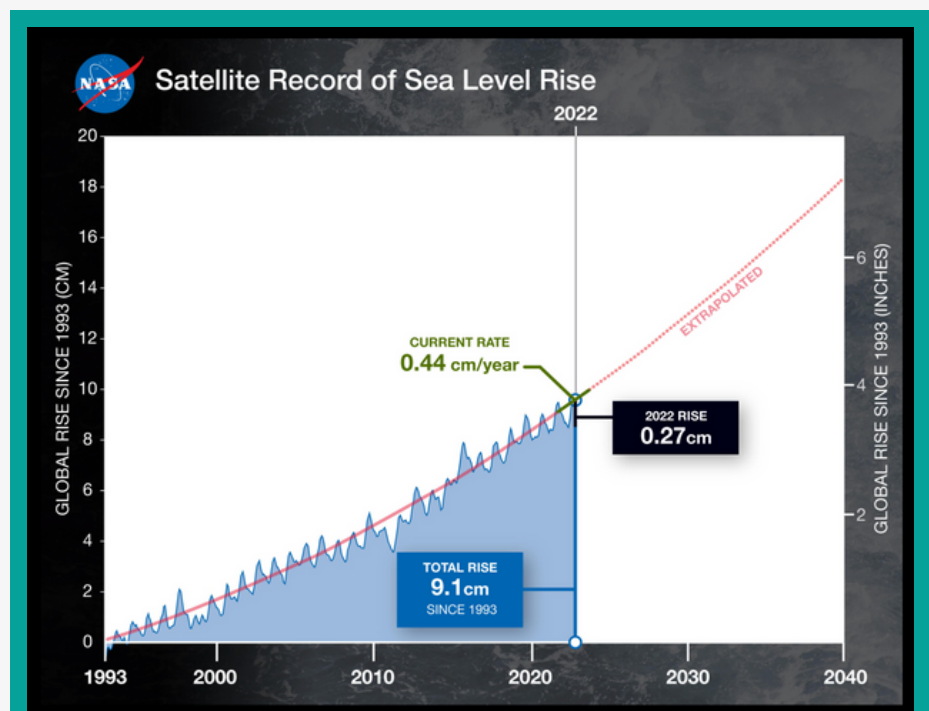
# 30 Years of Sea Level Rise

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?

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## 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 -- equivilent to 2x the size of Greenland. Source: www.un.org
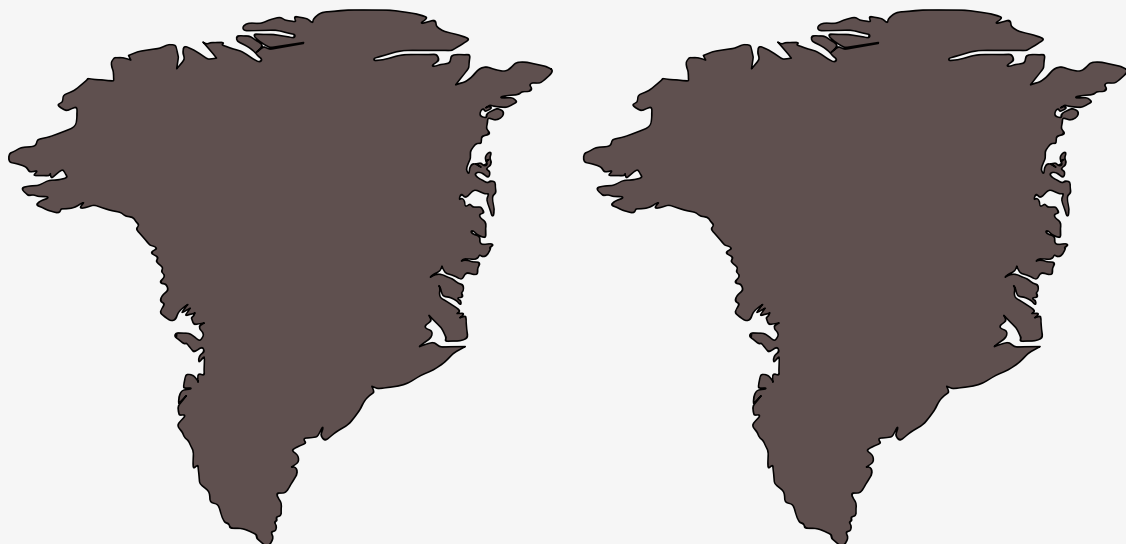
# Land League Challenge Examples

## Are you interested in taking action on land challenges?

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?

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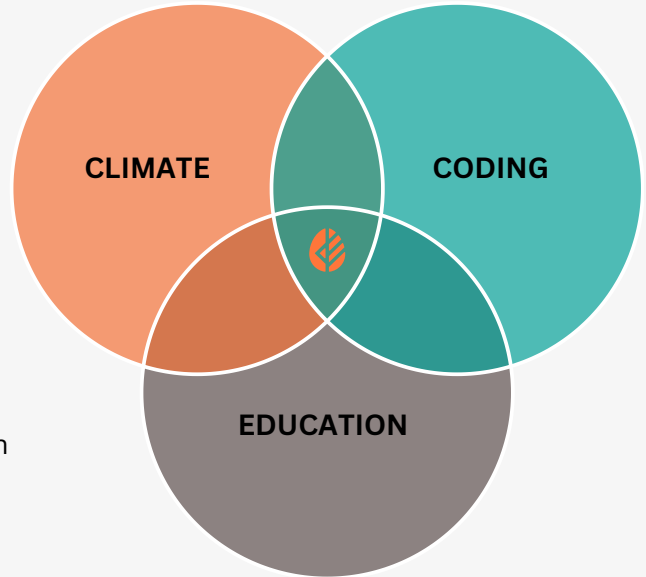
Program Coordinators
Koen Timmers, koen@takeactionglobal.org
Jennifer Williams, jennifer@takeactionglobal.org

**CLIMATE**

**CODING**

**EDUCATION**

# 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.
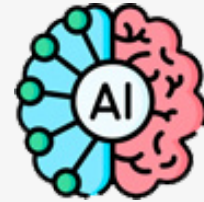
### Minecraft

Example: build an ecofriendly world in Minecraft

### Scratch

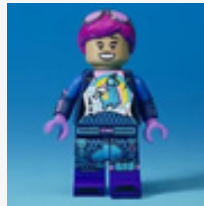Example: Create a simple game to visualise the concepts of climate change

### 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.

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2024

tag