



Challenge Guide



Biodiversity:
“...humanity’s
most important
life-supporting
‘safety net’”



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The OurEcho Challenge Challenge Guide



PROGRAM OVERVIEW

The OurEcho Challenge is an online destination powered by EarthEcho International and designed by educators to engage middle school-aged students as they tackle the decline in biodiversity head-on. All program resources are available at no cost and were created for educators, museums, community programs, and any organization or group of students seeking credible information for learning and teaching about biodiversity, as well as taking action.

The two main components of the program website www.OurEchoChallenge.org include:

1. **Teaching and Learning Resources** to foster **understanding and awareness** of biodiversity and factors impacting biodiversity.
2. **The OurEcho Challenge** to inspire **action** toward preserving, protecting, and repairing biodiversity at the local level.

Why Biodiversity?

Like an echo, the impact of every living species resonates among all other life to create the balance on which we all rely. This interconnectivity of life is called biodiversity. From the majestic blue whale to the hardworking honeybee, the complex web of life we call biodiversity touches every inch of our planet, including our own backyards. And now, more than ever, this life sustaining variety needs our help.

Recognizing that half of the world's biodiversity has been destroyed since 1970, the OurEcho Challenge empowers and engages young problem solvers in understanding and protecting the amazing diversity of species essential for the future of our planet. Teams of middle school students, guided by an educator or mentor, tackle the decline in biodiversity head-on by identifying threats to natural resources in their communities and developing an innovative solution and action plan in the form of a sustainable process or prototype.

The OurEcho Challenge is a STEM competition that empowers U.S. (grades 5 - 9) and U.K. (Years 6 - 10) students to take a closer look at biodiversity in their communities. Students will first identify threats to local ecosystems and then propose solutions to help preserve, protect, or repair those natural resources.

Why Now?



Source:
One million animal and plant species are now threatened with extinction, more than ever before in human history.



Plastic pollution has increased tenfold since 1980, as **300-400 million tons** of heavy metals, solvents, toxic sludge, and other wastes from industrial facilities are dumped annually into the world's waters.



Fertilizers entering coastal ecosystems have produced more than **400 ocean "dead zones,"** totalling more than **94,595 square miles** – a combined area greater than that of the United Kingdom.



The number of invasive alien species per country has risen by about **70% since 1970**, across **21 countries** who keep detailed records.



100 million hectares of tropical forests were lost from 1980 to 2000



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TEACHING AND LEARNING RESOURCES

EarthEcho has developed and curated a suite of middle-school level educational resources to support students' understanding of the important role biodiversity plays in sustaining the delicate balance of systems on our planet. All resources refer to Next Generation Science Standards (NGSS - US) and are free to use regardless of whether students are participating in the competition portion of the OurEcho Challenge.

Biodiversity Basics Lesson Plan

For educators looking to use the OurEcho Challenge as the deep-dive solution for teaching biodiversity to their students, we have developed a suite of research-based and standards-aligned lesson plans leading students from the basics of biodiversity all the way through building solutions and action plans to foster and protect this element of our world.

Step 1: What is biodiversity? In this introductory mini lesson, students will begin to examine biodiversity and signs that it is in peril. Teams of students will collaborate to design an ideal biome that reflects the healthy interconnectedness of species, habitat, and environmental factors.

Step 2: What are different types of biodiversity? What species pose challenges to biodiversity? Students will expand their understanding of diversity to realize that richness of species and ecosystems, and diversity within species, offers resilient and adaptive protections. But what happens when human activity interferes with ecosystems and non-native species are introduced? Students will create an ideal food web and infer consequences if an organism is overwhelmed by introduced species. Finally, students will consider what species is the ultimate invader... could it be humans?

Step 3: What are mitigating factors to strengthen biodiversity? Students will access international warnings and data about how humans have compromised biodiversity. While recognizing human activity as the culprit for this current phase of species extinction, students will also learn about the human activity to mitigate threats to biodiversity as they research citizen scientist groups trying to restore natural habitats and reverse extinction.

Step 4: Next Steps? What can I do to meet the challenge? Students journey from a global introduction about biodiversity to their own regional landscape. Students will explore local biodiversity threats through research and local polling, and start their first steps of the OurEcho Challenge action project: identifying a local threat to biodiversity, developing persuasive arguments to appeal to the community, and formulating a plan of action.

Supplemental Links: Similarly to EarthEcho, there are many great organizations and educators who have dedicated their time and energy to building high-quality resources that celebrate biodiversity. Within each lesson we have incorporated vetted materials from across the web, including lessons, videos, and helpful annotations and cited these resources throughout the curriculum.

Standards Correlation: All lessons are aligned to the US Common Core and Next Generation Science Standards for grades 6-8.



Activity Starters

For classroom or informal learning environments looking to integrate biodiversity into existing curriculum or programming in a more informal manner, consider these quick and interactive activity starters to introduce biodiversity in fun and dynamic ways.

Invasive Species: Trying to find a lesson starter that illustrates how invasive species work? Take two clear cups filled with water. Add yellow food coloring to one cup to serve as a habitat; add black food coloring, representing an invasive species, to the other cup. Talk to students about how some species can completely alter an ecosystem when they enter it. While this is not always the case, certain factors, such as diet, ambient conditions, and a lack of predators can create a lasting change when an unexpected visitor arrives. After walking students through several examples of invasive species, pour some water from the yellow cup into the black cup. Students should notice the water stays black. This is an example of a non-invasive species. However, when you then pour some of the black water in the yellow water, the water changes forever. This is an example of an invasive species.

Healthy Ecosystems: In this classic activity starter, we mix learning with food! We use the hands-on example of baking chocolate chip cookies, but you can get creative using any food you'd like—or even just talking through it with students. Start out with a batch of pre-made chocolate chip cookies alongside the ingredients it takes to make a batch of chocolate chip cookies. Tell students that you are going to make cookies as a class. Ask students how many ingredients they can take away from the ones displayed before the cookie is no longer a cookie. If possible, have students try to create chocolate chip cookies using the ingredients of their choice but without a recipe. After completing the exercise, explain to students how this compares to an ecosystem such as a pond—there are bugs, fish, and plants in the water. If we take away the plants we still have a pond, but if we take away all the plants some of the animals will begin to die. If we double the amount of algae in the pond, can the ecosystem still thrive? At what point does the pond's balance shift?

Intergenerational Biodiversity Investigation: Encourage students to research the biodiversity of their regions by collecting oral histories from older relatives and neighbors. Assist students in developing interviews to investigate if the region has changed from the middle of the last century until now. Suggested interview prompts include has/have: weather patterns changed, wildlife disappeared or overtaken the area, habitats changed from development, agriculture products changed, fish and seafood been depleted or introduced, and/or water sources been contaminated or restored.

Looking for more? Here are a few of EarthEcho's activities as well as some from our favorite partners creating great resources for teachers:

[EarthEcho Expedition: Into the Dead Zone:](#)

[Oyster Reef Ecology Lesson Plan](#)

[Oyster Reef Ecology Student Activities](#)

[National Biodiversity Teach-in](#)

[National Geographic Bio-Blitz](#)

[SciStarter's Introduction to Citizen Science](#)

[Global Biodiversity Festival](#)

[Teachers Pay Teachers](#) particularly the [Biodiversity Scavenger Hunt](#) by *E is for Explore* that gets students outside and exploring with a fun twist on this traditional activity using the game-like factor of a biodiversity scavenger hunt!



THE OURECHO CHALLENGE

How can we preserve, protect, and repair biodiversity starting in our own backyards? The OurEcho Challenge was created to inspire middle school-aged students to answer this question by identifying a local issue affecting biodiversity and proposing a solution. Solutions can be in the form of a process or prototype.

Basic Requirements:

FOR EDUCATORS AND PARENTS:

In order to participate in the OurEcho Challenge, all students must receive parent/guardian consent. To provide consent, parents/guardians will need to provide their student's educator with a signed [permission form](#), which can be found in the [OurEcho Challenge Resources](#) section of the website.

Given the age of students, an adult mentor (educator or parent) will need to submit each team's entry on behalf of their child/students using the [online form](#).

The OurEcho Challenge is open to groups of 1-3 students (ages 10-15). Teams will **identify an issue** impacting local biodiversity and **propose a solution** to protect, repair, and/or preserve biodiversity as it relates to that issue.

Supporting Resources:

In addition to a suite of classroom content (see [Educator Resources](#)), we have also provided a host of tools, worksheets, and a step-by-step checklist for entering the OurEcho Challenge. All of these resources can be found online on the [OurEcho Challenge website](#) and are listed below:

- OurEcho Challenge Checklist & Winning Tips
- Student Project Planning and Action Planning Worksheets
- Scoring Rubric
- OurEcho Challenge Timeline
- Official Rules
- FAQs



Judging:

The panel of judges may be comprised of EarthEcho Youth Leadership Council members, Aramco Services Company scientists, EarthEcho International employees, Board members, or partners, and middle school science educators. The panel of judges will carefully review all entries using the [scoring rubric](#) guided by the following criteria.

- **Inspiration (33%)**
Conveys authenticity and a connection to local community issues and resources.
- **Scientific Rigor (33%)**
Identifies an evidence-based issue with a proposed solution that alludes to the scientific method or the engineering design process.
- **Feasibility (34%)**
Demonstrates a realistic solution that answers the question, "Is this DO-able?" with supporting information.

Prizing:

Finalist teams will be expected to develop a presentation and do some preliminary work on their proposed projects for a final virtual judging. Each team will have a development period to draft a final presentation that may include a prototype of their proposed solution. The presentation will also include a budget and timeline for completion. Samples and templates to assist in creating the final presentation, budget, and timeline will be provided for all finalist teams once they are announced. Each team must create and submit a short team video, a recording of their final presentation, including any supplemental materials. Finalist teams will meet virtually with an expert panel of judges for a question and answer session about their entry based on your recorded presentation.

Winners:

The OurEcho Challenge has some exciting prizes that will allow student teams to bring their amazing ideas to life! All prizes will be awarded in the form of project grants to schools/organizations:

- **First Prize: \$5,000 (US) / £5,000 (UK)**
- **Second Prize : \$2,500 (US) / £2,500 (UK)**
- **Third Prize: \$1,000 (US) / £1,000 (UK)**

OurEcho Challenge Rules

The Contest is offered within the 50 United States and the District of Columbia, and the United Kingdom. Students (Grade 5 through Grade 9 (US) and Year 6 through 10 (UK) during the Entry Period, or equivalent age) are encouraged to enter in teams of 1-3. Given the age of students, we ask that an adult (21+) submit each entry online on behalf of the teams they are mentoring. Mentors can be traditional educators, parents, and/or adult facilitators of more informal learning environments. Note: any former member of an OurEcho Challenge Finalist Team must not re-use their prior OurEcho Challenge finalist entry materials to enter the OurEcho Challenge.

All students will require a permission form signed by their legal guardian to be uploaded with their entry. In order to ensure that teams are meeting the basic requirements for a qualifying entry, we encourage you to use the [Challenge Checklist](#) handout and the [Official Rules](#) prior to hitting "submit." We have also included the Challenge Checklist in the appendix of this Educator Guide.





OurEcho Challenge Timeline

Mark your calendars!

**November 2-3
2022**

OurEcho Challenge Biodiversity Teach-In

Join us for a 24-hour virtual event focused on biodiversity and the importance of conservation.

**November 3
2022**

OurEcho Challenge open for entries

Teams of students in the US (grades 5-9) and UK (Years 6-10) are eligible for entry.

**March 3
2023**

OurEcho Challenge entries close

USA entries must be received by or before 11:59 PM (ET) to qualify
UK entries must be received by or before 11:59 PM (GMT) to qualify

**April
2023**

USA and UK finalist teams notified

Based on scoring, 10 finalist teams from both the USA and UK will be identified.

**April - May
2023**

Development Period

The finalist teams will prepare a short video and final presentation of the proposed projects.

**May 23-24
2023**

Final Judging Event

Each team will virtually meet with an expert panel of judges to answer questions about their proposed projects.

**May 25
2023**

OurEcho Challenge Final Event

Each team and their mentor will virtually attend the final OurEcho Challenge livestream event, where the winning teams will be announced.



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Challenge Checklist & Winning Tips

Use this checklist to track your progress toward being ready to submit your entry!

- Our team includes 1-3 students and everyone is attending US grades 5-9 or UK years 6-10 (or of equivalent age).
- Our entry identifies a biodiversity issue that can be found in our community or region.
- Our entry proposes a solution to preserve, protect, and/or repair biodiversity.
- Our entry contains our original ideas and work.
- We have reviewed the [scoring rubric](#) to make sure our idea fits the criteria required for a successful submission.
- We have reviewed the [contest rules](#) with our adult mentor and/or parent/guardian to be sure that our entry is eligible.
- Every team member has a completed and signed [parent/guardian permission form](#), ready to be uploaded.
- An adult mentor, over the age of 21 years old, is submitting this entry on behalf of our team.

All entries must be submitted by March 3, 2023.

10 US finalist teams and 10 UK finalist teams will be chosen and notified late March 2023.

If your entry is selected and your team is chosen as one of the finalist teams, you will be expected to do some preliminary work on your proposed project for a final virtual judging:

- Finalist teams must film and produce a 1-minute video describing your project, due no later than April 21, 2023.
- Finalist teams must create and submit a recording of a final project presentation, including any supplemental materials, no later than May 10, 2023. The final presentation may include a prototype of your proposed solution. The presentation must also include a budget and timeline for completion.

Samples and templates to assist in creating the team video, final presentation, budget, and timeline will be provided for all finalist teams once they are announced.

Finalist teams will meet virtually with an expert panel of judges on May 23 - 24, 2023 for a question and answer session about their entry based on your team video and recorded presentation.

All team members and mentors must be available to virtually join the Final Event on May 25, 2023, where the winners will be announced to a LIVE virtual audience by EarthEcho founder, Philippe Cousteau.

The top US teams will receive \$1,000 for third place, \$2,500 for second place, and \$5,000 for the Grand Prize!

The top UK teams will receive £1,000 for third place, £2,500 for second place, and £5,000 for the Grand Prize!

QUESTIONS? EMAIL US AT OURECHOCHALLENGE@EARTHECHO.ORG



OurEcho Challenge Glossary & Vocabulary

Source: <https://www.merriam-webster.com>

Biodiversity – biological diversity in an environment as indicated by numbers of different species of plants and animals. Biodiversity includes three main types: diversity within species (genetic diversity), between species (species diversity), and between ecosystems (ecosystem diversity).

Biological resource – a resource is a substance or object in the environment required by an organism for normal growth, maintenance, and reproduction. Resources can be consumed by one organism and, as a result, become unavailable to another organism.

Biome – a major ecological community type (such as tropical rainforest, grassland, or desert).

Citizen scientist – volunteers who team up with professional scientists to collect and/or analyze data.

Criteria – a standard on which a judgment or decision may be based.

Community – an interacting population of various kinds of individuals (such as species) in a common location.

Constraint – the state of being checked, restricted, or compelled to avoid or perform some action.

Data – factual information (such as measurements or statistics) used as a basis for reasoning, discussion, or calculation.

Ecological biodiversity – the variation in the ecosystems found in a region or the variation in ecosystems over the whole planet.

Ecosystem – the complex of a community of organisms and their environment functioning as an ecological unit. Endemic an organism that is restricted or peculiar to a locality or region: an endemic organism.

Engineering design – the process of devising a system, component, or process to meet desired needs. It is a decision-making process (often iterative), in which the basic science and mathematics and engineering sciences are applied to convert resources, optimally to meet a stated objective.

Environment – the complex of physical, chemical, and biotic factors (such as climate, soil, and living things) that act upon an organism or an ecological community and ultimately determine its form and survival.

Full implementation – the process of putting a decision or plan into action

Genetic biodiversity – the sum of genetic information contained in the genes of individual plants, animals, and microorganisms; serves as a way for populations to adapt to changing environments.

Habitat – the place or environment where a plant or animal naturally or normally lives and grows.

Indigenous – produced, growing, living, or occurring naturally in a particular region or environment.

Innovation – a new idea, method, or device.

Introduced species – organisms that are not native or natural to a habit which have been accidentally or purposefully brought to a new habitat (also known as an exotic species).

Invasive species – a species that is not native to a specific location, and that has a tendency to spread to a degree believed to cause damage to the environment, human economy, or human health.

Keystone species – a species of plant or animal that produces a major impact (as by predation) on its ecosystem and is considered essential to maintaining optimum ecosystem function or structure.

Mitigate – to make less severe.

Natural resources – industrial materials and capacities (such as mineral deposits and waterpower) supplied by nature.

Proof of concept – evidence, typically deriving from an experiment or pilot project, which demonstrates that a design concept, business proposal, etc. is feasible.

Research scientist – a scientist who works primarily with gathering knowledge, understanding and conducting research or investigation, in order to discover new things, etc.

Resilience – an ability to recover from or adjust easily to misfortune or change.

Restoration – a bringing back to a former position or condition.

Scientific method – principles and procedures for the systematic pursuit of knowledge involving the recognition and formulation of a problem, the collection of data through observation and experiment, and the formulation and testing of hypotheses.

Solution – an action or process of solving a problem.

Species – a class of individuals having common attributes and designated by a common name.

Species biodiversity – the existence of many different kinds of plants and animals in an environment.

Stakeholder – one who is involved in or affected by a course of action.

Strategy – a careful plan or method.

Survey – to query (someone) in order to collect data for the analysis of some aspect of a group or area.

Sustainability – relating to, or being a method of harvesting or using a resource so that the resource is not depleted or permanently damaged.



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Thanks to the support of Aramco, EarthEcho's OurEcho Challenge strives to enhance the biodiversity of our planet by creating resources to help foster the problem solvers of the future.



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