



California Academy of Sciences

Environmental Literacy Initiative





Introduction

The world faces enormous environmental challenges. And while the solutions to those problems will come from a variety of places—including new technology, design, market, policy, and behavioral interventions—there is one commonality they all share: the need for widespread science and environmental literacy.

Achieving science and environmental literacy in the broader public is a necessary foundation for environmental progress. Time and again, we find that proposed changes in policy, regulations, markets, or behavior intended to improve the environment are limited by a lack of environmental literacy among the voters, consumers, and public they intend to serve.

As a leader in public education, the California Academy of Sciences aims to provide cutting-edge environmental education materials to everyone, especially middle school educators and students. In pursuit of this goal, the Academy distributes high quality, free K-12 educational materials across the world, through:

- » **Science Action Clubs.** After-school programs are ideal spaces for students to conduct scientific investigations and learn about their environment with hands-on activities. Academy **Science Action Clubs have spread to 175 sites across California and to 17 other states.** By 2020, we aim to reach 30,000 youth with our curricula.
- » **Science and Environmental Media Lab.** The Academy produces innovative digital and interactive media for students and educators across the world. A signature program, *Flipside Science*, provides environmentally-themed videos for middle school students that feature teen narrators. We also provide our award-winning planetarium shows on HD flat-screen devices for classrooms everywhere, ensuring their alignment to classroom teaching standards. We partner with groups such as Khan Academy and iTunes University to distribute these resources worldwide.

The Need

The world faces environmental challenges that will affect our quality of life for centuries to come. Solving these problems requires more research on the impacts of changing ecosystems. Even more importantly, it requires that we translate the latest science into civic discourse and public policy, with the ultimate goal of sustainably managing natural resources.

To achieve this goal, we first need to ensure that there is widespread environmental literacy among the citizens of California, the nation, and the world. Without improved understanding of basic ecological principles among our fellow citizens—especially educators—we cannot build a truly sustainable future.

Environmental and science education must be part of any sustainability solution.

Despite the funding and effort we put into public schools, most are not equipped to provide meaningful environmental and science learning experiences. The US ranks 20 out of 35 industrialized countries in K-12 students' science performance. And while 89 percent of Californians think that environmental education should be offered in K-12 settings, only 13 percent of California schools have integrated environmental education into their curricula. The majority of those schools spent \$5,000 or less on training, field experiences, and teaching materials related to environmental learning. There is a pressing need to do better. Fortunately, there is now an opportunity to change this dynamic.

First, many states are adopting new teaching standards, including Next Generation Science Standards (NGSS), which incorporate environmental literacy principles and focus on *doing* science, not just science content. Increasing interest in science, technology, engineering, and math (STEM) education expands the opportunities for environmental teaching, including lessons that make traditional science curricula more relevant and “real world” to students.

At the same time, there is a growing interest in the environment as issues like climate change start to impact communities. Additionally, advances in technology now make it easier and more affordable to engage students in doing science in meaningful ways.

But in order to succeed, the world needs a trusted, science-based, and creative source of engaging educational programs and materials.

The Academy's Response

We aim to become the nation's leading source of engaging environmental and science literacy programs and materials. In this work, we focus on the nation's K-12 students, teachers, and afterschool programs as our primary audience. We also intend to engage the broader, science-interested public, starting with our own visitors to the Academy and through networks of museum visitors across the country.



The Academy is poised to revolutionize science and environmental education, with several key strengths:

We are science-based. Education programs must be based on sound, peer-reviewed science—not rhetoric. The Academy has outstanding scientific credentials and engages world-renowned staff and Fellows to develop educational programs and teaching materials.

We are trusted. Museums are among the most trusted organizations in America —more than governments, NGOs, or media. And the Academy's reputation stands out even among our museum peers; educators trust us and our programs and materials.

We provide transformative experiences that make science learning engaging and relevant. On average, Americans spend less than 5 percent of their lives in the classroom. The majority of what adults know about science is learned in informal settings—museums or parks, personal interactions, or via media programming. Our staff excel at creating meaningful physical and virtual experiences that help individuals understand science in the context of their daily lives.

We embrace emerging trends in education. We work closely with teachers, school districts, and education experts to align our work in the informal science arena with best practices and educational standards. We

champion environmental education at the state and national level and encourage its integration with state and federal standards.

We are scaling environmental literacy. We are dramatically increasing the amount and quality of environmental and science education that students receive in and out of school in the Bay Area and California. With recent innovations in online education and other scalable models of delivery, we are bringing our programs to larger audiences, from California to the nation, and ultimately, the globe. Our new online resources are already being used by teachers in every US state and internationally.



I. Science Action Clubs

While recent changes in national science standards bode well for improving students' science and environmental learning, we must also leverage the afterschool space to dramatically improve the quality of their learning experiences.

Afterschool programs offer a safe space in which students can spend time exploring the science subjects that interest them. Environmental literacy content is especially well suited for afterschool programs, where hands-on, outdoor adventures are supported. Afterschool settings also reach diverse children; over 10 million US children participate in afterschool programs, and the demand is greatest among low-income and minority families.

Educators need high quality programs with support from institutions like the Academy. Those of us in the education community need to quickly scale our efforts for expanding access, including STEM (science, technology, engineering, and math) materials that encourage authentic investigations in nature.

The Academy has demonstrated the power of learning afterschool through its *Science Action Club* program,

which has grown significantly in just a few years throughout California and 13 other states. Leveraging national citizen science programs and hands-on activities, we aim to reach 30,000 youth by 2020 with our Science Action Club network.

II. Science & Environmental Media Lab

Classrooms need new resources to improve environmental and science teaching practice. Teachers are frustrated by outdated textbooks, students are bored, and everyone is clamoring for digital or interactive media. **Teachers want modular, grade-level, and standards-aligned materials. They need training on how to effectively use these media resources in their classrooms.**

For many young people, digital and social media are the preferred means of communicating and learning. The ubiquity of online tools, coupled with the power of digital media to visualize environmental phenomena, opens up a world of opportunity for educators. **It's time to transport science and environmental education into this new era of media-rich instruction.**

The Academy is uniquely qualified to meet this need as a producer of high-quality scientific visualization productions, including award-winning planetarium shows, exhibit media, and online environmental literacy experiences. Over the last two years, we have brought our science visualization and teaching expertise to life online, including courses and modules delivered through Apple's *iTunes University* and *Khan Academy*, virtual field trip programs, and online teacher trainings. We also piloted new models for scaling our programs through partnerships with *PBS*, *KQED*, and others. Finally, we used crowdsourcing to translate our materials into 23 languages.

We will now take these offerings and our experience to scale. **We want every US student and educator to have exceptional environmental learning experiences, transforming their connections to science and nature.**

Flipside Science

To give voice to youth concerns and to provide a forum for classroom discussions about complex topics, the Academy has developed a collection of high-quality, environmentally themed videos and materials targeted at middle school students. This collection, known as *Flipside Science*, is differentiated by its "can-do," solutions-oriented focus on key sustainability issues



related to food, water, and energy systems.

Launched in 2015, *Flipside Science* features problem, solution, and action segments narrated by members of Academy

youth programs.

Accompanying the video modules, Academy educational materials emphasize engineering and design thinking for teacher-guided use in the classroom.

Award-winning Planetarium Shows in Classrooms

The Academy has already adapted the first of a series of original film productions for use in the classroom by K-12 teachers across the nation. *Habitat Earth in the Classroom* launched in 2015, accompanied by a suite of classroom lessons and data-rich clips. The Academy will continue to adapt its full dome offerings, starting with adaptations of our existing environmentally-themed shows: *Fragile Planet*, *3D Earth: Rainforests*, and *Life: A Cosmic Story*. Adaptations and education materials tied to coral reefs (2018) and tropical rainforests (2020) will follow, along with adaptations of our most popular astronomy-themed productions.



Free Access for Diverse Learners

To ensure free and broad access to these learning resources, the Academy provides content to dozens of notable learning platforms—including *Khan Academy* and *PBS LearningMedia*—where millions of teachers and students already congregate. In addition, our materials are available on multiple Academy channels, including our YouTube channel and educator website. They are also distributed through national conferences and professional education networks.

We plan to incorporate multilingual translations, captions and text versions of audio tracks, and different reading levels, to ensure these resources are truly accessible for all learners.

New Ideas Focused on the Needs of Educators

Most importantly, the Academy is committed to serving the changing needs of the over 3.5 million teachers in the US. We leverage the most current market research to inform our product choices and design, prompting us to continue emphasizing images, infographics, and video-based resources for teachers.

We will also leverage our leadership in the Bay Area to partner with innovative leaders in education technology. These partners are bringing new types of interactivity online for teachers, including 360° video, live virtual programs in multiple classrooms, virtual reality experiences, and simple simulations that allow students to practice exploration and engineering skills.

Our materials have already garnered 2.5 million views. By 2020, we hope to capture over 17 million views by teachers in all 50 states and abroad, focused especially on US regions where the need for exceptional materials is the greatest.



Summary

The California Academy of Sciences *Environmental Literacy Initiative* will have a profound and lasting impact on the public's environmental knowledge locally, nationally, and across the globe. We will dramatically broaden access to effective environmental education for formal and informal educational settings; evaluate, measure, and share the impact of our messages; and broaden the Academy's global reputation as a leader in science and environmental literacy.

By equipping individuals with the scientific background to environmental challenges, we are building the foundation for a more sustainable future.

Funding to launch the *Environmental Literacy Initiative* was provided by a generous gift from the Pisces Foundation. We seek visionary philanthropists to join them in supporting our effort to share these transformative programs on a global scale.



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The California Academy of Sciences is a renowned scientific and educational institution dedicated to exploring, explaining, and sustaining life on Earth. Based in San Francisco's Golden Gate Park, it is home to a world-class aquarium, planetarium, and natural history museum, as well as innovative programs in scientific research and education—all under one living roof.
www.calacademy.org.