



Sustainability Science Sleuths

Overview

PROGRAM AT A GLANCE



Program Description

Water footprint, sustainability, renewable energy? What does it all mean? Discover the mysteries of your local ecosystem through hands-on activities, musical science, interactive videos, and career exploration. By engaging in a variety of activities on this eco-friendly adventure, environmental enthusiasts, just like you, will uncover the mysteries of clean water, investigate air quality, and learn about advanced technologies that create green energy. You have the power to engineer positive change in your local community and help create a healthier future for our planet. In partnership with Discovery Cube, explore the power of water and energy to identify ways you can personally make environmentally conscious decisions.

This program contains 45-60 minute sessions and is designed for students in 3rd-5th grades.



Program Objective

A science sustainability sleuth is a detective who learns all about the science of using water and energy in ways that help, instead of hurt, our environment. We only have one planet Earth, so it is important to keep our planet healthy and clean. This program can be divided into modules and will immerse students into a world of hands-on science, engaging video content, and will excite them to become a conservation expert!



DAILY SUMMARIES

Day 1: Southern California's Environment

It can take thousands of years for one water molecule to move its way through the entire water cycle. By watching a special kid-friendly documentary and doing several hands-on activities, students will learn about and create their own mini-water cycle models.

The Water Cycle has three basic parts: evaporation (when water turns from a liquid into a gas), condensation (when water vapor turns from a gas into a liquid), and precipitation (when liquid or solid water falls down onto the surface of the Earth).

To start learning about the importance of water conservation, first watch [The Water Cycle](#) documentary.

Day 2: Salt Water

Ocean Water is too salty to drink. But, through this fascinating investigation into salt water and this fun experiment, you will learn how to harness the power of the water cycle to separate salt from water.

Desalination is the process of removing salt and other dissolved minerals from water. Even though California is next to the world's largest ocean, it is expensive and difficult to turn ocean water into drinking water.

To continue learning about the importance of water conservation, watch [Hidden Worlds: Mysterious Salts](#).

Day 3: Sources of Water

California has a rich landscape diversity: from a long coast line, a lush central valley, deserts, and lots of tall mountains. Much of Southern California doesn't have a wealth of drinking water, so a lot of our water comes from snow melting in the tall California mountains.

California has tall mountains with lush, agriculturally rich valleys down below. Learn about the Big Bumpy Land we call home and show off these features in your very own 3D relief map as you learn where our water comes from in Southern California.

To start learning about the geography of our land, first watch [Big Bumpy Land](#).



Day 4: Aqueducts

Put your engineer cap on as you design, build, and test your own aqueduct maze to learn how we transport water.

Engineers build aqueducts to bring clean, fresh water from places where it rains or snows to places where people live in more arid environments, like Southern California.

To start learning about aqueducts, first watch [From the Mountains to Your Tap](#).

Day 5: Groundwater

From a guest [scientist spotlight video](#) to a delicious and healthy science treat, this lesson will introduce you to the science behind aquifers and groundwater storage.

Aquifers are natural underground storage systems for water. You can make your own edible aquifer parfait as you learn how we store, access, and refill our underground water.

Day 6: Water Conservation

Discover the hidden ways you use water every day and learn how you can make choices to reduce your water use. Then, be inspired by our custom water footprint calculator and learn how to talk to a computer by creating your own code.

We all use water every day to drink, cook, and clean, but it's also used to make the clothes we wear, the food we eat, and the gas we use to power our cars.

To start learning about water conservation, first watch [Ways to Save](#).

Day 7: Watersheds

When it rains, water flows past our homes and schools on its way to oceans and lakes. Build a watershed model of a fictional town to see how the water flows and hear from a local scientist who specializes in monitoring the health of our watersheds.

You may live downstream from another part of your watershed, and the water that flows past your home or school will probably go toward someone else's home. You can do your part to keep the water clean by picking up trash and being careful not to over fertilize plants.

To start learning about watersheds, first watch [Scientist Spotlight: Watersheds with Mo Wise](#).



Day 8: Air Quality

The air is made up of tiny molecules and particles too small for us to usually see, but these experiments will help you see the quality, speed, and power of the air around you.

The quality of the air around you is constantly changing based on the temperature, humidity, direction and strength of the wind, and sources of air pollution such as nearby fires or factories. Wind farms use turbines to harness the power of the wind and give us electrical energy.

To begin learning about air quality, first watch [Sustainable Energy Song](#).

Day 9: Renewable Energy

You don't need to be an electrician to understand circuits! In this lesson, you will power on a lightbulb and harness the power of the sun to make a s'more as you learn about renewable energy.

Renewable energy is energy created from the Earth's natural resources. There are several different forms of renewable energy, including energy generated from the sun, wind, and water. Most renewable energy is turned into electricity, which can be used (for example) when you flip a light switch on and create a closed electrical circuit.

To start learning about renewable energy, first watch [Hidden Worlds: Earth Power](#).

Day 10: You Make a Difference

Congratulations! You have learned learned about many of the Earth's natural resources. Now it's time to do your part – you can make a difference and help make smart choices with the water and energy you use. And it's not even hard! Through a simple water scavenger hunt and by leaving yourself reminders around your home, you can reduce your water and energy use.

Water can be found in many different places around your home and school and is used for cooking, cleaning, and drinking. But, if you have a water leak, you will waste and have to pay for clean water you are not using and, if the leak is hidden, possibly damage your home, so it's so it's important to find and fix leaks as quickly as possible. From finding and fixing leaky pipes to reducing your energy use, through these simple final challenges, you can become a conservation expert!



Next Generation Science Standards

3RD GRADE

3-ESS2-2: Obtain and combine information to describe climates in different regions of the world.

3-LS3-2: Use evidence to support the explanation that traits can be influenced by the environment.

3-LS4-3: Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

3-LS4-4: Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

3-PS2-1: Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.

3-PS2-2: Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

3-PS2-3: Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.

4TH GRADE

4-ESS2-1: Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

4-ESS2-2: Analyze and interpret data from maps to describe patterns of Earth's features.

4-ESS3-1: Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

4-ESS3-2: Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

4-PS3-1: Use evidence to construct an explanation relating the speed of an object to the energy of that object.

4-PS3-2: Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

4-PS3-4: Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

5TH GRADE

5-ESS2-1: Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

5-ESS2-2: Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.

5-ESS3-1: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.



5-LS1-1: Support an argument that plants get the materials they need for growth chiefly from air and water.

5-LS2-1: Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

5-PS1-1: Develop a model to describe that matter is made of particles too small to be seen.

5-PS1-3: Make observations and measurements to identify materials based on their properties.

5-PS1-4: Conduct an investigation to determine whether the mixing of two or more substances results in new substances.

5-PS2-1: Support an argument that the gravitational force exerted by Earth on objects is directed down.

3-5TH GRADE ENGINEERING DESIGN

3-5-ETS1-1: Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

COMPUTER SCIENCE STANDARDS

3-5.AP.11: Create programs that use variables to store and modify data.

3-5.AP.12: Create programs that include events, loops, and conditionals.

3-5.AP.13: Decompose problems into smaller, manageable tasks which may themselves be decomposed.

3-5.AP.17: Test and debug a program or algorithm to ensure it accomplishes the intended task.

Environmental Principles and Concepts

PRINCIPLE 1 – PEOPLE DEPEND ON NATURAL SYSTEMS

Concept A. The goods produced by natural systems are essential to human life and to the functioning of our economies and cultures.

Concept B. The ecosystem services provided by natural systems are essential to human life and to the functioning of our economies and cultures.

Concept C. That the quality, quantity, and reliability of the goods and ecosystem services provided by natural systems are directly affected by the health of those systems.

PRINCIPLE 2 – PEOPLE INFLUENCE NATURAL SYSTEMS

Concept A. Direct and indirect changes to natural systems due to the growth of human populations and their consumption rates influence the geographic extent, composition, biological diversity, and viability of natural systems.



Concept B. Methods used to extract, harvest, transport, and consume natural resources influence the geographic extent, composition, biological diversity, and viability of natural systems.

Concept C. The expansion and operation of human communities influences the geographic extent, composition, biological diversity, and viability of natural systems.

PRINCIPLE 3 – NATURAL SYSTEMS CHANGE IN WAYS THAT PEOPLE BENEFIT FROM AND CAN INFLUENCE

Concept A. Natural systems proceed through cycles and processes that are required for their functioning.

Concept B. Human practices depend upon and benefit from the cycles and processes that operate within natural systems.

Concept C. Human practices can alter the cycles and processes that operate within natural systems.