

MATH AND THE ENVIRONMENT

California's Environmental Principles & Concepts¹ (EP&Cs) examine the interactions and interdependence of human societies and natural systems.

Some Terminology

Natural systems: Interconnected elements that function as a whole, encompassing both living and non-living components.

Examples: forests, coral reefs, ocean depths, solar system, planetary atmosphere circulation, human body

Human social systems: The functions, processes, and interactions among individuals, human communities, and societies including political, social, cultural, economic, and legal systems.

Examples: nuclear families, schools, businesses, communities, nations, corporations, online social networks

Ecosystem goods: Tangible materials produced by natural systems, that are essential to human life, economies, and cultures.

Examples: food (e.g. fish, crops), timber, water, raw materials (e.g. minerals, natural fibers)

Ecosystem services: The functions and processes that occur in natural systems that support or produce ecosystem goods and help sustain human life, economies, and cultures.

Examples: food production, water purification, pollination, climate regulation, and aesthetic/recreational values

Principles and Concepts



Principle 1: People Depend on Natural Systems

The continuation and health of individual human lives, and of human communities and societies depend on the health of natural systems that provide essential goods and ecosystem services



Principle 2: People Influence Natural Systems

The long-term functioning and health of terrestrial, freshwater, coastal, and marine ecosystems are influenced by their relationship with human societies.



Principle 3: There are no Permanent or Impermeable Boundaries that Prevent Matter from Flowing Between Systems

Natural systems proceed through cycles that humans depend on, benefit from, and can alter.



Principle 4: Natural Systems Change in Ways that People Benefit From and Can Influence

The exchange of matter between natural systems and human societies affects the long-term functioning of both.



Principle 5: Decisions Affecting Resources and Natural Systems are Complex and Involve Many Factors

Decisions affecting resources and natural systems are based on a wide range of considerations and decision-making processes.

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MathLinks: Grade 7 and the Environment

See Program Information (print copy or on the Teacher Portal), page 34, Mathematics and the Environment, for more information.

Student Activity ideas: Ask students to research, do a project, do a presentation, or have a class discussion / debate about how the subject of each problem affects the environment.

Location	Title / Problem #	Connection to Environmental Principles
Unit 1, TE, pg 32	Phrases that Describe Probabilities	Climate change has many negative effects on the environment. In their assessment reports on climate change, scientists attach probabilities to common expressions of likelihood.
Unit 2, TE, pg 17	Practice 7 (electric, hybrid, and gas vehicles)	Each type of powered vehicle has a different effect on the environment. EVs depend on the power grid, which can vary from region to region, and disposal of batteries is a concern. Hybrids produce lower emissions and have better fuel economy than gas vehicles, but they still involve gasoline and battery production.
Unit 3 TE, pg 17	Practice 5 / #6 (electric vehicles vs. hybrid cars)	
Unit 2, TE, pg 21	Practice 9 (Little Free Library)	Little Free Libraries have a positive impact on the environment because they promote reusing books and reducing waste. Some libraries are even constructed from recycled materials, which further minimizes waste and promotes sustainability.
Unit 2, Project	Build a Little Free Library	
Unit 3, TE, pg 20	Practice 7 / #1-4 (Community Garden)	Community gardens promote sustainable agriculture. This reduces food transportation distances and helps to improve soil and air quality. Gardens also cool urban areas affected by the heat island effect.
Unit 3, TE, pg iv	Ratios are Everywhere	Examples of how ratios are used to describe issues important to the environment are described here.
Unit 6, Math Talk	Data Talk A: Water Used to Make Various Foods	Excessive use of water to produce foods contributes to water depletion and pollution. Furthermore, fertilizers, pesticides, and other pollutants can harm aquatic life.
Unit 8, TE, 18a	Lesson Notes S8.3b / Slide 1 (Pyramids – An Ancient Wonder of the World)	Preserving natural wonders can have a positive effect on the environment because they help mitigate the effects of climate change and maintain ecosystem services. However, some preservation measures, such as construction near the sites, can contribute to environmental degradation.
Unit 8, Project	Exploring the Wonders of the World	
Unit 9 TE, pg 29	Spiral Review #6-7 (Recycling)	Recycling reduces waste sent to landfills, conserves natural resources, and prevents pollution. Reducing the need for raw materials also helps to lower greenhouse gas emissions.
Unit 10, TE, pg iv	Using Data to Understand Our World	Counting animals with a method such as mark-recapture can inform decisions about habitat protection, breeding programs, and other plans to protect endangered species in the environment.
Unit 10, TE pg 14	Estimating Fish Populations	