

## MATH AND THE ENVIRONMENT

California's Environmental Principles & Concepts<sup>1</sup> (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 6 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.

<b>Location</b>	<b>Title / Problem #</b>	<b>Connection to Environmental Principles</b>
Unit 1, TE, pg 1	Beach Cleanup	Removing trash from beaches provides a layer of defense - sometimes the final chance - against ocean pollution. This helps to protect the marine ecosystem, wildlife, and coastal communities from harmful effects caused by the pollution.
Unit 1, Task	Choosing a Service Project	Planting new trees produces oxygen through photosynthesis, which is vital for human survival. Trees also benefit countless animal species, help combat climate change, and offer a whole host of other benefits.  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.  Replacing non-native species with native ones supports biodiversity, conserves resources, and maintains ecosystem health.
Unit 4, Project	Why are Parks Good for Communities?	Parks create outdoor space for community members to congregate safely, enjoy nature, and play / exercise, which all contribute to public health.
Unit 5, TE, pg 26 Part 2C	Poster Problems (Buddy Benches)	Buddy Benches foster social inclusion, encourage kindness, and combat isolation, and as an added benefit, they're typically made of recycled plastics.
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, Task Unit 9, Project	Recycling Plastic Bottles How Many Plastic Bottles?	Recycling plastic bottles reduces waste and minimizes environmental harm. For example, it helps to reduce pollution, especially in the oceans.
Unit 10, TE pg iv	What is Sea Level?	Rising sea levels contribute to ecosystem change by affecting habitats for marine animals, which may threaten their existence. It also contributes to climate change, causing potential warming and expansion of ocean water, and melting of glaciers and ice sheets.