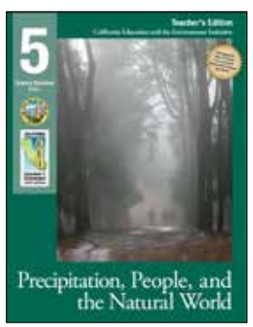
California Education and the Environment Initiative

The EEI Curriculum cohesively integrates science and engineering practices (SEPs), content (disciplinary core ideas/DCIs), and crosscutting concepts (CCs) within its lesson procedures. This preliminary analysis intentionally teases apart the individual SEPs, DCIs, and CCs as a means of correlating the EEI unit with specific performane expectations; however, the EEI lessons weave these components back together to provide three-dimensional learning for students.

Grade 5 and Middle School (Grades 7 and 8 in the Integrated Course Model)

5.3.c. Precipitation, People, and the Natural World

"Precipitation, People, and the Natural World" uses a study of the Sierra snowpack, the source of a great proportion of California's fresh water supply, to engage students in a study of Earth's hydrosphere and biosphere. They consider a wide array of maps, graphs, and statistics as they discover the importance of water in natural systems and for human use. Students examine different models that allow them to discover how California's proximity to the Pacific Ocean and its topography influences the water cycle, cloud formation, and uneven distribution of precipitation throughout the state. Through this unit, they discover that the relatively small amount of fresh water on Earth is constantly cycling between the different water reservoirs in the hydrosphere; it also reinforces their knowledge of the water cycle. Students study different California ecosystems in order to determine that the amount of precipitation throughout California has a direct effect on the types of plants and animals that are able to survive within any given habitat. Finally, they examine evidence about the effects of human activities on precipitation patterns and local climates.



Next Generation Science Standards* Correlation with the California Education and the Environment Initiative (EEI) Curriculum

The EEI Curriculum is a great choice for transitioning to NGSS and contributes toward achievement of the performance expectations for the standards reflected in the Summary Chart below: 5-ESS2 Earth's Systems, MS-LS2 Ecosystems: Interactions, Energy and Dynamics, and MS-ESS3 Earth and Human Activity. Each EEI unit highlights a small number of performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts. Therefore, the EEI units contribute to students' overall achievement of the performance expectations by the end of a school year, where they will have had multiple opportunities to engage in all appropriate science and engineering practices, disciplinary core ideas, and crosscutting concepts. While EEI was designed to teach the 1998 California science standards to mastery, it reflects the real world interconnections in science and already incorporates many of the paradigm shifts reflected in the NGSS. To learn more about how EEI supports NGSS, visit http://californiaeei.org/NGSSGuides/.

	Next Generation Science Standards								
	5-ESS2			MS-LS2			MS-ESS3		
California Connection		✓	✓		✓			✓	✓
Lesson 1 – Discover the importance of the snowpack to California and identify types of precipitation.	✓	✓	✓		✓				
Lesson 2 – Assess how and where fog and clouds occur in California.	✓	✓	✓						
Lesson 3 – Examine how precipitation patterns influence the distribution of natural systems.	✓		✓	✓	✓	✓			✓
Lesson 4 – Analyze water use by California's agriculture industry.	✓	✓	✓	✓		✓	✓	✓	✓
Lesson 5 – Discover what happens when aquatic plants and chalk are put in acidified water.		✓	✓	✓	✓	✓	✓	✓	✓
Lesson 6 – Examine evidence about historical amounts of precipitation around cities.		✓	✓	✓	✓		✓	✓	✓
Traditional Unit Assessment	✓	✓	✓		✓	✓	✓	✓	✓
Alternative Unit Assessment					✓	✓	✓	✓	✓
	SEP	DCI	CC	SEP	DCI	CC	SEP	DCI	CC

Correlation Chart Key

SEP (Science and Engineering Practices)
DCI (Disciplinary Core Ideas)
CC (Crosscutting Concepts)

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EEI Unit 5.3.c. Precipitation, People, and the Natural World

Disciplinary Core Ideas Supported by this EEI Unit

5-ESS2 Earth's Systems
MS-LS2 Ecosystems: Interactions, Energy and Dynamics
MS-ESS3 Earth and Human Activity

Performance Expectations	Suggestions for Using the EEI Unit to Support NGSS
5-ESS2-1: Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.	Use this unit to have students examine models that help describe how California's proximity to the Pacific Ocean and its topography influences the water cycle, cloud formation, and uneven distribution of precipitation throughout the state.
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.	Use this unit to have students learn about the distribution of water on Earth and how the majority of all of Earth's water is saltwater that is not suitable for human use. Students consider the percentage of fresh and saltwater on Earth.
MS-LS2-1 *(Grade 7 in the Integrated Course Model):* Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.	Use this unit to have students analyze and interpret data that allow them to determine that the amount of precipitation throughout California has a direct effect on the types of plants and animals that are able to survive within any given habitat.
MS-ESS3-4 *(Grade 8 in the Integrated Course Model):* Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.	Use this unit to have students collect evidence about the effects on Earth's natural systems (for example, climate, natural vegetation, water and air quality, and precipitation patterns) of a growing human population and the resulting increased human needs (for example, fresh water, food, energy, and places to live).

Science and Engineering Practices (SEPs)	Suggestions for Using EEI to Support SEPs	Disciplinary Core Ideas (DCIs)	Suggestions for Using EEI to Support DCIs	Crosscutting Concepts (CCs)	Suggestions for Using EEI to Support CCs
Developing and Using Models (5-ESS2-1)	Use the unit to have students examine how the water cycle functions (Lesson 1). Have them explore a model of cloud formation using the "cloud in a jar" demonstration (Lesson 2). Have students analyze how California's location and topography affect where and how different types of precipitation move through the hydrosphere, atmosphere, and geosphere (Lessons 2, 3, and 4).	**ESS2.A: Earth Materials and Systems:** Earth's major systems are the geosphere (solid molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1)	Use the unit to have students determine how two of Earth's major systems, the hydrosphere and atmosphere, interact to affect weather and precipitation patterns throughout California (Lessons 1 and 2). Have them consider how the biosphere, including humans, interacts with both the hydrosphere (water) and with the atmosphere (Lessons 4, 5, and 6).	**Scale, Proportion, and Quantity (5-ESS2-2)**	Use this unit to have students analyze California's current weather patterns, and consider how changing amounts of precipitation falling as rain influences the snowpack, which in turn has a direct effect on the quantity of water that is stored in the state's reservoir system and used to meet human need (Lessons 1, 3, and 4).

Science and Engineering Practices (SEPs)	Suggestions for Using EEI to Support SEPs	Disciplinary Core Ideas (DCIs)	Suggestions for Using EEI to Support DCIs	Crosscutting Concepts (CCs)	Suggestions for Using EEI to Support CCs
Analyzing and Interpreting Data (MS-LS2-1)	Use this unit to have students evaluate and interpret precipitation data to help them explain the uneven distribution of precipitation throughout California and how it can affect different ecosystems (Lessons 3 and 4). Have them review and analyze the data they collected about acidic water (Lesson 5). Have students analyze data about precipitation patterns and interpret it in a way that allows them to determine the effects of urban heat islands on these patterns (Lesson 6).	**ESS2.C: The Roles of Water in Earth's Surface Processes:** Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5-ESS2-2)	Use this unit to have students realize that most of Earth's fresh water is in either glaciers or underground, and that the limited available fresh water in the snowpack, rivers, lakes and streams, is influenced by weather patterns (Lessons 1 and 4).	**Systems and System Models (5-ESS2-1)**	Use the unit to have students evaluate and use various models involving the biosphere, atmosphere, and hydrosphere to discover how they interact with one another and with natural systems (Lessons 1-6). Have them analyze the complex system that is used to manage and store water including the dams, aqueducts, and reservoirs that provide water to meet human needs (Lesson 4).
Using Mathematics and Computational Thinking (5-ESS2-2)	Use this unit to have students examine the amounts of freshwater in the hydrosphere and consider how the characteristics of each type of reservoir affect the amount of water that is moving among the reservoirs, for example, water in the atmosphere is more dynamic than groundwater reservoirs or water trapped in glaciers (Lesson 4). Have them consider how the movement of water among the reservoirs is directly influenced by human use of water in different reservoirs, for example, as farmers use more groundwater for agriculture, that reservoir decreases (Lesson 4). Have students analyze water use data for agriculture in California (Lesson 4).	**LS2.A: Interdependent Relationships in Ecosystems:** - Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. - Growth of organisms and population increases are limited by access to resources. (MS-LS2-1) **ESS3.C: Human Impacts on Earth Systems:** Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (MS-ESS3-4)	Use this unit to have students determine how the amount of precipitation in different parts of California influences which species of plants and animals are able to survive in a given ecosystem, and recognize that this phenomenon results in California having rich diversity of plant and animal life (Lessons 1 and 3). Use the unit to have students examine how the growth of California's human population has influenced water distribution throughout the state (Lesson 4). Have them conduct an experiment to discover the effects of acidified water on plants, and consider how acid rain, caused by the burning of fossil fuels, can affect natural systems (Lesson 5). Have students evaluate how the construction of larger cities, which result from a growing population, can affect rainfall patterns and rates of precipitation (Lesson 6).	**Cause and Effect (MS-ESS3-4, MS-LS2-1)**	Based on their studies of several California ecosystems, have students predict what types of plants and animals can survive in other regions with similar precipitation (Lesson 3). Use the unit to have students predict how an increase in population will affect water use and water need in California (Lesson 4). Have students analyze the cause and effect relationship between the human use of fossil fuels and increasing quantities of acid rain (Lesson 5).

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Science and Engineering Practices (SEPs)	Suggestions for Using EEI to Support SEPs	Disciplinary Core Ideas (DCIs)	Suggestions for Using EEI to Support DCIs	Crosscutting Concepts (CCs)	Suggestions for Using EEI to Support CCs
Engaging in Argument from Evidence (MS-ESS3-4)	Use the unit to have students argue that as humans require more water to meet the needs of population centers and agriculture, water must be moved from areas in northern California to Southern California, and that that need changes how water has been naturally distributed throughout California (Lesson 4). Have them analyze how the burning of fossil fuels has contributed to a rise in overall global temperatures, acid precipitation, and water pollution (Lesson 5). Have students gather evidence to understand how precipitation patterns can be changed by urban areas (cities) that act as urban heat islands (Lesson 6).				