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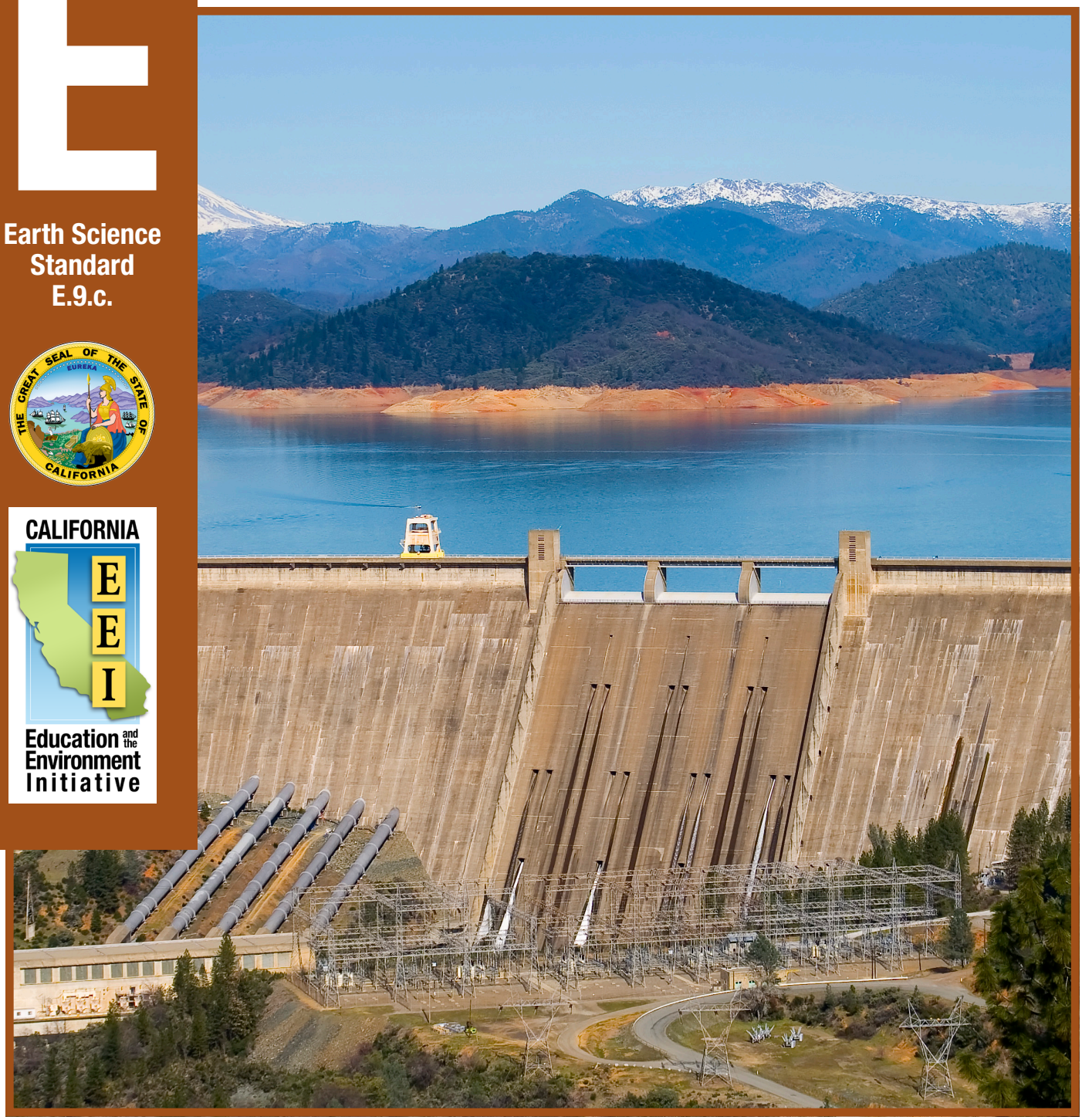
Earth Science Standard E.9.c.

Student Workbook

California Education and the Environment Initiative



Liquid Gold: California's Water

California Education and the Environment Initiative

Approved by the California State Board of Education, 2010

The Education and the Environment Curriculum is a cooperative endeavor of the following entities:

California Environmental Protection Agency
California Natural Resources Agency
Office of the Secretary of Education
California State Board of Education
California Department of Education
California Integrated Waste Management Board

Key Leadership for the Education and Environment Initiative:

Linda Adams, Secretary, California Environmental Protection Agency
Patty Zwarts, Deputy Secretary for Policy and Legislation, California Environmental Protection Agency
Andrea Lewis, Assistant Secretary for Education and Quality Programs, California Environmental Protection Agency
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Key Partners:

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Aqueduct: An artificial canal used to transport water.

CALFED Bay-Delta Program: A program carried out by 25 state and federal agencies working cooperatively to improve the quality and reliability of California's water supplies, while restoring the Delta ecosystem.

Central Valley Project (CVP): A system that stores and transports fresh water in California's Central Valley, involving the Sacramento River, the San Joaquin River, and the Tulare Lake Basin.

Confluence: The area where two or more streams or rivers join together.

Groundwater: Water located beneath the land surface in spaces and fractures within rock and sediment, called an aquifer.

Hydrologic region: A geographic region defined by major watersheds or area drainages.

Impaired waterbodies: Lakes, streams, and rivers that do not meet water quality standards set by the U.S. Clean Water Act. The standards vary with the usage of the water—drinking water, recreation, or health of aquatic ecosystems. California currently has over 500 bodies of water on this impaired list.

Indicator species: An organism whose survival is representative of the health of a habitat or ecosystem.

Municipal: Relating to a town, city, or region that has its own local government.

Reservoir: A place where something is stored, like an artificial lake that holds water; or a part of the Earth-atmosphere system that contains supplies of elements, such as carbon and nitrogen.

Runoff: Water from precipitation or irrigation and other human practices, that flows over the ground and eventually reaches a body of water.

Sacramento-San Joaquin Delta: The water, land, and ecosystems that begin at the confluence of the Sacramento and San Joaquin rivers and extend eastward toward the Sierra Nevada range.

Salinity: The total amount of salts dissolved in water; sea water averages 35 parts per thousand.

Salinization: The accumulation of salts in soil to levels that are above normal.

Stakeholders: Individuals, groups, or organizations that have an interest in, or concern about, a particular action or decision.

State Water Project (SWP): The nation's largest state-built water storage and transport system.

Surface water: Fresh water originating as rainfall or snowmelt that collects in streams, rivers, and lakes.

Water budget: A summation of inputs, outputs, and net changes to a water system, such as a groundwater basin, or an entire state, over a fixed period.

Name: _____

Instructions: Answer each of the following questions in the spaces provided.

1. When you turn the faucet on in the morning, where does that water come from?

_____

_____

_____

_____

_____

_____

_____

2. Who else is using this water besides you and your neighbors?

_____

_____

_____

_____

_____

_____

_____

3. Why is there a need for our water supply to be managed and distributed?

_____

_____

_____

_____

_____

_____

_____

_____

Name: _____

Instructions: Create a timeline related to water with events identified in ***California Connections: Taking Charge of the Bay-Delta*** (Student Edition, pages 2–5). Write the year to the left of the timeline and the water-related events to the right.

Year:		Event:
	1845	
1849		*Prior to 1849, the Delta was mostly an untouched natural environment.*
	1860	
	1935	
	1950	
	1965	
	1980	
	1995	
	2010	

Name: _____

Instructions: On the map below, describe the sources or other water-related processes identified in ***California Connections: Taking Charge of the Bay-Delta*** (Student Edition, pages 2–5). Locate examples of these sources and processes on the **Water for Life** wall map.

Name: _____

Instructions: Fill in the graphic with information about what the Delta Vision Blue Ribbon Task Force was charged with doing about securing and conserving water supplies for the future, as identified in ***California Connections: Taking Charge of the Bay-Delta*** (Student Edition, pages 2–5).

Name: _____

Instructions: Fill in the chart with any problems and solutions related to water use and supply identified in ***California Connections: Taking Charge of the Bay-Delta*** (Student Edition, pages 2–5).

Problems	Solutions

Name: _____

Part 1: Where does our water come from?

Instructions: Complete the following tasks using **California's Water Supply** (Student Edition, page 6). (5 points each)

1. What is/are the source(s) of California's water supply?

_____

_____

_____

_____

_____

2. In which type of year (wet, dry, or average) do we use more groundwater? Give some reasons why.

_____

_____

_____

_____

3. Which hydrologic regions do not rely on recycled (reclaimed) water as a water source?

_____

_____

_____

_____

4. Explain why the North Coast, San Francisco Bay, and Sacramento River hydrologic regions have the most surface water.

_____

_____

_____

_____

_____

Name: _____

Part 2: What is our water used for?

Instructions: Complete the following tasks using **California's Water Use** (Student Edition, page 7). (5 points each)

5. What are the three main categories of water use in California?

_____

_____

_____

_____

_____

6. Describe the differences in the use of California's water between an "average" and a "dry" year.

_____

_____

_____

_____

_____

_____

_____

7. Explain why the San Joaquin, Tulare Lake, South Coast, and Colorado River hydrologic regions are so different from the hydrologic regions in the northern part of the state in terms of water use.

_____

_____

_____

_____

_____

_____

_____

Name: _____

Part 3: So, what's the "water" problem?

Instructions: Use information from this lesson to write two to three paragraphs in response to the prompt below. Include discussion of California's fresh water sources, supply, and uses.

8. Consider a specific region within northern California and another region within Southern California. Is there typically enough water supply within each chosen region to meet that region's demand? Why or why not? (10 points)

Name: _____

Instructions: Complete the following tasks below, using information about the water project to which you have been assigned. (5 points each)

Water Project: _____

1. Provide a timeline of events for this water project.

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

2. Why was this project undertaken? What was (is) the purpose?

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Name: _____

3. Describe key parts of this water project (interesting natural and human-made structures).

4. Who oversees/is in charge of this water project?

5. How does this water project serve the needs of *all* Californians?

Name: _____

Instructions: Fill in the following chart with information about the natural systems being affected by the use of California's freshwater supply. (5 points each cell)

	The Bay-Delta ecosystem?	The San Joaquin Valley?
How is our water use affecting:		
Why is that a problem for:		

Name: _____

	The Bay-Delta ecosystem?	The San Joaquin Valley?
What is being done to protect:		
How are California's residents and businesses being affected by what is happening in:		

Name: _____

Part 1

Instructions: You are about to hear a speech given to the members of the Association of California Water Agencies (ACWA) by Phil Isenberg, chairman of the governor's Delta Vision Blue Ribbon Task Force. Complete the following tasks by using information from Mr. Isenberg's speech. (5 points each)

1. What are two sides of the Delta issue that the Task Force recommends be "treated equally?"

_____

_____

_____

2. Name some of the stakeholders that feel strongly about water issues in the Delta, and who gave feedback to the Task Force.

_____

_____

_____

_____

_____

_____

_____

_____

3. Why will the "old ways of doing things" not work in California in regards to water?

_____

_____

_____

4. What are two parts of the water management system in California that the Task Force feels have to be addressed right away (in the short term)?

_____

_____

_____

Name: _____

Part 2

Instructions: This is the estimated annual water budget for California today. Look at it carefully, and then answer the question below with an essay composed of two to three paragraphs.

California's Water Budget	Quantity of Water
Precipitation and Imported Water	200 million acre-feet
Used in Evaporation/Transpiration (plants)	-130 million acre-feet
Total Runoff	**70 million acre-feet**

Available from Runoff	70 million acre-feet
Outflow to Pacific Ocean	-21 million acre-feet
Total Runoff Stored in Reservoirs	**49 million acre-feet**

Stored in Reservoirs	**49 million acre-feet**
Used for Agriculture	- > 20 million acre-feet
Used for Urban Purposes	- > 5 million acre-feet
Allocated to Ecosystems (Instream)	- > 25 million acre-feet

By the year 2030, experts believe that California's water use will increase by 4 million acre-feet. Scientific evidence shows that our current precipitation amounts have remained unchanged for thousands of years. Added to that are the claims that climate change may influence the amount of water produced by natural sources, and Californians should be prepared for less water in the very near future.

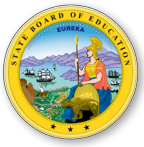
5. What would you recommend that the state do to effectively manage California's fresh water into the future? What are the stakeholder perspectives that should be considered? What types of scientists would you involve in making decisions about California's water supply and distribution system? (15 points)

_____

_____

_____

Name: _____



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