

Introduction

The coast is emblematic of California, from sunny, sandy beaches with volleyball courts and lifeguard towers to redwood crested rocky crags. California's climate, ecology, and economy are intertwined with the coast and ocean and these connections offer a perfect learning opportunity for middle and high school students to delve into interesting and complex subjects.

California Coastal Voices is a project-based learning tool designed to address science, social science, and environmental literacy. The projects and activities note specific connections to the Next Generation Science Standards performance expectations and three dimensions, the History-Social Science Standards, and California's Environmental Principles and Concepts. Consisting of six "projects" or stand-alone units that introduce students to coastal conflicts, challenges, and scientific and policy issues, the emphasis is on problem solving and communication. The projects, which can be modified to meet student interests and needs, will be especially useful for teachers of environmental science or those who seek to integrate Earth science into biology, chemistry, or physics classes. Several of the projects work well in government and seminar classes.

California Coastal Voices incorporates strategies that have been teacher-tested and proven in classrooms throughout California and are endorsed by the *California Science Framework*, including:

- Problem-based learning, a form of project-based learning as articulated by the Buck Institute for Education
- The BSCS 5E instructional model (engage, explore, explain, elaborate, evaluate)
- Science notebooks
- Outdoor learning experiences

California Coastal Voices supports student learning of California's *Environmental Principles and Concepts* to nurture and celebrate environmental literacy. Students participating in the *California Coastal Voices* projects explore natural systems, consider how people influence natural systems, and are empowered to directly participate in decision-making about complex natural resource management issues. Students investigate local environments as their context for learning and think about how human society has altered and been influenced by natural functions. Keeping learning relevant to students' own lives supports educational equity by empowering students to be agents of change in their communities.

"The learning cycle, or 5E sequence of instruction, is one of the science education community's most studied, tried-and-true approaches for helping students learn about science content and practices."

"The CA NGSS emphasize the importance of making sense of phenomena and solving problems by using all three dimensions of learning [i.e. science and engineering practices, disciplinary core ideas, and crosscutting concepts]. Instructional approaches such as problem-based learning and project-based learning provide students with the time and support to successfully engage in three-dimensional learning."

2016 California Science Framework

The *California Coastal Voices* projects fall into two types:

- **Teacher-Guided Projects** are designed to be accessible to most secondary school teachers. The three *Teacher-Guided Projects* have more scaffolding, are more tightly-constructed, and are less open-ended than the *Student-Driven Projects*. They include step-by-step instructions for classroom activities, and although these activities work best as part of the entire Project, most can be pulled out for stand-alone use. Key elements of project-based learning are woven into an enhanced 5E learning cycle with an instructional focus on the crosscutting concepts from NGSS and two key science and engineering practices: arguing from evidence and modeling.
- **Student-Driven Projects** have been designed to incorporate the elements of high quality project-based learning as articulated by the Buck Institute for Education. While accessible to any motivated teacher, the three *Student-Driven Projects* are most suitable for teachers with experience managing highly differentiated student-driven classrooms, high levels of student choice, and project-based learning routines.



Art by Alejandra Martinez, 10th grade

Please read *Organizing for Student Success* to orient yourself to the contents of the guide and tips for teaching. *Essential Elements of Project-Based Learning* provides background on this instructional strategy. Following the six projects is a Readings and Resources section that contains tools for group learning, rubrics for self-assessment, and readings on California coastal law and on remote sensing analysis that are required for some projects. Finally, please make use of the *Coastal Voices Website* at www.coastal.ca.gov/coastalvoices for slideshows, images, videos, and links needed for the projects as well as for additional teacher background reading.

Thank you for bringing the California coast into your classroom and helping to inspire your students to be engaged, active, educated stewards of our natural world. California, the nation, and the ocean are waiting for them.