

## The Fluid Earth/The Living Ocean (FELO)

Hawaii Marine Science Studies (HMSS) Project

**Publisher and Developer:** Curriculum Research and Development Group (CRDG) at the University of Hawaii

**Grade levels:** 9–12

**Scientific domains:** Marine physics, chemistry, geology, biology, and ecology

**Web site:** <http://www.hawaii.edu/crdg>

**Year profiled:** 2002

*The Fluid Earth/The Living Ocean (FELO)*, developed in 1975, emphasizes the basic concepts of physical science, earth science, and chemistry by investigating the oceans through a central focus on marine environments. It consists of text materials supported by a Web-based database. It offers students the opportunity to learn and explore basic science concepts and skills in their applications to ocean phenomena. In laboratory and field investigations, the program leads students through inquiry methods to interpret phenomena and establish organizing principles.

### SCOPE/CONTENT

*FELO* has two main components:

- *The Fluid Earth: Physical Science and Technology of the Marine Environment* explores the physics, chemistry, and geology of the oceans and their applications in ocean engineering and related technologies.
- *The Living Ocean: Biology and Technology of the Marine Environment* explores the biology and ecology of the oceans and other aquatic environments and their applications in aquaculture and related technologies.

*FELO* integrates the study of scientific concepts with the study of technologies in oceanography and ocean engineering, and investigates the problems in the global environment to promote awareness of and commitment to the wise use of natural and technological resources. Students learn to abstract from real-world experience to general principles and to identify the interrelationships of marine phenomena by engaging in hands-on study of real, simulated, or modeled environments.

### FORMAT

The instructional materials are built around laboratory and field studies and include the following:

- A teacher's guide and student book for each component: *The Fluid Earth: Physical Science and Technology of the Marine Environment* and *The Living Ocean: Biology and Technology of the Marine Environment*.
- A packet of workbook masters.
- A set of ancillary materials on additional resources: a Water Resource Management stand-alone unit; a Descriptive Atlas of the coastal zones of the Pacific; a booklet on Hawaiian coral reef ecology; and a series of additional links to modern technology and the economics, politics, and social implications of managing resources in a marine environment.
- Booklets on correlation with the *National Science Education Standards* (NRC) and the *Benchmarks for Science Literacy* (AAAS) for each component.
- A Web-based database enhancement called SWIM ([www.hawaii.edu/swim](http://www.hawaii.edu/swim)), containing pages and links to outside sites that relate to the topics covered in the books.

### **ASSESSMENT INSTRUMENTS**

*FELO* units include questions at the end of each lesson along with options for further investigations to extend the activities. The teacher's guide includes suggested answers for the teacher. Also, there are charts and tables for students to fill out based on information given in the lesson and findings from the labs. The SWIM database provides information referenced in the student questions and/or the Further Investigation sections.

### **PROFESSIONAL DEVELOPMENT SUPPORT**

The program recommends and offers a 10-day institute that covers both *FELO* components. Institutes are arranged on request anywhere in the United States, usually during the summer. University credits are available.

### **STAND-ALONE VS. SUPPLEMENTAL**

*FELO* was designed to form a one-year multidisciplinary science course in a marine context for students in grades 9–12. The program is presented as an alternative to general science courses and recommends using each book either for a one-semester or one-year course—*The Fluid Earth* in the physical sciences and *The Living Ocean* in the biological sciences. Each component is an independent module; they may be taught in either order. Topics within each unit are sequenced, and the program requires that work in each unit begin with the first topic.