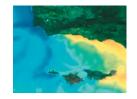# Mapping an Ocean Sanctuary
Using GIS to study ocean science

Overview

Mapping an Ocean Sanctuary is an innovative and powerful introduction to the techniques and applications of geographic information systems. Developed by the Center for Image Processing in Education (CIPE), in association with Channel Islands National Marine Sanctuary (CINMS) and Sustainable Seas Expeditions (SSE), *Mapping an Ocean Sanctuary* is a set of six lessons that teach fundamental marine and environmental science concepts. The curriculum provides students with actual case studies, data, and images from the Channel Islands region in Southern California. As students work through the *Mapping an Ocean Sanctuary* lessons, they also learn GIS analysis techniques that can be used to customize the lessons or to develop new projects.

Students use *ArcView* GIS to explore a variety of issues impacting the Channel Islands National Marine Sanctuary (CINMS) and its surrounding waters. The students investigate the distribution of marine species within CINMS; commercial and recreational usage patterns; the impact of El Niño/La Niña events on marine inhabitants; population dynamics and impact of no-take zones; and the effect of storm water run-off on offshore waters and identification of areas with high concentrations of impervious surfaces. They also collect their own data and add it to an existing *ArcView* GIS project.

Layers of discovery

Over one hundred themes, or data layers, specific to the northern Channel Islands have been compiled from a variety of public and private agencies, including: regional bathymetry and topography data provided by CINMS; fish, invertebrate, and algae survey data provided by Channel Islands National Park and REEF Environmental Education Foundation (REEF); chlorophyll and turbidity data from the SeaWiFs project of the National Aeronautic and Space Administration; data on water quality and bacteria levels provided by the Public Works Department of the City of Santa Barbara; data on whale and dolphin sitings from Cascadia Research Collective and the National Oceanic and Atmospheric Association (NOAA); land use data for Santa Barbara from Landsat scenes; environmental sensitivity index (ESI) data from NOAA and the California Department of Fish and Game; and photographs of marine life from CINMS, NOAA, and REEF.

Classroom features

Each lesson contains **Teaching Notes**, that provide background information, references, and answers to questions; the **Student Activity** itself, which guides students through the lesson and provides step-by-step instructions for analyzing the data with *ArcView* GIS; a separate **Data Sheet**, which can be turned in and graded; and an **Extensions Activity** section, which suggests areas of further study, provides tips for customizing the lessons, and may also include supplemental data sets. The lessons are also correlated to the National Science Education Standards, National Geography Standards, and the California State Science Standards. Although the lessons are sequenced from introductory to more advanced exploration, they may be used as stand-alone units.

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