

Learning Outcomes

Where Do the Fish Live?

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Grade Levels:

This lesson can be used with grades 5-12

Lesson Duration:

Preparation and computer lab time: 2 - 40 minute class periods.
Follow-up and extensions: 1 - 40 minute class period

Materials:

Computers with My World GIS Software
Lesson handouts for students
Activity recording sheets and World Maps

Optional:

Lab materials
Globes
Additional videos or pictures of the fish that inhabit the kelp forest
These can be obtained on the CIMNS CD_ROM or online

Lesson Overview:

This lesson illustrates the relationship between the physical ocean structure; bathymetry and substrate, to ecological communities, the kelp forest and its inhabitants.

In the first section of the lesson, students are introduced to the Channel Islands off the coast of California, USA. After drawing some initial conclusions about the relationship of the islands to the mainland and their North to South distribution, students are then given more information about the physical geography of the Catalina Island region, known as “Two Harbors”.

After this introduction to the physical location, the second segment of the activity relates fish distribution to habitat. Students examine several “fish counts” to see the distribution fish across 2 regions, the rocky kelp habitat and the sandy bottom. Students are then asked to find the preference of several fish species through the use of habitat and bathymetry (depth) information.

This lesson encourages students to see the relationship between habitat and animal distribution. This activity is a lead-in to the third activity in the series, Kelp and El Niño, which looks at the impact of El Niño on the kelp forests and asks students to predict what might happen to the fish.

Key Questions

- ✓ How does the physical environment affect the biological environment?
- ✓ What type of substrate, rock or sand, does kelp prefer?
- ✓ Does fish distribution change as a result of habitat?
- ✓ Where are the Channel Islands, especially Catalina Island?
- ✓ How is ocean life monitoring conducted?

Goals

GIS and Map Skills

Students who complete this project will be able to:

- Open a My World GIS project
- Turn layers on and off
- Create selections using the Analyze mode
- Use the Zoom tools
- Use the Identify tool
- Turn legends on and off
- Edit a layer's appearance
- Use the Link tool
- Use the measurement tool

Content Knowledge

Students who complete this project will know:

- How the physical and biological environments are interlocked.
- The types of habitat that kelp forests prefer.

Prerequisite Background Knowledge

Students should have a basic understanding of kelp and ocean plants. Reading materials and activities to achieve this understanding can be found in JASON XIV – From Shore to Sea, or on Web sites, listed below.

Students will also need to have had some introduction to physical oceanography.

This lesson is intended to follow the introductory lesson in the series, “Global Kelp Location”

California Standards

Subject : Science

Grade : Nine thru Twelve

Strand : Life Sciences

Substrand 6 : Stability in an ecosystem is a balance between competing effects. As a basis for understanding this concept:

Ecology

STAR California Standards Test

Standard:

6b

Students know how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, or changes in population size.

Subject : Science

Grade : Nine thru Twelve

Strand : Earth Sciences

Substrand 5 : Heating of Earth's surface and atmosphere by the sun drives convection within the atmosphere and oceans, producing winds and ocean currents. As a basis for understanding this concept:

STAR California Standards Test

Standard:

5d

Students know properties of ocean water, such as temperature and salinity, can be used to explain the layered structure of the oceans, the generation of horizontal and vertical ocean currents, and the geographic distribution of marine organisms.

Student Activity:

See separate document. – Where do the Fish Live?

Assessment:

My World Skills Assessment

Fish Identification quiz

Discussion of kelp forests and terrestrial forests, and how animals use them for food and shelter

Extensions:

A complete suite of lessons entitled “Forests Under the Sea” by Paul Sperry can be found here: <http://teachnet-lab.org/santab2003/sperry/index.htm>

Student research projects on life in the kelp forest an example described here: http://projects.edtech.sandi.net/grant/kelpbeds/kelpbeds_-_teacher_page.htm

Activities from the Monterey Bay Sanctuary: <http://www.mbnms-simon.org/sections/kelpForest/education.php?sec=kf>

Build a kelp forest model from COAST : http://www.coast-nopp.org/resource_guide/elem_mid_school/ma_habitats_acts/kelp.html

Teacher Background and Supplemental Resources:

Books and Print Resources:

JASON XIV – From Shore to Sea: A complete unit on the Kelp Forest of the Channel Islands.

Life In A Kelp Forest

by Mary Jo Rhodes, David Hall

The Hidden Forest

by Jeannie Baker

The Amber Forest: Beauty and Biology of California's Submarine Forest by Ronald H. McPeak

Kelp Forests (Monterey Bay Aquarium Natural History Series)

Hands-On Activities:

JASON online at the Texas Instruments Web site.

JASON: Mixing Soil And Water--Let's Settle This. Discusses turbidity and light penetration.

Upwelling Mini- lab

<http://www.oceanoasis.org/teachersguide/activity6.html>

What do Algae Eat? Chemistry and nutrient connection from SBC_LTER

<http://sbc.lternet.edu/outreach/downloads.html>

Web Links:**Kelp Forests:**

Site with links http://www.pcds.org/share/sci8/usefullinks/kelp_forest.htm

Monterey Bay Aquarium Kelp Cam - <http://www.mbayaq.org/efc/kelp.asp>

Monterey Bay Aquarium Field Guide -

http://www.mbayaq.org/efc/living_species/default.asp?hOri=0&hab=5&inhab=479

Kelp Forests, Rainforests of the Sea -

http://www.lincoln.smmusd.org/staff/Vanderveen_Web/Ecology/Kelp%20Reading/kelpreadings.htm

Ocean Realm - <http://www.pbs.org/oceanrealm/seadwellers/>

Kelp Watch - http://www.geol.utas.edu.au/kelpwatch/facts_i.html

Australian Museum Online - Who Lives in Kelp Forests

http://www.amonline.net.au/factsheets/kelp_forests.htm

American Museum of Natural History

http://www.amnh.org/exhibitions/permanent/ocean/02_ecosystems/02c2_algae.php

Background Info Kelp - <http://life.bio.sunysb.edu/marinebio/kelpforest.html>

Articles on Catalina Kelp by Bill Bushing

<http://gis.esri.com/library/userconf/proc95/to250/p247.html>

http://www.starthrower.org/research/kelpmisc/kelp_mp.htm

Pictures of Kelp - <http://www.oceanlight.com/html/kelp.html>

Jewels of the Sea - <http://www.abc.net.au/oceans/jewel/kelp/default.htm>

Student research page - <http://projects.edtech.sandi.net/grant/kelpbeds/>