

Coastal Ecosystem Connections

Duration:

1 class period

Objectives:

Students will:

- Discuss different ecosystems and the organisms found in them
- Examine how storms affect these systems
- Describe how coastal ecosystems are connected

Vocabulary:

Ecosystem

A community of organisms and its environment

Wetlands

Areas where water is the dominant factor determining soil development, and plant and animal communities

Corals reefs

Structures built by living coral animals creating large reefs that support many other organisms

Forests

Land-based ecosystems where trees are dominant

Pelagic

Open sea, away from the sea bottom

British Columbia PLO's:

Science 6, 7, 8
Social Studies 6, 7, 8

Background:

For this activity students will examine ecosystems that are found along coastlines by looking at how major disturbances affect them. Students will create concept maps, illustrating severe storm impacts using a variety of resources and images.

Changing storm patterns are one way that coastlines will be affected by climate change. With sea surface temperatures heating up, severe tropical storms are predicted to increase in destructiveness and frequency. This will increase the frequency and severity of disturbances to coastal ecosystems.

Tropical storms have a large impact in the Atlantic, Pacific, and Indian Oceans. In these areas coral reefs are ripped apart, wetlands and forests are inundated with saltwater, seagrass beds are shredded, and the open ocean is flooded with sediments and toxins from the terrestrial environment.

The intensity of severe hurricanes with destructive properties is predicted to increase 5% for every 1°C increase in tropical ocean temperature. With sea surface

temperatures predicted to rise 3 - 8°C worldwide in the next century, tropical storms are likely to get much worse. Many scientists are now asking what will this mean for the already fragile ecosystems found along our coastlines.

Materials:

- *Ocean News* article *Stronger Storms are bad news for coastal ecosystems*
- Chart paper
- Marker/felts
- Images of coastal ecosystems (magazines, books, internet)
- Map of the world
- Images of hurricanes

Procedure:

1. Use a hook – Place a picture on the overhead or screen of a large tropical storm for the students to see as they walk into the classroom (see the resource section for a website with good images).
2. As a class brainstorm what types of ecosystems are affected by tropical storms (estuaries, forests, coral reefs, seagrass beds, open ocean).
3. With the class read the *Ocean News* article *Stronger Storms means bad news for coastal ecosystems*. This can be done individually or as a group with students taking turns reading.

4. Review with the class how increased sea surface temperatures and more severe hurricanes are related. If you have Internet access and a projector in the classroom view the NASA animation (see resource section) that shows sea surface temperature and hurricane development during the summer of 2005.
5. Have the class break into groups of 3-4 people and assign each group an ecosystem that was listed on the board or mentioned in the article. Give each group their own colour of markers (i.e. open sea – blue, forests – green, coral reefs – orange etc.), so that the ecosystem groups can be distinguished on the posters by colour. Also give each group a large piece of chart paper. On a scrap piece of paper have them list the types of organisms found in each area. To help jump start this process give each group a picture characterizing each system. Any books with pictures or magazines that illustrate the ecosystems should be included as well.
6. Once species lists have been compiled, ask each group to create a visual representation on the chart paper with words and diagrams about the organisms that live in their ecosystem.
7. After 10 minutes have the groups rotate around the room leaving their ecosystem drawing, and taking their coloured markers with them. At the next ecosystem station get the students to examine the illustration done by the groups and add in how their ecosystem is connected to this one (using their marker colour).
8. Have the students rotate around the room visiting the other ecosystem posters for approximately 5 minutes at each station. At each station they will look at what has been illustrated about this ecosystem by the original group, the following group, and then add how their ecosystem is connected. (At the end, all the forest connections will be in one colour, coral reefs connections in

another colour etc; this should be easily visible.)

9. Put the connection diagrams up on the wall so that everyone in the class can see them.
10. Have the students write a summary about their original ecosystem and how it is connected with all the others.
11. On a computer in the classroom or on an overhead screen visit the Hurricane tracking website (address below) and look at the tropical storms occurring on that day. Ask the students to list local impacts those storms may have by thinking back to the ecosystem concept maps.

Discussion:

- How do ecosystems on the coast interconnect?
- How will Canadian ecosystems be affected by severe storms?
- How would surrounding ecosystems be affected if wetlands were destroyed in a storm?
- What organisms would be affected if the beaches along the nearest coast were destroyed?
- How have animals in these areas adapted to the regular disturbances that affect their ecosystem?
- How are greenhouse gas emissions and climate change related to tropical storms?

Extension and Resources:

- Images of hurricanes can be found at www.nnvl.noaa.gov/cgi-bin/index.cgi?page=items&ser=107940, and www.fws.gov/home/hurricane/.
- NASA has a great animation showing how Hurricane Katrina was fed by warm sea surface temperatures at http://www.nasa.gov/mpg/126449main_katrina_fred_animation.mpg
- All current hurricanes can be viewed and tracked at <http://www.sailwx.info/hurricanes/hurricanes.phtml>

- Old National Geographic magazines are a great resource for images that can be used in the classroom.
- Divide the students into small groups to discuss how severe storms will affect Canadian waters and create lists of species that may be affected.
- Have students research and present what threatened species may be affected in coastal areas by climate change. In Canada the Species at Risk website at www.speciesatrisk.gc.ca/ gives information on threatened species.