



The Oceans Are Downhill from Everywhere: Changes Caused by Humans in the North Pacific Gyre Ecosystem

Grade Level – High School Biology

Concepts

Biology/Life Sciences - Grades Nine Through Twelve
Ecology 6. Stability in an ecosystem is a balance between competing effects. As a basis for understanding this concept:

- Students know bio diversity is the sum total of different kinds of organisms and is affected by alterations of habitats
- 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
- Students know how fluctuations in population size in an ecosystem are determined by the relative rates of birth, immigration, emigration, and death.
- Students know how water, carbon, and nitrogen cycle between abiotic resources and organic matter in the ecosystem and how oxygen cycles through photosynthesis and respiration

Vocabulary

anthropogenic
watershed
respiration
photosynthesis
ecosystem

Summary

Using Google Earth and geographically linked observations made by the crew aboard the Ocean Research Vessel Algalita, students will look at anthropogenic ocean ecosystem changes due to plastic marine debris and nutrients that enter the ocean from watersheds.

Materials

- Activity Sheet for each student: “The Oceans Are Downhill from Everywhere: Changes Caused by Humans in the North Pacific Gyre Ecosystem” (Ecosystem Instability HS Bio v.2.docx)
- Computers with Google Earth and PowerPoint software installed and access to the internet
- Files
 - “Dead Zone” spreads across Gulf of Mexico Image
 - GyreAnimation.pps
 - North Pacific Currents Map.kmz
 - Voyage 2009.kml
 - Voyage2007.kml
 - AMRF_GIS_DATA_Sites.kmz
- Pencil or pen

Procedure

- Discuss or let students view “Mapping Plastic Pollution” found at: http://algalita.org/Maps_Home.html. Pay particular attention to “Sampling in the North Pacific Gyre: Background”. This could be done the day before along with “Synthetic Sea” explained in Extension #1.
- Students complete the worksheet using their computers.

Extension

- Watch the Synthetic Sea shortened (7+ minutes) free version at: http://www.algalita.org/pelagic_plastic_mov.html
- Describe some of the current research findings related to marine plastic debris .
- What future research needs to be done to get data related to the problem of plastic marine debris?