



Trash Travels: Plastic Pollution in the Pacific Ocean

Concepts

8th Grade Focus on Physical Sciences

1. The velocity of an object is the rate of change of its position. As a basis for understanding this concept:

- b. Students know that average speed is the total distance traveled divided by the total time elapsed and that the speed of an object along the path traveled can vary.
- c. Students know how to solve problems involving distance, time, and average speed.

8th Grade Investigation and Experimentation

f. Apply simple mathematic relationships to determine a missing quantity in a mathematic expression, given the two remaining terms (including speed = distance/time, density = mass/volume, force = pressure × area, volume = area × height).

EXTENSION ACTIVITY

Density and Buoyancy

- 8. a. Students know density is mass per unit volume.
- b. Students know how to calculate the density of substances (regular and irregular solids and liquids) from measurements of mass and volume.
- c. Students know the buoyant force on an object in a fluid is an upward force equal to the weight of the fluid the object has displaced.
- d. Students know how to predict whether an object will float or sink.

Vocabulary

- Latitude
- Longitude
- Elevation
- Watershed
- Oceanographic Research Vessel

Grade Level - 8

Summary

Using geographically linked observations made by the crew aboard Oceanographic Research Vessel *Algalita*, students learn about plastic pollution in the Pacific Ocean.

Materials

- “Trash Travels: Plastic Pollution in the Pacific Ocean” activity sheet for each student or group: <http://algalita.org/MappingPlasticPollution.htm>
- Computers with Google Earth software installed and access to the internet
- Voyage 2007.kml file: <http://algalita.org/MappingPlasticPollution.htm>
- Pencil or pen (if activity sheets are printed).

Procedure

1. Discuss oceanographic research and the topic of plastic marine debris with your students. Provide students with some background on the research voyage they will be viewing. Much of this information is contained within the text of the voyage - more detail can be found at <http://algalita.org/>
2. Students can work individually or in groups. The worksheet provides detailed directions that assume Google Earth is already open and the .kml file of the 2007 voyage is already loaded for the students use.
3. Discuss question 7. What distance and time did the students calculate? Did their calculations vary, and why? What further information did they feel was important to include in the calculation (7d). Discuss question 9. This is a relatively new topic of research and little is known about the effects of plastic on marine organisms. Why might this be an important research topic? Discuss the distance of your school from the ocean, your student’s connections to the ocean through the watershed, and what they can do to prevent plastic from entering the ocean.

Extensions

Not All Plastic Floats: Density and Buoyancy

All of the plastic pollution collected by the ORV *Algalita* research crew was floating on or near the ocean’s surface, but not all plastic floats. Many types of plastic sink directly to the bottom of the ocean, or remain suspended in the water column. The amount of plastic visible on the ocean’s surface varies with sea state and barometric pressure. Have students create a list of plastic items described by the ship’s crew. Then ask the students to discern which plastic items might sink if changes were made to the plastic object (e.g. the bottle cap was removed, or the air was let out of the balloon.) Have students develop a hypothesis, and collect the items to test the hypothesis using a tub of water. Measure mass and volume to calculate the density of each item to further illustrate their observations of buoyancy. What does this tell us about the quantity of plastic pollution in the ocean relative to the observations of the research crew?