



## Deep East 2001 Exploration

# Down in the Dumps

### FOCUS

Hudson River Canyon

### GRADE LEVEL

7-8

### FOCUS QUESTION

What are the effects of long-term dumping in the ocean?

### LEARNING OBJECTIVE

Students will determine the fate and effects of past dumping activities at the DWD-106 mile site in the Hudson River Canyon.

### ADAPTATIONS FOR DEAF STUDENTS

Teaching time can be increased to 2 class periods. The first class period will be used for explanation and research. This would include the K-W-L chart, the general pollution discussion, and the web searches for background information. The second class period will be used for the debate and wrap-up.

### MATERIALS

Resource Sheets (15 Arguments in Support and 15 Arguments Against Dumping)

### TEACHING TIME

One 45-minute session

### SEATING ARRANGEMENT

Divide the class into two groups.

### KEY WORDS

Municipal sludge  
Biomass  
Biodiversity  
Pollution  
Dumping  
Mediator  
Debate  
Organisms

### BACKGROUND INFORMATION

Between 1989 and 1992, a large volume of sewage sludge was deposited off the New Jersey coast. This site is known as DWD-106, or Deepwater Dumpsite 106. The sludge was deposited by a barge at the surface, and the coarser materials settled faster than the smaller particles, which tended to mix with the ocean water.

This dumping affected deep-sea communities in a variety of ways. Increases in certain chemicals and biological changes that were not expected were discovered at the site. The dumping was halted as a result of these findings. Some of these chemicals found their way into the deep-sea food webs, since the sludge-derived organic material was ingested by invertebrates. Scientists are studying some of the invertebrates, specifically the urchin *Echinus affinus*, to see if sludge chemicals have bioaccumulated in these organisms.

Biodiversity at this site is high. The weight distribution of associated fish species seems not to have been affected by the dumping activities when compared with weight distribution of the fish at other

sites. The long-term effects of human impact at this dumpsite are now being studied.

### LEARNING PROCEDURE

1. Have the class do a K-W-L chart on municipal sludge.
2. Discuss pollution in general and its effects on ecosystems. Teachers will want to use their own situations so that students can make a connection to their surroundings.
3. Brainstorm good and bad effects of landfills and their surrounding environments. Teachers will then lead a discussion comparing landfilling activities to deep ocean dumping, and how dumping in the oceans could affect those deep-sea ecosystems.
4. Divide the class into two groups; one in support of dumping, one against dumping.
  - The group that will be in favor of dumping could include city officials, landfill management, developers, residents of a large city and its surrounding areas.
  - The group that would be against dumping could include local, state, and federal government representatives, environmental groups, and fishermen.
5. Each group will research the DWD-106 mile site to understand why they would either support or not support dumping (see Resource Sheets). Web sites to use include:  
<http://marine.rutgers.edu/nurp/vdover96.html>  
<http://marine.rutgers.edu/nurp/grasjf96.html>  
[www.csa.com/routenet/cnie/feb98/98feb21.html](http://www.csa.com/routenet/cnie/feb98/98feb21.html)  
<http://www-ocean.tamu.edu/~wormuth/pollution.html>
6. With the teacher or an individual student acting as the moderator, the two groups will debate the pros and cons of dumping at DWD-106.

### THE BRIDGE CONNECTION

[www.vims.edu/bridge/](http://www.vims.edu/bridge/)  
<http://marine.rutgers.edu/nurp/vdover96.html>  
<http://www.csa.com/routenet/cnie/feb98/98feb21.html>  
<http://marine.rutgers.edu/nurp/grasjf96.html>  
<http://www-ocean.tamu.edu/~wormuth/pollution.html>

### THE "ME" CONNECTION

Students will see the end result of the waste products that are produced from our everyday lives. What can be done with this waste? Is dumping in the ocean a solution?

### CONNECTION TO OTHER SUBJECTS

Geography, English/Language Arts, and Health

### EVALUATION

At the conclusion of the debate, students will write an essay comparing the pros and cons of dumping in the deep-sea. They should be able to give at least two points for either side of the argument.

### EXTENSIONS

Instead of a debate, the students could have a trial. The class would be divided into roles such as the judge, jury, lawyers, officials, and witnesses. The officials from the large city who authorized the dumping to take place could be put on trial. Witnesses could include those who would be in support of the dumping and those who would be against the dumping. At the end of the trial, the "jury" would decide if the dumping should continue.

### NATIONAL SCIENCE EDUCATION STANDARDS

#### Physical Science – Content Standard B

- Properties and changes of properties in matter
- Transfer of energy

#### Life Science – Content Standard C

- Structure and function in living systems
- Regulation and behavior
- Populations and ecosystems
- Diversity and adaptations of organisms

#### Science and Technology – Content Standard E

- Understandings about science and technology

#### Science in Personal & Social Perspectives – Content Standard F

- Personal health
- Populations, resources, and environments
- Natural hazards

- Risks and benefits
- Science and technology in society

**History and Nature of Science – Content Standard G**

- Science as a human endeavor
- Nature of science

**FOR MORE INFORMATION**

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<http://oceanexplorer.noaa.gov>

## Student Handout

# Student Resource Sheets

### In Support of Dumping

#### ***Arguments in support of dumping at DWD-106:***

- Large cities have no place to dump waste.
- It keeps the streets clean.
- The onshore environment will be cleaner, including the air quality.
- The weight, or the biomass, of the fish associated with DWD -106 is not affected.
- There is a great diversity of organisms at DWD -106.

### Against Dumping

#### ***Arguments against dumping at DWD -106***

- The chemicals accumulate in the organisms.
- There are biological changes in the organisms.
- The sludge is ingested by the invertebrates and becomes part of the food web.
- The sludge may eventually affect humans through the food web.
- In some places, the sludge is moving back toward land.
- The sludge is also moving downstream, so it affects other locations as well.
- The long-term effects of dumping sewage sludge in the ocean are not yet known.