

## HOW CAN WE HELP PROTECT OUR WATER RESOURCES?

# Classifying Aquatic Debris

### VIRGINIA SOL

- Science 1.8, 3.10
- Social studies 1.10, 2.10
- Language arts 1.3, 1.12, 2.3, 3.9
- Math K.17, 1.20

### OBJECTIVES

- Predict the effects on animals of different kinds of aquatic debris (litter) in water
- Discuss the concept of debris and entanglement
- Describe specific examples of hazardous effects of debris on wildlife
- Discuss other harmful effects of debris in water
- Classify different kinds of debris found in water
- Identify different ways that debris can find its way into the water
- Discuss ways to reduce harmful debris
- Make a display presentation to publicize harmful effects and different types of aquatic debris, and possible solutions

### MATERIALS

A large garbage bag of assorted trash items, provided by the teacher

### SAFETY & REGULATIONS

All trash objects should be cleaned and checked by the teacher before being handled by students. Avoid any sharp objects or materials containing harmful chemicals.

For the field trip to the water site, follow all safety procedures as described in the Introduction to this packet.

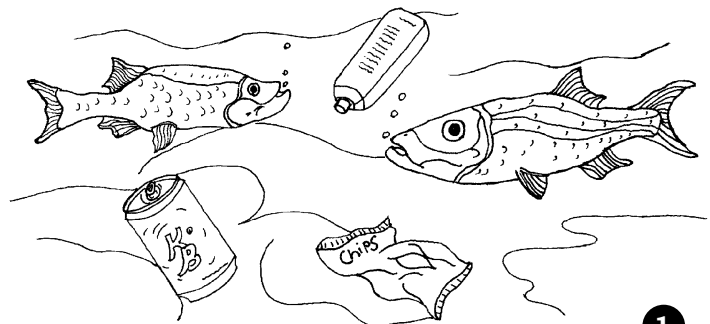
### TIME NEEDED

2 class periods, and additional time to visit local water site

*What different kinds of litter can be found in local water and how can it cause harm to people and animals?*

This lesson is designed to increase students' awareness of different kinds of debris in water environments. Many times we think first of debris on our beaches and in our oceans. However, debris is also found in other aquatic environments, such as streams, rivers, ponds and lakes. Litter on beaches and in waterways is more than an ugly eyesore. Now we realize that debris has serious detrimental effects. Animals and humans can be harmed, aquatic habitats can be destroyed or damaged, littered beaches may need to be closed due to health concerns and it can be very costly to carry out cleanups or repair damage caused by debris.

Impact on animals is the first harmful effect of aquatic debris that most people think of. Fish, birds, mammals, and sea turtles can either ingest aquatic debris or become entangled. When animals ingest debris they have a false sense of being full and they can then die of starvation. Birds, fish, turtles and other animals that become entangled in fishing line, six-pack rings, or other packaging become restricted in their movement. Entanglement makes it harder for the animal to eat and breathe and often leads to death. Plastic trash is a particular danger to animals.



## HOW CAN WE HELP PROTECT OUR WATER RESOURCES?

Plastics have many desirable qualities and so are widely used, but plastics also take hundreds of years to break down. Plastic materials can also look very similar to some animal foods and so are often mistakenly ingested by animals.

Other harmful effects of aquatic debris include risks to human health and safety, for example from pieces of glass or metal, or such things as discarded needles and syringes. Boaters can be endangered by entanglement of boat propellers. Aquatic habitat is diminished or destroyed when debris covers submerged aquatic vegetation or smothers bottom-dwelling species. Chemicals from debris can have detrimental effects on water quality. And there are also economic impacts from aquatic debris. It is very costly to carry out clean-ups of trash and debris, and there are other indirect consequences such as lost tourist income to littered parks and beaches.

In this lesson, students will first discuss these harmful effects of aquatic debris. They will then sort household garbage or trash into different categories to understand some different types of aquatic debris, and they will also discuss different sources of aquatic debris. Lastly, the students will discuss some solutions to the problem of aquatic debris, and they will make a display presentation to publicize harmful effects of aquatic debris, different kinds of trash, and possible solutions.

### LESSON INTRODUCTION

Begin the lesson by talking with children about how different kinds of trash in water can affect the animals living in that habitat. Discuss with them the concepts of debris and entanglement. Emphasize to the students that trash or garbage refers to waste being generated, and when it is improperly disposed it then becomes debris or litter. First, ask children to work in groups to predict some effects that debris might have on different animals. After the groups have shared their suggestions, describe to the children some specific examples of hazardous effects of debris on wildlife.

Debris in water can have harmful effects on wildlife, but the debris can also have other harmful consequences. Ask the students what other harmful effects they can think of, and then discuss some examples with them. Other harmful effects include hazards for humans as well as animals, impacts on aquatic habitats, and economic impacts from costly cleanups and lost tourist revenues. As harmful effects of debris are discussed, organize these on the board in different categories.

Have students summarize the different harmful effects of aquatic debris in their science journals.

### ACTIVITY PROCEDURES

Talk with students about different kinds of trash. Ask the children what different kinds of

## HOW CAN WE HELP PROTECT OUR WATER RESOURCES?

trash their families produce. Ask the students how the trash that their family produces might find its way into a stream, lake, or other water body. Ask the students if they have recently visited a river, a lake, or the ocean, and what trash they have seen near the water. Make sure students recognize that any trash that is improperly disposed is considered debris (litter) and can potentially enter a waterway and have negative impacts there.

Provide the class with a collection of trash. For safety reasons, the teacher should provide this trash. Students should not bring trash from home. This allows the teacher to be sure that students will not come into contact with any harmful objects. The trash should also be washed clean before bringing into the classroom. A large plastic garbage bag can be filled with cleaned trash in advance, and then the bag can be emptied out in the classroom, either on the floor or on a large table.

### **Observing, Describing and Classifying**

Have the students work in small groups to observe, describe, and then eventually classify the trash. First, allow each group to collect different pieces of trash for the group to study more closely. Let the groups talk about their collection of trash and the characteristics of each piece. After each group has had time for a discussion, direct each individual student to choose a *favorite* piece of trash. The students should then make a drawing of their object and also write a sentence describing the object in words. When the students have finished

doing this, gather the groups together and show the whole group drawings and descriptions made by some of the students. Praise these students' work, and point out to the group how the students' drawings and descriptive words are successful in describing their objects.

Next, ask students in the large group to share words they used to describe their favorite piece of trash. Write these words on the board as the students share them. This should result in a good list of descriptive words. Read these aloud along with the class, so they can practice the words by reading them out loud. Leave these descriptive words written up on the board to help the children as they classify the trash items into groups.

For the classifying activity, begin by having each of the small groups work together to sort their own collection of trash objects into separate families. The students should sort their collection of objects into several smaller families of objects. Make sure to walk from group to group as the students do this and ask each group what it is that the objects grouped together share in common with each other. Usually the students will be grouping the objects based on the descriptive words that were used to communicate their earlier observations of the objects. When each group has sorted their objects, ask each group to join with a different group, and have the group spokesman explain for the other group how the sorting was carried out. Then the two

## HOW CAN WE HELP PROTECT OUR WATER RESOURCES?

groups should combine their objects and work together to reclassify the objects into families again, this time working as a larger group. Have the students complete the classification activity by each pair of groups working together to create a poster showing how they chose to do their final classification. The students can glue the families of objects of trash onto their poster board. They should label each of the families of objects that they create on the poster board with a descriptive word, and they should write a number for each family of objects.

Students could classify the objects of trash in a number of different ways. The most obvious way to classify trash and aquatic debris is by its appearance. For example, different objects are made of different materials, such as plastic, metal, glass, cloth, or paper. Objects can also be classified according to their source or what they were used for. Examples of different activities producing trash include fast food consumption, smoking, fishing, other sports and games, advertising with balloons, and illegal dumping. Objects could also be classified as biodegradable or non-degradable, recyclable or non-recyclable, or by the type of impact they can have on the environment. Some objects, including fishing line, are dangerous to wildlife because animals can become entangled. Discuss with the class different ways that groups have decided to classify the trash, and tell students about some of the other possible ways that they may not have considered.

### *Discussion of Sources...*

After the students have classified a selection of household trash, they should next discuss different ways that trash can find its way into water. Lead a classroom discussion of some of the different possibilities. These will include littering directly into waterways, dumping trash into storm drains, and dropping trash on a street served by storm drains. Trash can be deliberately tossed from a car or accidentally blown from a car or truck. Trash can also enter the water, either deliberately or accidentally, from commercial or recreational ships and boats. Illegal dumping and inadequate sewage treatment are two more ways that trash can reach water. List different ways that trash can get into the water on the board.

### *In the field...*

After the students have discussed in the classroom some different ways that litter can get into water, you might take the students on a visit to their local water study site. Have the students observe the water and its surroundings, with the focus for their observations being any signs of debris. The students should look for different kinds of debris, and they should also continue to think about the different ways that litter can reach the water.

### *Back in the Classroom...*

Back in the classroom, have students write additional entries in their science journals to describe the work they have done and what

## HOW CAN WE HELP PROTECT OUR WATER RESOURCES?

they have learned from it. The students should summarize their classification of trash into different categories. They also should summarize what they have learned about different sources of aquatic debris.

The last thing for students to do, having learned about the harmful effects of aquatic debris, classified different types of trash, and discussed different ways that trash gets into the water, is to generate some possible solutions to the aquatic debris problem. Ask students to think about the reasons that people litter, and then suggest solutions that will change this behavior. The students should talk about this in small groups first and then share their suggestions with the whole class. One possible solution is to clean up debris from waterways regularly, using volunteers as well as paid employees. Two later lessons in this packet describe a simple cleanup for younger students and a more scientific cleanup for older students.

Cleanups, however, are only a temporary solution, and they do not address the sources of pollution. The two main approaches to preventing litter or debris from entering water in the first place are proper disposal of trash and waste reduction. People can be educated on the need to dispose of their trash properly, and ways can be found to make it easier for people to do this. Waste reduction involves examining how much waste we produce and finding ways to reduce this. The three **Rs** of waste reduction are **Recycle**, **Reuse**, and **Reduce**. Many littered items could be recycled over and over

again. Many times we could choose to use a reusable product rather than a disposable product, thereby reducing the amount of waste we create.

Finally, have the class work together to create a display presentation to publicize everything they have learned about the harmful effects and different types of aquatic debris, and possible *pollution solutions*. This display presentation could be in poster form, or in the form of a three-dimensional model representing different kinds of trash and designed to show harmful effects along with possible solutions.

### QUESTIONS

- What kinds of litter or aquatic debris have you seen around a river, a lake, or the ocean?
- How might different kinds of litter or debris be harmful to animals?
- What might you do to help stop animals being hurt by aquatic debris?
- What might you do to help reduce the amount of trash?
- Do you support or oppose requiring that grocery stores charge for bags to encourage consumers to use reusable shopping bags?

### ASSESSMENTS

- Science journal entry on harmful effects of aquatic debris.
- Science journal summary of classification of trash into different categories.

## HOW CAN WE HELP PROTECT OUR WATER RESOURCES?

- Science journal entry summarizing what has been learned about different sources of aquatic debris and different ways that it can get into water.
- Classification poster with different objects of trash grouped together, each group numbered and labeled with a descriptive word.
- Display presentation publicizing harmful effects and different types of aquatic debris, and possible solutions.
- Have students draw pictures of an aquatic environment that is healthy for wildlife and an aquatic environment that is hazardous for wildlife. To go with their drawings, students can write a few sentences about how to help protect the wildlife.

### EXTENSIONS

- Have students, after they have sorted objects of trash into categories, count the number of objects in each different category. Have the groups of students create bar graphs showing the number of objects in each category according to their classification. You can also combine the tallies for the whole class and have students prepare another bar graph for the class data.
- Help students survey their school grounds or community for litter. If there is a serious litter situation, help students to develop a plan to address the problem and raise public awareness.

### RESOURCES

*For the teacher...*

- Aching Gull. *Pollution Solutions: Litter Prevention Activities for Virginia Teachers.*
- Henry Heron, A Litter Story. *Pollution Solutions: Litter Prevention Activities for Virginia Teachers.*
- Plastic Dumping Simulation Game. *Plastic Debris Teaching Activities.*
- Stash the Trash. *Pollution Solutions: Litter Prevention Activities for Virginia Teachers.*
- Tangled in Trash. *Waterways: Links to the Sea.*
- Turning Back the Plastic Tide: Will Plastic Take Over Our Oceans and Beaches? Price, B. (1988). *ScienceWorld*, 44(18), 8–11.
- Turning the Tide on Trash: Marine Debris Curriculum. U.S. Environment Protection Agency, Office of Wetlands, Oceans, and Watersheds <http://www.epa.gov/owow/OCPD/Marine/contents.html>
- Virginia Department of Environmental Quality Office of Litter Prevention and Recycling. [www.deq.state.va.us/recycle](http://www.deq.state.va.us/recycle)
- Wildlife and Marine Debris. *Save Our Seas.*

*For the student...*

- *Prince William*. Rand, G. (1994). Henry Holt & Company. (Caring for a baby seal caught in an oil spill.)