

## Activity 3-B: Pollution Soup

**Summary** This activity illustrates how many of the items we use every day in the home and yard can create hazardous waste when mixed with water and disposed of carelessly.

### **Learning Objectives**

Students will be able to:

- (a) identify household items that are harmful to the environment and those that are benign; and
- (b) learn how long-term disposal of household products can end up polluting our water supplies, and how to avoid such pollution.

**Age Levels** 7 and up

**Subject Area** Science

**Time** 30–60 minutes

**Materials** A large container—goldfish bowl, glass jar, or aquarium  
An improvised filter system to represent what primary sewage treatment does, made of a plastic pop bottle (cut off the top section of the bottle to make a funnel, turn it upside down and set it in the bottom section of the bottle) and a plastic vegetable strainer  
Film canisters, labeled (masking tape works well) and containing small amounts of the items listed under “Procedure”  
Factsheets #2, #3, and #4 on pages 3-7 through 3-11

**Background** As outlined in the factsheets on pages 3-7 through 3-11, every day we use chemicals in and around our homes that will have a long-term, serious impact on the environment. If we are going to cut down on the pollution of our water supplies and the destruction of waterways and wetlands habitats, we need to change our household habits. For example, many people throughout the Cayman Islands like to use bleach in large amounts as a general-purpose cleaner, because it kills bacteria. However, bleach contains chemicals, like dioxins, that are a known cause of cancer if absorbed over an extended period of time. Baking soda works just as well as a scouring agent and is a harmless alternative.

**Procedure**

1. Have a student fill the container half-full with cold tap water. Ask students if we can assume this water is safe to drink. “Who would drink this water?”
2. Pass out the prepared film canisters to students.
3. Have the students add the contents of the film canisters to the large container of

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water (approximately in order of listing), one at a time or in groups as follows:

- natural items
- manmade items used in the home
- manmade items used in the home that are quite toxic—these go down the drain, for the most part, and then to a treatment plant (in urban areas) or a septic system (in rural areas)
- items used in the yard or community that often get washed down storm drains or go untreated into ditches and streams and end up in the ocean

4. Discuss what effects they have on humans, and on the animal and plant life in places where the water will end up.

## Natural items

- **Milk** left over after a meal.  
Would you drink this water?
- **Vegetable water**, from the draining of hot cooked vegetables  
Is the water still okay to drink? Does the temperature of the water make a difference to you? Does it make a difference to fish?
- **Salad oil** from leftovers remaining in the salad bowl  
Would you feed this water to your pets (dog/cat/bird)?
- **Food scraps**—yam or banana peels  
Would you drink this water or let your pets drink it?
- **Potting soil, mud or sand, leaves** from rinsed-off muddy shoes or hands after planting in the home or yard  
What does sediment do to aquatic life? What if this water accidentally ended up in your bath or shower? How would you feel? Would you be mad? Would you want to know who put it in your water?

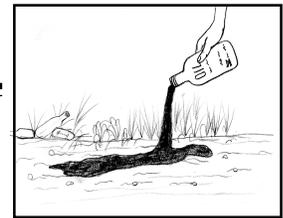
5. Continue the discussion by pointing out that excessive nutrients increase the level of nitrates and decrease the level of dissolved oxygen in water. Explain that the items so far have been natural things and, while they have not contaminated the water, it becomes unpleasant to us. Adding a lot of foodstuffs will cause algae to grow. When these producers of oxygen die and decompose, they use up much of the dissolved oxygen in the water, so there will not be enough for the fish and other animals. Discuss the difference between natural and manmade items.

## Manmade items #1

- **Shampoo**, after washing hair
- **Laundry detergent**, after washing clothes  
What would happen to you if you unknowingly drank some of this water? Would you be fine? Would you be ill? Do you think you might have to see a doctor?
- **Bleach mixed with water**, after washing and cleaning.  
What kind of effect do you think this will have on the plant life in the area? In turn, how will this affect fish and wildlife that use the plant life for food and protection?

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## Manmade Items #2

*Note: Items in (parentheses) indicate a harmless substance to use in the demonstration rather than a toxic one.*

- **Household cleaner (baking soda)**, used for scrubbing sinks and tubs
- **Drano (rock salt)**, used for clearing drains
- **Motor oil (molasses)**—washes down storm drains and into ditches from driveways and roads
- **Coolant/antifreeze (milk with a drop of green or blue food colouring)**—washes down storm drains and into ditches from driveways

If this water accidentally ended up in your shower, what might it do to your body? So imagine what these things must do to fish and wildlife, which have no choice about whether they consume these toxic substances. What would you want to say to someone responsible for putting these things in your water supply that would make them realize they could harm you and the plants and animals?

- **Styrofoam litter**—is washed down storm drains and ditches, left on beaches, or thrown from boats
- **Plastic bags**—are washed down storm drains and ditches, left on beaches, or thrown from boats
- **Aluminum cans**—are washed down storm drains and ditches, left on beaches, or thrown from boats.

Litter is quite obvious, and we can easily recognize it as pollution. Many of our fast-food and take-out items are packaged in Styrofoam containers, plastic bags, and cans or bottles that get tossed away. What effect does garbage have on plants and animals? Murkiness of the water will prevent sunlight from getting through to the plants—so what happens then? Also, creatures often mistake garbage for food or become entangled in it.

## Discussion/Reflection

Some of the discussions are included in the procedure (such as items 4 and 5). As the teacher goes through the activity, it is best to discuss the items at that time. The discussions can also be geared to different age levels, depending on how much information you wish to use.

When all the items have been added, discuss what primary treatment does (mostly in a sewage plant or in a septic tank). We often think that treatment plants are going to fix up this mess. Demonstrate by using the improvised filter. With primary filtration, solids are removed from the water, but not much of anything else. All of the pollutants dissolved in the water will, unfortunately, remain in the water afterwards. The same is true of septic tanks and grease, or grey-water, pits. We must be conscious not only of the big stuff going down the drains, but everything else as well. What goes in will inevitably end up poisoning the water and the creatures dependent on it for life. We, too, are among those creatures.

Also discuss the water cycle. Whatever goes into the water will somehow find its way back to us—in the food we eat, the water we drink, the clothes we wash.

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Ask where the water that we use goes—“down the drain” in our homes and “down the storm drains or into the ditch” from our yards and streets. Because wetlands and estuaries are where many pollutants end up, we have to be concerned about what we do with our water. Floating bits attached to pollutants end up settling on the bottom. Marshes help to keep the ocean’s water clean and healthy by filtering and removing harmful pollutants before they reach the sea. Therefore, the water flowing out of the marsh is cleaner and purer. Some of these pollutants can actually be turned into harmless products through processes that take place inside the plants or below the soil in the plant roots.

There is, of course, a limit! Plants can store and get rid of only so much before these toxins are released back into the aquatic environment. As the plants die and decompose, these toxins will be harmful—in some cases, deadly—to the estuary and ocean. The effect of bioaccumulation on the food chain is an example of this (see page 3-15). The best solution is to reduce pollution or, better yet, eliminate it.