

FRED THE FISH

I. Objectives

- a. To learn in a hands on, fun way about real life water pollution and it's effects on the environment and ecosystems.
- b. To learn the different steps in the water treatment process.

II. Materials

1. Fred the Fish Story
 2. large clear jar
 3. plastic fish suspended from pencil with fishing line
 4. water
(About 1/4 cup of each of the following)
 5. Dirt = Erosion
 6. Brown Sugar = Fertilizer (lawns)
 7. Karo Syrup = Oil (car oil change no recycling)
 8. Salt = Natural Saltwater Spring
 9. Paper = Litter
 10. Soap = Campers Washing (burping bubbles)
 11. Pudding = Untreated Sewage (city not doing its job)
 12. Green Food Coloring =Leaking toxic waste (rusting barrels)
- About 1/3 small ziploc bag of the following:
13. fine sand
 12. coarse sand
 13. charcoal
 14. fine gravel
 15. coarse gravel
 16. 3 liter soda bottle, cut in half with top inverted into bottom. Lid removed and replaced with a cotton ball held in place with a small square of cloth and a rubberband.
 17. Water Treatment Video can be shown for further reinforcement

III. The Story

Once upon a time, there was a fish. <PULL OUT FRED THE FISH> A fish named Fred. Fred lived in a natural wildlife preserve near the small town of Shady. Fred had a problem. Fred was bored. He would swim through the nice, clear water of the preserve day by day, but he always wanted to know what was outside of the preserve. He never quite had the courage to find out, until one day...

One day Fred swims around the preserve, daydreaming and not really paying attention to where he's going. He suddenly realizes he has followed the stream outside of the preserve area. Afraid, he turns around and starts to head back, but then he stops. He turns back around and looks downstream. Curiosity overwhelms Fred. He's never been outside of the preserve before. "Today," Fred decides, "would be a great day to have an adventure." He gathers up some courage, and sets off down the stream!

<DROP FRED IN THE JAR>

As Fred travels down the stream, he finds himself in a dark cloud. Soil washed in during a recent rain. <DROP ONE SPOON OF HEAVY DIRT IN WATER> He can't see where he is going. But is this going to stop Fred? The cloud begins to clear and Fred continues on.

Fred passes a storm drain. The water here smells and tastes different. Fertilizer has been washed from the neighboring lawns and has traveled down the storm drains! <DROP IN PELLETS OF BROWN SUGAR> This makes Fred feel a little sick, but is this going to stop Fred? He moves on through the goop and continues down the stream.

Fred once again finds himself in a dark cloud, but this one is slippery and sticky! <DROP IN ONE SPOONFUL DARK KARO SYRUP> Someone threw the used oil from their car onto the stream bank instead of recycling it! Is this going to stop Fred, though? He struggles to escape and slowly continues on.

A natural salt-water spring flows into the stream. <DROP IN SALT> Fred begins to taste the salt and gets very thirsty. Do you think Fred's going to stop, though? Fred ignores his thirst and presses on.

Suddenly, Fred's bumping into tires, cups, and tin cans! <DROP IN SHREDDED PAPER> He gets tangled up in all the litter. Dodging right and left, he clears the litter. Hoping that the worst is behind him, he continues on his journey.

But instead, suds surround him. <DROP IN SOAPY WATER / BUBBLES> Campers are washing their dishes and clothes in the stream! Fred burps some bubbles, and hurries on!

Shady Town Water Reclamation Plant has not been doing its job. Untreated sewage flows into the stream.

<DROP IN CHOCOLATE PUDDING > Fred has trouble breathing, but presses on. He begins to dream of the stream back at the nature preserve.

Fred finally turns back after running into a green nasty cloud. <DROP IN 1-2 DROPS OF GREEN FOOD COLORING> It was caused by leaking toxic waste at the Green Gunk Factory. The barrels have rusted through, and the holes are allowing the waste to leak out.

After a hard return journey, Fred arrives back at his nature preserve with the nice clean water. He decides perhaps it's not a bad place after all.

ADD ALUM TO JAR, and begin going over filter.

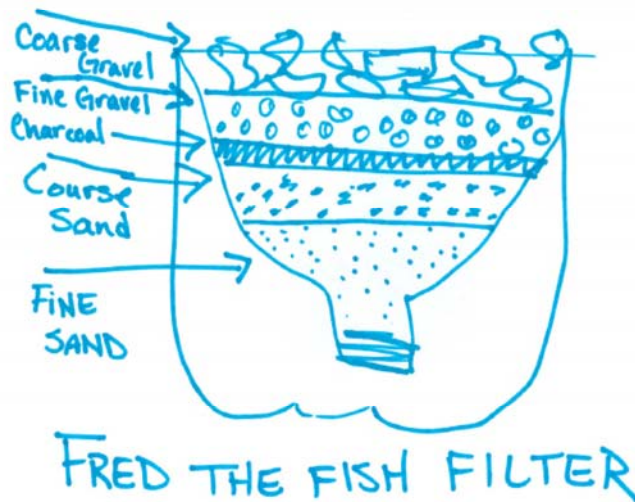
Aeration - shake the water or pour back and forth from one container to another to add air

Chlorination - pretend to add this bacteria killing agent

Flocculation - the alum has begun making particles stick together

Sedimentation - the sediments begin sinking to the bottom of the container

Filtration - Students build filters.



Have students work in groups to make their own filters. Divide polluted water between groups, pouring into completed filters. While students wait for filters to begin working, have them fill out worksheet.

Fred the Fish

“Today,” Fred decides, “would be a great day to have an adventure.”

Pollutant	Cause
Dirt	Erosion
Brown Sugar	Fertilizer (lawns)
Karo Syrup	Oil (car oil change no recycling)
Salt	Natural Saltwater Spring
Paper	Liter
Soap	Campers Washing (burping bubbles)
Pudding	Untreated Sewage (city not doing its job)
Green Food Coloring	Leaking toxic waste (rusting barrels)

Water Treatment Steps

Chlorination: Chlorine is added to kill germs and microbes

Aeration: Add oxygen to let gases escape

Flocculation: Aluminum Sulfate (Alum) added to cause suspended and dissolved particles to stick together (floc)

Sedimentation – Removal of suspended and dissolved solids from water floc sinks

Filtration – 3 to 4 feet thick, charcoal to control taste and odor.

6-8 hours to complete process

Tested multiple times – Water Quality Report

Notes: Fine sand, course sand, fine gravel, course gravel, charcoal, fred fish bucket, coke bottles with filter rubber banded and cotton ball stuffed in.

The Water Filtration Process
or
The Amazing Adventure of Fred the Fish

What were the pollutants that Fred encountered on his adventure?

- | | |
|----------|----------|
| 1. _____ | 5. _____ |
| 2. _____ | 6. _____ |
| 3. _____ | 7. _____ |
| 4. _____ | 8. _____ |

Describe how the water looked before it percolated through your filter.

Label each of the layers in the order you constructed your filter.

Describe how the water looked after it had percolated through the filter.

What are the stages of the filtering process that your water goes through every day?

- | | |
|----------|----------|
| 1. _____ | 4. _____ |
| 2. _____ | 5. _____ |
| 3. _____ | |