# Earth's Water Distribution

**Standards of Learning**
Science 6.5

**Objective**
Students will:
- Describe the importance of protecting and maintaining earth's water resources

**Materials**
- 1 one-liter bottle
- 1 50 ml graduated cylinder
- 1 10 or 25 ml graduated cylinder
- 5 clear plastic cups
- Blue Food coloring (optional)
- 1 packet of salt
- dropper

**Background Knowledge**
Although the Earth's surface is about 75% water, only 3% of that is fresh, drinkable, water. Of that 3%, three-fourths is found in polar ice caps and glaciers. That means that less than 1% of the water on the earth is drinkable. Water is vital for humans, animals, and plants.

The purpose of this lesson is to show the value of the water as essential for life. In addition lead discussions of why 75% of the earth is covered with water but only a small portion is useable.

The cycle of the Earth's water is continuous, carrying and spreading pollutants introduced by human activity all around. Intensive farming uses chemical fertilizers responsible for various forms of air and water pollution. Animal dung introduces large quantities of nitrate into the soil; the nitrate then filters into the water table. Certain underground gas tanks leak, discharging hydrocarbons into the water table. Pesticide residue is found in the water table and in watercourses; it makes water unfit for consumption. Wastewater leakage from a dwelling's underground tank contaminates the water table. Vast expanse of underground water fed by rainwater filtering through the earth; it supplies springs and can be collected in wells. Burying household waste without taking any particular precautionary measures leads to contamination of the water table. Untreated, it contains organic matter and potentially pathogenic substances that cause infection and promote the growth of algae. Pollution causes by leaks from refineries and offshore drilling platforms, by ships emptying their fuel tanks at sea and by oil spills. Radioactive nuclear waste was once immersed at the bottom of the ocean; it has a life span of up to 1,000 years. Industrial waste is highly variable; its principal components are lead, mercury, cadmium, hydrocarbons and acid deposits.

**Procedure**
1. Fill the one-liter bottle full of water or buy a one-liter bottle full of water and remove the label. This represents the earth's total water budget. Show this to the students and explain that for today this is the model for all of the water on earth.

2. Next, take the 50 ml graduated cylinder and either you or a student measure out 30 ml of water from the bottle. Do the percentages on the board. 1000-30=970, therefore the bottle now has 97% of the water and the cylinder has 3%. Take the salt and put it in the bottle. Ask the students why you did that? That's right, 97% of the earth's water supply is salt water. Now that is out of the way, let's focus on the main 3%.
3. Before you divvy it up, ask why it is important that we protect it? Let's see where it is.
4. Get cup one and label it ice (students may be thinking the ice you put in a glass, so clarify the ice like glaciers). Discuss whether or not this fresh water is directly beneficial to them here in Virginia. Then tell them that of the 3% of fresh water in the world, 76% of that is ice. Do the math 30 ml x .76 = 22.8 ml (round to 23 ml). You or a student can measure out 23 ml from the existing 30 ml place in the cut marked ice and set aside. (You should have 7 ml left)
5. Get cup two and label it shallow ground water. Discuss whether this is beneficial to them. Wells are made from shallow ground water. Then tell them that 12% of the earth's budget is from shallow ground water. Do the math 30 ml X .12 = 3.6 ml (round to 4). You or the student can measure out the 4 ml of water and place in the cup. Since this water is directly beneficial to them put a drop of food coloring in it (optional) before you set it aside.
6. Get cup three and label it deep ground water. Discuss whether this is beneficial to them. Deep ground water is not readily available for human use. Then tell them that 11% of the earth's budget is from shallow ground water. Do the math 30 ml X .11 = 3.3 ml (round to 3). You or the student can measure out the 3 ml of water and place in the cup. Set it aside.
7. Get cup four and label it lakes and rivers. Discuss whether this is beneficial to them. They can not drink from them, but they use them recreationally. Then tell them that .34% of the earth's budget is from shallow ground water. Do the math 30 ml X .034 = .102 ml. You or the student can try to get one or two drops of water from the cylinder to place in the cup. Since this water is beneficial to them put a drop of food coloring in it (optional) before you set it aside.
8. Get cup five and label it water vapor. Discuss whether this is beneficial to them. Water vapor is integral to the water cycle. Then tell them that .037% of the earth's budget is from shallow ground water. Do the math 30 ml X .037 = .0111 ml. You or the student can try to get one drop of water from the cylinder to place in the cup. Since this water is beneficial to them put a drop of food coloring in it (optional) before you set it aside.
9. Look at those that have been set aside as useful and those that have been set aside as not. How does this expedite your need for water conservation?
10. Discussion Questions:
    - What things can be done by individuals to conserve water?
    - What things can be done by industries to conserve water?
    - Why would conserving water be especially important to the agriculture industry?

**Extension**

- Find out what things are being legislated in the name of conservation.