A publication of the Southwest Florida Water Management District

Alternative Water Sources

CURRENTS

current water info for high schools

Do you ever think about the future?

There's the same amount of water on earth as there has always been, but each year the U.S. population alone grows by about 2.5 million people. By the year 2050, the U.S. population is expected to grow to about 439 million people.

Florida is growing even faster than most places in the U.S. In 1940, Florida's population was 1.9 million. Today, approximately 18 million people call Florida home. And that doesn't include the 1,000 new residents moving into Florida each day. Each person, each golf course, each school, each theme park and each flower garden uses water.

What does the future hold?
What will you do about it?

This issue of *Currents* focuses on alternative water sources. All the articles and activities are designed to help you learn more about the use of nontraditional sources of water as a way of meeting the increased demands for water in our area.

Introduction

In the early 1960s, people predicted the year 2000 would bring a Jetsons-like space odyssey featuring personal hovercrafts, push-button food and robotic maids. Obviously we're not there yet, but technology has come a long way.

We need this technology to help us deal with some big issues, such as the growing population on this planet and the limited natural resources.

Living in Florida is like living in paradise. We have sunshine, lakes, beaches, theme parks and an abundant array of wildlife. It's no wonder so many people want to live here. But additional people moving into the state each year put a strain on our natural resources. Because of this, Florida has become a microcosm of what's happening in countries around the world: growing numbers of people cause increasing impacts on our natural resources. In other words, the little state of Florida is dealing with some big worldwide problems.

Water is the most important natural resource. Every living thing needs water to survive. A person can live for about a month without food, but only several days without water. While producing "new" water is still something for which we'll have to wait, technology does allow us to use alternative sources of water. Alternative sources of water are ways of getting previously unusable water into a usable state. Below are some of the alternative water sources you may have heard about:

- Recycling or reclaiming used drinking water involves processing the water with chemicals and reusing it for non-drinkable purposes, such as watering lawns, washing cars and restoring damaged wetlands.
- Desalination removes the salt, or brine, from salty or brackish water and leaves behind clean, fresh drinking water.
- Aquifer storage and recovery, also known as ASR, takes excess rainwater, treats it with chemicals and pumps it into aquifers beneath the earth's surface. When the water is needed, it can be pumped back to the surface for use.

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Southwest Florida Water Management District

Currently Wondering

Question:

Is it true that the international color for reclaimed water is purple?

Answer:

Yes, purple is the international color for reclaimed water. In fact, reclaimed water even runs underground through purple PVC pipe. The color purple was chosen as the international identifier for reclaimed water because it's not used for identifying any other substances and because PVC pipe accepts purple dye. Other purple objects you'll find near reclaimed water include sprinkler heads, signs and tape.

Don't Let Water Go to Waste. Instead, Reclaim It!

Outdoor water use accounts for about half of all water used at home. Reclaimed water allows us to save our drinking water and, instead, use recycled water for landscapes. Golf courses and public-owned parks have been using reclaimed water for many years now, but thanks to cities and counties throughout the state, reclaimed water is now coming to a neighborhood near you.

This means that your parents, grandparents and neighbors may be using recycled water to keep their landscapes green. Having reclaimed water installed in your neighborhood means that you and your family may experience some road construction and noise from machinery, but because using reclaimed water is cheaper than using drinking water, it also means that your parents will see a cheaper water bill. You may think that using reclaimed water can't make a huge difference in saving water, but when you consider all the parks, golf courses, highway medians and residential neighborhoods that use water to maintain lush, green landscaped areas, you'll realize just how much drinking water can be saved.

Ask your parents if you live in a neighborhood that is hooked up to reclaimed water. If so, share with your family and neighbors the benefits of reclaimed water and encourage them to get "online." If your neighborhood doesn't currently have reclaimed water, don't worry. Here are some other ways you and your family can save water in your yard:

- Install the right plant in the right place. Choosing low-maintenance plants and locating them in areas that already have the light, soil and water conditions your plants require will save time and money by producing healthier plants that need less fertilizer, pesticides, water and pruning.
- Limit turf. To stay green, grass needs more water than some other plants. Plus, by cutting back on the amount of turf in your landscape, you decrease the amount of time you spend mowing the lawn.
- Water landscapes in the early morning or evening. This cuts back on the amount of evaporation that can occur. In other words, it keeps the water on your plants rather than taking it back up into the atmosphere.
- Group plants according to their water needs. Put plants that need more water together and plants that need less water together. This will allow you to water your lawn more efficiently.
- Encourage your parents to install micro-irrigation in your landscape. Micro-irrigation includes misters and drip hoses that emit only 10 to 20 gallons of water per hour.
- Put mulch around plants. Mulch holds moisture in, allowing your plants to go longer without watering.
- Score some points with parents — offer to help.

Reclaimed Water Facts

Although this may be the first time you've heard about reclaimed water, the process of reusing water has been around for quite a while. For centuries, people have reused water by withdrawing what is needed for drinking, industry and agriculture, and then releasing the *used* water back into a stream. Downstream communities would then pull water out of the stream, inevitably withdrawing some of the previously used water.

Another, older form of recycling water is the *hydrologic cycle*. This giant water recycling system circulates water through a never-ending series of stops, changing the water from a liquid to a gas and, sometimes, to a solid. Today's technology, however, allows us to recycle wastewater much faster than nature can. Below are some reclaimed water facts that you may find interesting.

- The first major urban reclaimed water system was developed in 1977 in St. Petersburg, Florida.
- More than 48% of wastewater in the Southwest Florida Water Management District (SWFWMD) is reclaimed.
- Within the SWFWMD, more than 83,000 residential irrigation customers, 168 golf courses, 375 parks, 7 power plants and 145 schools use reclaimed water for irrigation and industrial processes.
- The 288 reclaimed water projects cooperatively funded by the SWFWMD include more than 950 miles of purple pipe, which is a distance longer than that of Tampa to Washington, D.C.
- Contrary to a popular misconception, reclaimed water does not stain sidewalks brown and does not smell like rotten eggs. In fact, reclaimed water is comparable to pool water in look and smell.

Tracking the News

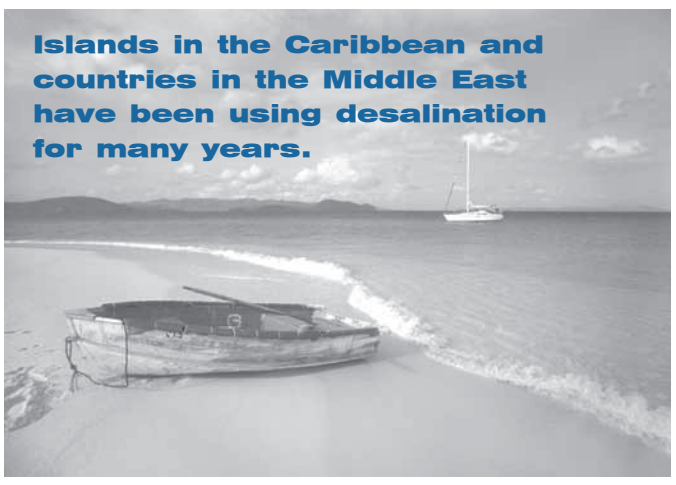
Now it's your turn to search current news articles about alternative water sources. Locate a news release at the Southwest Florida Water Management District's web site, *WaterMatters.org*, and write a short summary about it. Explain how these facts can be used to teach people about the benefits of reclaimed water.

Squeezing Fresh Water from Seawater

Our ancestors probably never considered the salty waters of Tampa Bay to be a valuable source of drinking water, but thanks to technology we now do. Through an elaborate process that removes the salt, or brine, from salty or brackish water, desalinated (or de-salted) water is now available for drinking and other purposes. Although the Tampa Bay area is just now becoming familiar with desalination, islands in the Caribbean and countries in the Middle East have been using desalination for many years.

Desalination is an important alternative source of drinking water because salt water is abundantly available in Florida and because the desalination process can be environmentally safe and droughtproof. You'll also hear many people say it allows for "sustainable" growth. Sustainable growth happens when our natural resources, roads, schools and developments are adequate enough to provide for more people to move into an area.

You may not realize it, but the largest desal plant in North America is located at Tampa Electric Company's Big Bend Power Plant on Tampa Bay. It is called the Tampa Bay Seawater Desalination Project (TBSDP). The desal plant is located at the Big Bend Power Plant because the power plant already brings in thousands of gallons of water to cool off the plant's machines. Since the water is already being pulled in, why not process it for drinking? To learn more about the technology used in creating this alternative water source, visit *www.tampabaywater.org/watersupply/tbdesal.aspx/*.



A Few Facts and Figures About the TBSDP

- The Tampa Bay Seawater Desalination Plant provides the Bay area with up to 25 million gallons of water a day (mgd).
- *Reverse osmosis* (RO), a process of desalination that uses high pressure to force salt water through membranes to separate the water into salt-free water and a salty concentrate, is used in the desalination process.
- Approximately 1.4 billion gallons per day of cooling water from the Big Bend Power Station is used as source water.
- Approximately 44 mgd of the 1.4 billion gallons of cooling water is required to produce 25 mgd of drinking water.

Currents Calculations

Use the information in the article to solve these problems.

1. If the plant is able to increase its production of desalinated water from 25 mgd to 35 mgd, what is the percent of increase?

2. If 44 million gallons of cooling water is used to produce 25 million gallons of drinking water, how much water is needed to produce 1 million gallons of drinking water?

3. Approximately how much of the cooling water is needed to produce 35 million gallons of drinking water?

Power Math — It's Extreme

Find out how powerful you are when it comes to the numbers associated with alternative water sources. But don't just choose the correct answer for each problem — explain how you got it!

1. The primary treatment phase at a wastewater treatment plant removes almost 50 percent of the pollutants. The secondary treatment phase removes almost 90 percent of the remaining pollutants. If this is so, approximately what percent of pollutants still need to be removed from the water in another phase?
   a. 5 percent b. 20 percent c. 10 percent

2. Reclaimed water can be used effectively on our golf courses. According to the Florida Department of Environmental Protection (FDEP), 419 golf courses used a total of 110 million gallons per day (mgd) of reclaimed water for irrigation in 2001. If this is so, what was the average amount of water used by each golf course?
   a. 0.45 mgd b. 0.19 mgd c. 0.26 mgd

3. Alternative water sources can help meet our water demands in the future. Almost 80 percent of the 18 million people in Florida live near the coast. It is estimated that on average 7,000 more people move to the state every week. If the same percentage of people continue to live near the coast, how many people will be near the coast after one year?
   a. 14,228,000 b. 14,691,200 c. 15,246,500

Cut and submit to the address below

Currents Quiz

Here is your opportunity to create a quiz about alternative water sources. Develop a multiple-choice question about a topic included in this issue of *Currents*. Use the form below and send a copy to us. We'll send you a free prize!

Question: _____

_____

_____

Answer choices:

a. _____

b. _____

c. _____

d. _____

The correct answer is: _____

_____

_____

Send to:

Currents Alternative Water Sources Issue
Youth Education
Communications Department
Southwest Florida Water Management District
2379 Broad Street, Brooksville, FL 34604-6899

Name _____

Address _____

_____

City _____ State _____ ZIP _____

County _____ School _____

Teacher _____ Grade _____

Cleaning Our Water

Adapted from "Water Filtration," *A Water Sourcebook* Activity

Background

Water from lakes, rivers, ponds and underground areas contains impurities such as bacteria and other microbiological organisms that can cause disease. Therefore, it is important to realize that before water can be safely used in our homes and businesses, it should be "cleaned" or treated at a water treatment plant. The processes that normally occur at a treatment plant include:

- Aeration: adding air to water and causing gases in the water to escape.
- Coagulation: removing dirt and other particles suspended in water by adding chemicals and alum that cause the clumping of sticky particles called *floc* to form.
- Sedimentation: pulling of gravity that causes floc to settle at the bottom.
- Filtration: passing of water through filters to remove most of the impurities remaining after coagulation and sedimentation processes.
- Disinfection: adding disinfectants to purify water and kill harmful organisms.

What happens at a treatment plant is similar to the earth's water moving naturally through the water cycle.

Complete the following experiment to learn the basics of water treatment.

Learning Goal

To develop an appreciation for the processes involved in keeping our water sources clean.

Subjects

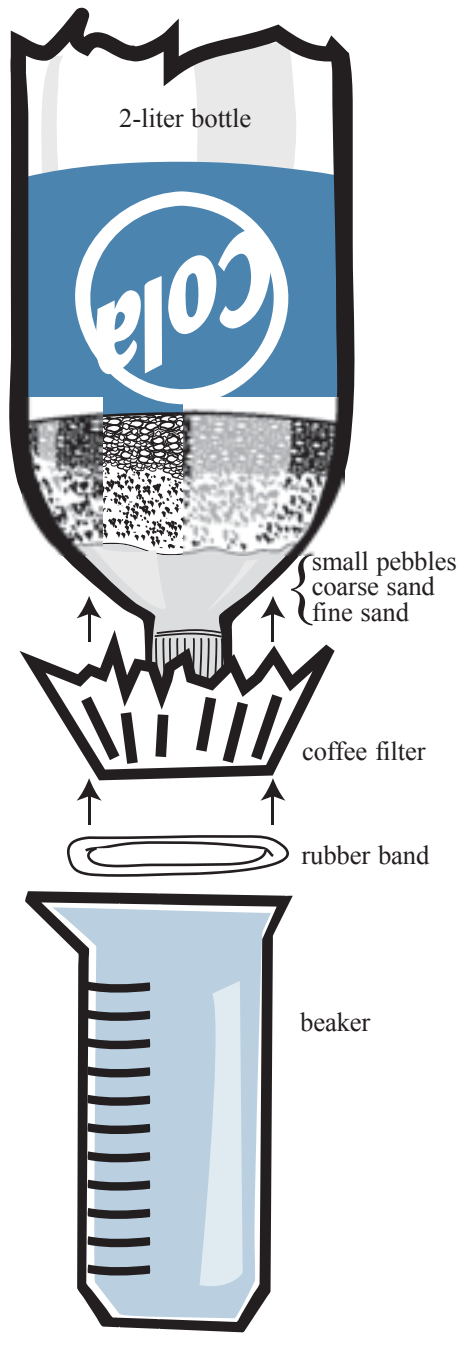
- Science
- Mathematics

Materials

- 5 liters of dirty water (add 2 cups dirt to water)
- 1 two-liter plastic bottle with cap
- 1 two-liter plastic bottle with top cut off
- 1 two-liter plastic bottle with bottom cut off
- funnel
- 20 grams of alum (about 2 tablespoons)
- spoon or stirring stick
- fine sand
- coarse sand
- small pebbles
- 2 large beakers or jars (500 ml or larger)
- 1 coffee filter
- 1 rubber band

Activity

1. Remove the cap from the two-liter bottle and pour about 1.5 liters of dirty water into it. Describe its appearance and odor. Make a chart similar to the one below to record your observations.
2. Place the cap back on the bottle and shake it for 1 minute. Use the funnel and the bottle with the cutoff top to pour this water back and forth several times. End this step by returning the water to the bottle that has its top cut off. Describe any changes that occur during the aeration process.
3. Add 20 grams of alum to the dirty water and slowly stir for 5 minutes. Describe any changes that occur during the coagulation process.
4. Allow the mixture to rest for 20 minutes. During the sedimentation process, describe any changes that occur at each 5-minute interval.
5. Use a rubber band to attach the coffee filter to the neck of the bottle that has its bottom cut off. Turn the bottle upside down and place layers of pebbles, coarse sand and fine sand as shown in the illustration. Place a beaker under the upside-down bottle. Without disturbing the layers, gently pour clean tap water through the filter for 3 minutes. Set aside.
6. Take the bottle of dirty water and place an empty beaker under the upside-down bottle. Carefully pour about two-thirds of the dirty water through the filter, collecting the filtered water in the beaker. Describe the changes that occurred during the filtration process.
7. Compare the differences between the treated water and the untreated water. Note that the final step of disinfection is not included as part of this experiment. Discuss the importance of each of the processes associated with water treatment.



Process	Description of changes that occurred
Aeration	
Coagulation	
Sedimentation Intervals:	
5 Min.	
10 Min.	
15 Min.	
20 Min.	
Filtration	

Sites for CURRENTS Readers to Explore

A lot of information about alternative water sources is available on the Internet. The following key words will help get you started on your search for information. You may want to combine "Florida" with these words to narrow the scope of your search.

Desalination
Reclaimed water
Alternative water sources
Reuse
Water supply

Also, don't forget to explore the Southwest Florida Water Management District's web site:

WaterMatters.org

Currents is provided free to schools within the following counties in the Southwest Florida Water Management District: Charlotte, Citrus, DeSoto, Hardee, Hernando, Highlands, Hillsborough, Lake, Levy, Manatee, Marion, Pasco, Pinellas, Polk, Sarasota and Sumter counties. For the corresponding teacher's guide or copies of this newsletter, visit our online ordering site at *WaterMatters.org/publications/*.

Southwest Florida
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