San Francisco Water Power Sewer
Services of the San Francisco Public Utilities Commission

What is Groundwater?

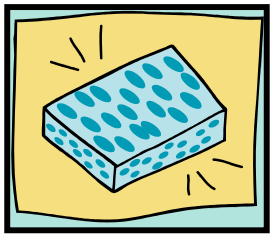
Our Underground Water Supply

Student Fact Sheet 6

Impossible to See

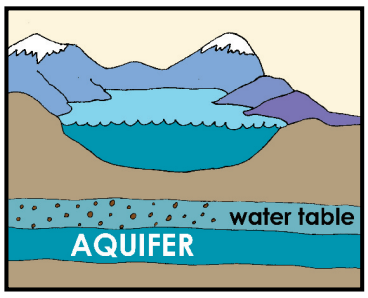
We all know water exists in rivers, streams and lakes, but fresh water is also found underground where we can't see it! This is called groundwater. **Groundwater** is water that exists beneath the earth's surface. Most of it flows between the tiny openings called **pores** that are found between pieces of soil and rock. It can also be found in breaks or **fractures** within hard rock. Forty percent (40%) of Californians receive groundwater as all or part of their daily water supply!

Soaking like a Sponge



When it rains, a portion of the rainwater soaks into the earth. The force of gravity pulls that rain deep into the ground. It then passes between **particles** or pieces of soil, sand, gravel, or rock. These tiny particles help **filter** or remove impurities from the water as it journeys downwards until it reaches a depth where the ground is filled or **saturated** with water. This is like a sponge that is soaking wet. The area that is filled with water is called the **saturated zone**. The top of this zone is called the **water table**. The water table may be very near the ground's surface or it may be hundreds of feet below.

What is an Aquifer?



When enough groundwater is held in the saturated zone, and it can be used as a source of water, that layer is called an **aquifer**. Aquifers provide water through springs that naturally come out from the earth, or through wells. A **well** is a structure that is **installed**, or put into an aquifer (after a lot of drilling!) to **extract**, or remove groundwater for our use. Aquifers are refilled or **replenished** whenever it rains. The ground absorbs the rainfall, which filters down through soil and rock until it reaches the saturated zone. This natural process is called **groundwater recharge**.

Groundwater and Nature

Groundwater can seep through, or flow into springs, creek beds, lakes, and other bodies of water. This is one way that these water bodies get replenished. Since groundwater provides water to many creeks and wetlands, the plants and animals that live in these natural areas depend on it. Without a fresh source of water, many of those species would not be able to survive. Some might even go **extinct** or disappear forever. That's why it's important, when pumping water from aquifers, to make sure there is still enough groundwater left to feed the springs

and creeks. Plants and animals need this water for their survival!

Protecting our Groundwater

The San Francisco Public Utilities Commission (SFPUC) manages its local groundwater aquifers **sustainably**. This means that the aquifer is always allowed to refill itself so that we have an ongoing supply of water for the future. To make sure we are using our groundwater wisely, scientists continually measure the amount being used. They measure how much water is flowing in, and how much water is being pumped out. They also use specialized equipment to check the water levels in wells throughout the aquifer. This allows us to avoid taking out too much groundwater from an aquifer. Withdrawing too much water, or **overdrafting** the aquifer can cause problems. One problem is that it could allow salt water from a nearby ocean or bay to seep into the aquifer. This problem is called **saltwater intrusion**. Overdrafting an aquifer can also cause the land above it to drop as the water table below drops. This is called **land subsidence**, which is another way of saying "sinking land!" In the past, the Central Valley of California has overdrafted some of their aquifers so much that in some places, the land has sunk about 30 feet in 40 years! These are some of the problems that can arise if we do not balance our groundwater withdrawals with natural replenishment.

Is it Safe to Drink?

Before a well is drilled to supply water for a city, the area has to be carefully studied. Is the proposed well site near any kind of industry such as a gas station, or other industrial site such as a landfill? If so, **pollutants** or harmful chemicals connected to those places might have soaked through the earth and into the groundwater below. This could make the water unsafe to drink or use in other ways. Once a proper site has been located, more care is taken to build or construct the well. Strict standards or rules are followed to determine where a well can be placed, and to prevent pollution from entering the well. These standards are prepared and enforced by the both State and local agencies. Finally, groundwater samples are collected from the well and tested to make sure the water is safe to drink.

Then and Now

In the 1870's, groundwater was used to create lakes and grow plants in Golden Gate Park, and it's still being used there! Today, the City of San Francisco is planning new groundwater projects; wells will be built to supply part of our drinking water. This groundwater will help make sure San Francisco has enough water to meet everyone's needs, especially during emergencies or times of drought!

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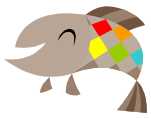

Groundwater

Student Comprehension Questions

1. What is groundwater?

2. What is an aquifer and how do they get replenished?

3. Why is groundwater so important to plants and animals that live in wetlands and creeks?

4. What does it mean to manage local groundwater aquifers sustainably?

5. How do pollutants impact groundwater?

6. What is one way you can prevent pollutants from entering our groundwater?

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Teacher Answer Key

Groundwater **Student Comprehension Questions**

1. What is groundwater?

Groundwater is water that exists beneath the earth's surface.

2. What is an aquifer and how do they get replenished?

When enough groundwater is held in the saturated zone, and it can be used as a source of water, that layer is called an aquifer. Aquifers are replenished whenever it rains.

3. Why is groundwater so important to plants and animals that live in wetlands and creeks?

Plants and animals depend on groundwater to provide water to wetlands, creeks and other water bodies in natural areas where they live.

4. What does it mean to manage local groundwater aquifers sustainably?

Managing groundwater aquifers sustainably means that the aquifer is allowed to refill itself so that we have an ongoing supply of water for the future.

5. What are pollutants and how do they impact groundwater?

Pollutants are harmful chemicals and if they soak through the earth, they can get into the groundwater below and make the water unsafe to drink or use in other ways.

6. What is one way you can prevent pollutants from entering our groundwater?

One way to prevent pollutants from entering our groundwater is to never dump pollutants on the ground.