

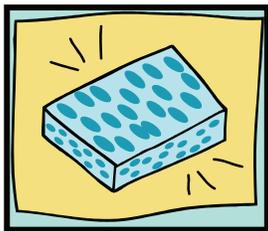
### Impossible to See



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 within soil and rock. It can also be found in breaks or **fractures** within hard rock. Seventy percent (70%) of Californians receive groundwater as all or part of their daily water supply!

### Soaking like a Sponge

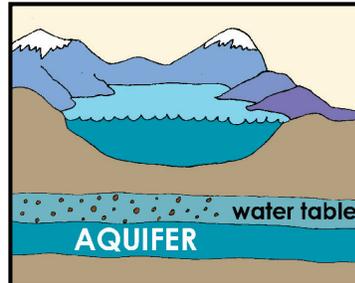


When it rains, a portion of the rainwater soaks into the earth. The force of gravity pulls that rain deep into the ground.

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 water levels in wells and to collect water samples to test its quality. 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 **seawater intrusion**. Overdrafting an aquifer in some areas can also cause the land above it to drop. This is called **land subsidence**, which is another way of saying “sinking land!” The Central Valley of California has overdrafted some of their aquifers and 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 a gas station, or any other industrial site such as a landfill or factory? 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 both State and local agencies. Groundwater samples are collected and tested extensively to make sure the water is safe to drink.

### Then and Now



Starting in the 1870’s and continuing to present day, groundwater has been used to create lakes and grow plants in Golden Gate Park. In the 1930s, groundwater was an important source of drinking water for the city of San Francisco. Today, the SFPUC is treating and blending a small amount of groundwater into 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!