



Getting To Know Water

Understanding Water As A Resource

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One of our more precious resources, water is absolutely essential for life as we know it. All living things require water for their survival.

Water makes up about 70 percent of the human body. Every system in the body needs water. Water helps digest food. Water lubricates joints. Water regulates body temperature. Water transports nutrients, hormones, enzymes, minerals, respiratory gases, and body wastes. Water makes up almost 85 percent of the blood.

Human beings can live much longer without food than they can without water. Each day the average adult must replace 2 to 3 quarts of water. This can average from 13,000 to 20,000 gallons over a normal human life span. Some of this water comes from eating food and the rest from drinking.

Water is used for food production, power generation, transportation, recreation, heating, cooling, fire fighting, cooking, and bathing.

We use water in so many ways that we take it for granted. We tend to forget that it is absolutely essential for life.

What Is Water?

Water is a unique substance. It is the only known substance on earth that commonly exists in three forms: solid, liquid, and gas (vapor). Solid water is ice, which is cold and strong. Liquid water is fluid and wet. Gaseous water is steam, which is wet, weightless, and hot. Water vapor is present in the air at all temperatures. In pure form it is colorless, odorless, and tasteless.

How Much Water Is Available?

There is no shortage of water on earth. Water is one of the most abundant substances with oceans covering more than 70 percent of the earth's surface. If the earth were a perfect sphere, ocean water would submerge the entire globe to a depth of 800 feet.

Salt Water And Fresh Water. The oceans make up 97 percent of all water on earth, but this water is salt water and not suitable for many uses. The remaining 3 percent is fresh water. About two-thirds of this water, however, is in ice at the North and South poles. The other one-third, or only 1 percent of the total water on earth, is liquid fresh water available for most common uses. (See Figure 1.)

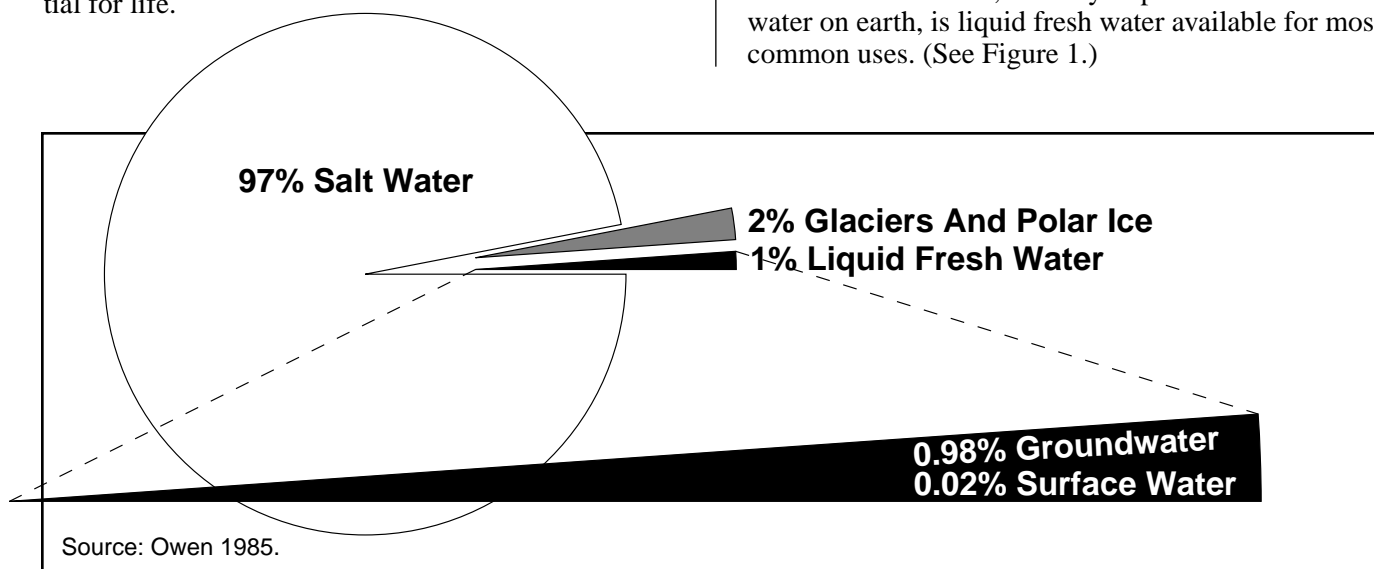


Figure 1. Availability of fresh water.

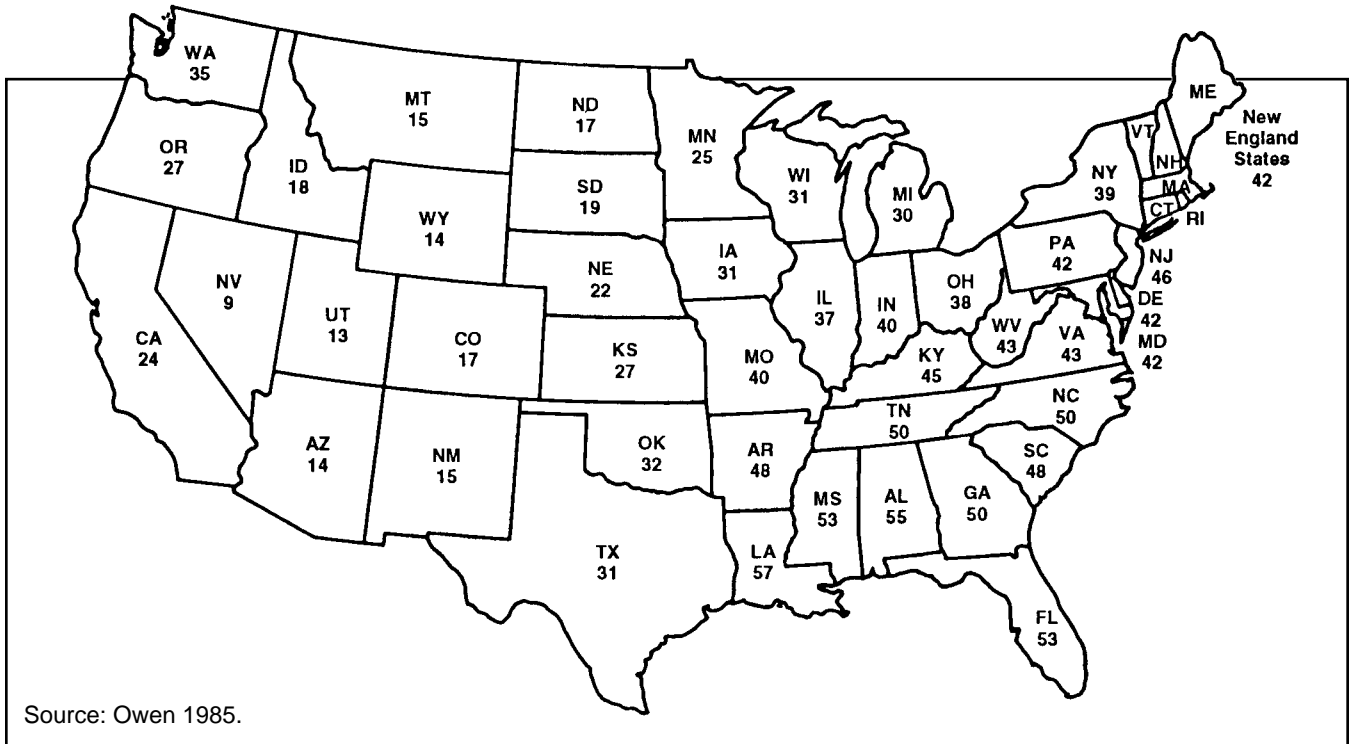


Figure 2. Average annual rainfall distribution (in inches) in the United States.

One form that liquid fresh water takes is precipitation. Essentially all fresh water comes from precipitation. At any given time only about 0.001 percent of the earth's total water supply is in the atmosphere.

Global rainfall is plentiful enough to supply all human demands except for two factors: rainfall is extremely variable and its distribution is far from uniform. For example, some areas of the world receive more than 400 inches of rain per year while others may wait several years for a modest shower. The average rainfall of the United States is about 30 inches per year. But the distribution is very uneven. The average annual precipitation per state is shown in Figure 2.

Alabama is blessed with plenty of rainfall with an annual average of 55 inches. This is second only to Louisiana, which receives 57 inches yearly. Although the statewide average is 55 inches, annual rainfall distribution is somewhat variable ranging from 48 to 68 inches. (See Figure 3.)

Surface Water and Groundwater. Of the total liquid fresh water on earth, about 2 percent is surface water and 98 percent is groundwater. This means that lakes and flowing streams, which account for most water uses, make up only 0.02 percent of the total water found on earth. So most of the liquid fresh water is found beneath the earth's surface as groundwater. That's where most

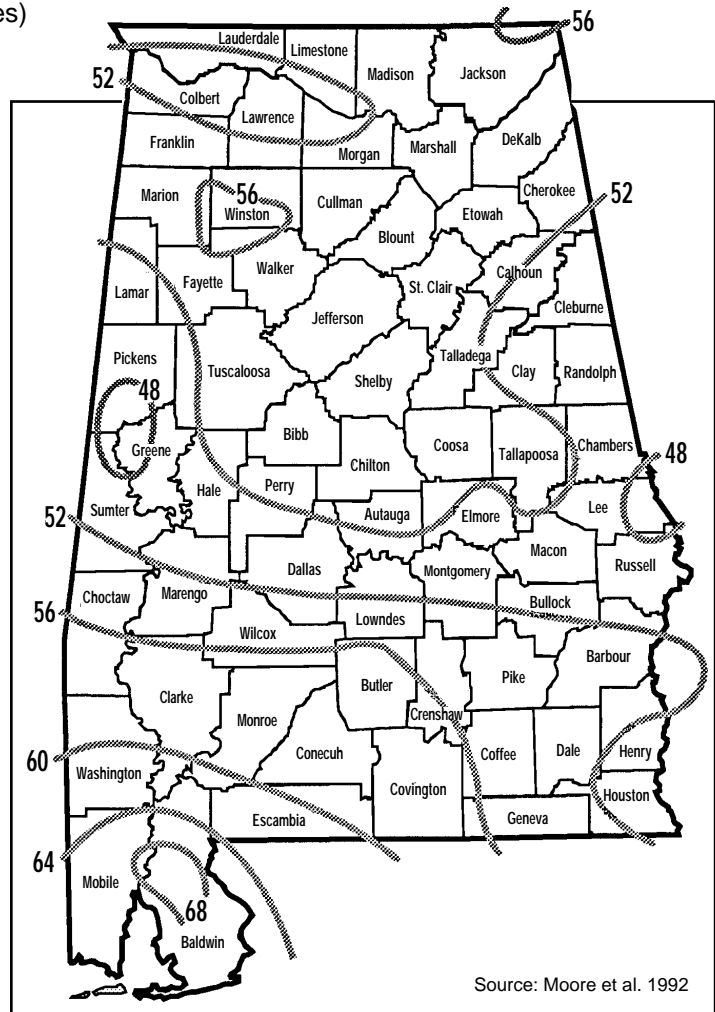


Figure 3. Annual rainfall distribution in Alabama.

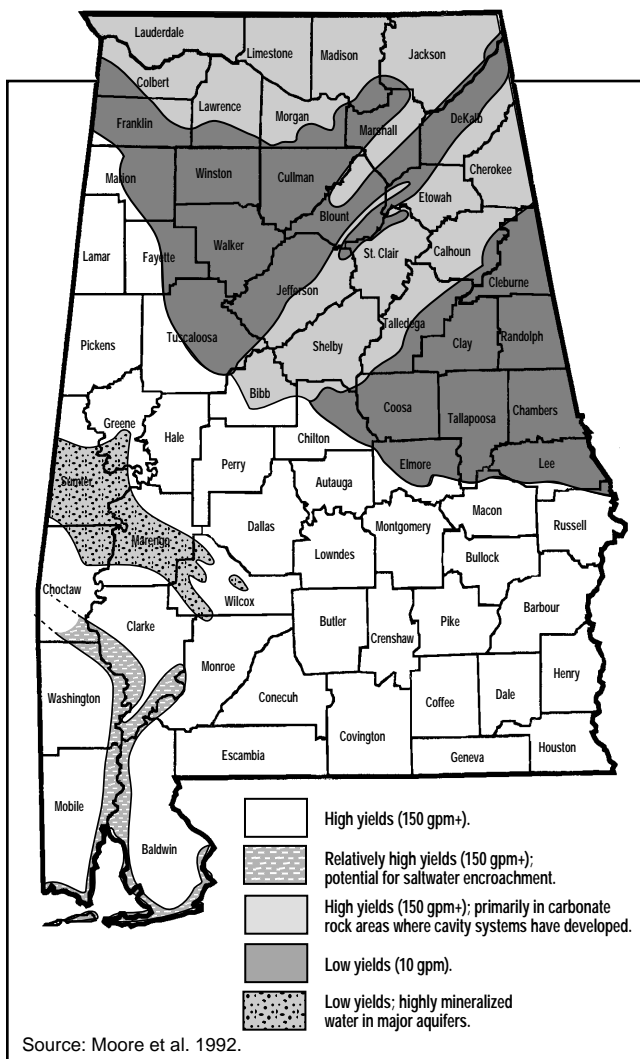


Figure 4. Potential yields of aquifers in Alabama.

fresh water is stored although some of it is not readily available.

The United States has 2 million miles of streams and more than 30 million acres of lakes and reservoirs. In addition, there are huge reserves of fresh water underground. Groundwater supplies about half of all Americans with their drinking water.

Few states can match Alabama's surface water resources. Alabama has 14 major river systems or basins, 348,826 acres of lakes and reservoirs, 400,000 acres of estuaries, and more than 3,000,000 acres of marshes and wetlands. Surface water is used for drinking water by about 56 percent of the state population.

Groundwater provides approximately 44 percent of Alabama's population with home water supplies. In many rural areas, however, groundwater makes up more than 90 percent of domestic water supplies. Several large cities and many smaller towns also use

groundwater for municipal supply, especially in south Alabama where groundwater is readily available and of good quality. (See Figure 4.) High yields of groundwater also guarantee water for industrial development.

How Much Water Do We Use?

An average American family of four uses about 88,000 gallons of water a year. This amounts to an average of more than 240 gallons a day for the household or more than 60 gallons per person per day. In large homes with several bathrooms and irrigated lawns, families can use more than 75 gallons of water per person per day.

Most people use 50 to 70 gallons of water indoors each day and may use just as much or more outdoors, depending on the season. Indoors, three-quarters of all the water is used in the bathroom. Outdoors, lawn and garden watering and car washing account for most of the water used.

Most items we use every day require water in their manufacturing. For example, it takes 148 gallons of water to produce a Sunday newspaper, 32 gallons to make a pound of steel, and 158 gallons to produce a pound of aluminum. It requires almost 800,000 gallons of water a year to provide one person with food. Water is used not only to grow food, but to process food as well. It takes 148 gallons of water to make a loaf of bread and 285 gallons to make a pound of ground beef.

Who Owns The Water?

Unlike ownership of land, ownership of water is not a simple matter. In fact, water law is one of the most controversial issues of modern civilization because water is constantly changing. The location of water changes over time. Water is also changed by the climate, the water cycle, the way it is used, and the way people modify land.

Water may be obtained from three sources: surface water, watercourses, and percolating water. Surface water is that water on the earth's surface which does not flow in a well-defined channel. Most of us think of surface water and watercourses as being the same thing, but in terms of water law that is not necessarily the case.

A watercourse may be defined as water flowing in a well-developed channel on or below the surface of the land. Groundwater that is moving in a well-defined aquifer may be defined as a watercourse. Water beneath the earth that is not confined to a well-defined channel is called percolating water. The separation of percolating water and underground water that is in a watercourse has been a subject of much argument because both may be classified as ground-

water. The difference is that one is confined and the other is not.

In general, surface water in Alabama belongs to the individual landowner to use as he pleases, except in municipal limits of incorporated cities. Rural landowners are entitled to all the surface water they can retain and use on their land. This allows higher elevation landowners in rural areas to deprive lower elevation landowners of water benefits from surface water. With Alabama's abundant rainfall, there is usually little concern about surface water usage but more concern about surface water discharge. In rural areas the higher elevation landowner has the right to discharge surface waters over the property of lower elevation landowners. The lower landowners cannot interrupt or obstruct this flow.

The use of watercourse water in Alabama is based on the principle of the **Riparian Rights Doctrine**. The basic premise of this doctrine is that water in its natural state, a watercourse, can be used only on that land through which it flows. Thus, a riparian landowner can use riparian water anywhere, so long as it does not extend beyond the natural watershed of the riparian source of water.

However, the use of riparian water is subject to the **Reasonable Use Doctrine**. This means that riparian water may be used for any purpose so long as quality and quantity of flow are adequate for other downstream riparian owners. Since "reasonable use" is difficult to define, many states now have permitting programs to monitor riparian uses so that all owners can have their reasonable share of the available sources. At this time, Alabama does not have a statewide permitting program for all riparian watercourse users, although cities and industrial users are permitted.

The right of use of percolating water in Alabama is very similar to surface water use. Individual landowners have the right to reasonable and beneficial use of these waters even to the extent that neighboring properties can be affected, as long as the water use is not wasteful and does not cause personal injury to others.

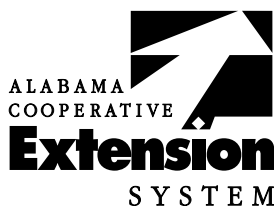
With a growing interest in preserving the natural quality of scenic rivers or other areas, the **Public Trust Doctrine** is likely to be adopted by more states in the future. It has been invoked in California. The principle of this doctrine is that private rights to use water may be limited by the need to preserve environmental, scenic, recreational, or scientific areas that benefit all. Hence, certain waters may be held in public trust to preserve their quality and use for future generations under this doctrine.

So who owns the water? It depends on the location of the water over time.

For effective water management, however, there must be cooperation between federal, state, and city governments as well as individuals.

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