

Uses of Water

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CHAPTER 1

Uses of Water

Learning Objectives

- Describe how humans use water in a variety of ways.

What do you use water for?

Drinking, of course. Bathing, naturally. But what else? Growing food, producing goods, recreation, maintaining healthy ecosystems: all require lots and lots of water.

Water Consumption

Humans use six times as much water today as they did 100 years ago. People living in developed countries use a far greater proportion of the world's water than people in less developed countries. What do people use all of that water for?

Human Uses of Water

Besides drinking and washing, people need water for agriculture, industry, household uses, and recreation (**Figure 1.1**). Recreational use and environmental use average 1% each.

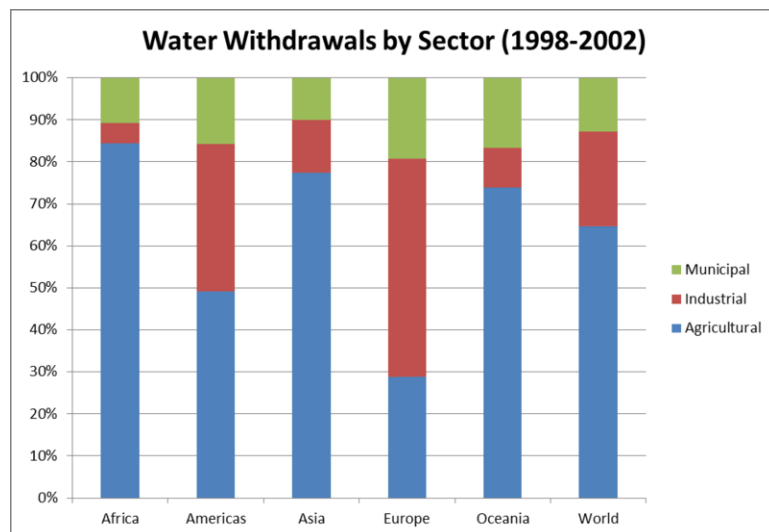


FIGURE 1.1

Water used for home, industrial, and agricultural purposes in different regions. Globally more than two-thirds of water is for agriculture.

Water use can be consumptive or non-consumptive, depending on whether the water is lost to the ecosystem.

- **Non-consumptive** water use includes water that can be recycled and reused. For example, the water that goes down the drain and enters the sewer system is purified and then redistributed for reuse. By recycling water, the overall water consumption is reduced.
- **Consumptive** water use takes the water out of the ecosystem. Can you name some examples of consumptive water use?

Agriculture

Some of the world's farmers still farm without irrigation by choosing crops that match the amount of rain that falls in their area. But some years are wet and others are dry. For farmers to avoid years in which they produce little or no food, many of the world's crops are produced using irrigation.

Wasteful Methods

Three popular irrigation methods are:

- Overhead sprinklers.
- Trench irrigation: canals carry water from a water source to the fields.
- Flood irrigation: fields are flooded with water.

All of these methods waste water. Between 15% and 36% percent of the water never reaches the crops because it evaporates or leaves the fields as runoff. Water that runs off a field often takes valuable soil with it.

Non-wasteful Methods

A much more efficient way to water crops is **drip irrigation** (Figure 1.2). With drip irrigation, pipes and tubes deliver small amounts of water directly to the soil at the roots of each plant or tree. The water is not sprayed into the air or over the ground, so nearly all of it goes directly into the soil and plant roots.



FIGURE 1.2

Drip irrigation delivers water to the base of each plant so little is lost to evaporation and runoff.

Why Not Change?

Why do farmers use wasteful irrigation methods when water-efficient methods are available? Many farmers and farming corporations have not switched to more efficient irrigation methods for two reasons:

1. Drip irrigation and other more efficient irrigation methods are more expensive than sprinklers, trenches, and flooding.
2. In the United States and some other countries, the government pays for much of the cost of the water that is used for agriculture. Because farmers do not pay the full cost of their water use, they do not have any financial incentive to use less water.

What ideas can you come up with to encourage farmers to use more efficient irrigation systems?

Aquaculture

Aquaculture is a different type of agriculture. Aquaculture is farming to raise fish, shellfish, algae, or aquatic plants (**Figure** below). As the supplies of fish from lakes, rivers, and the oceans dwindle, people are getting more fish from aquaculture. Raising fish increases our food resources and is especially valuable where protein sources are limited. Farmed fish are becoming increasingly common in grocery stores all over the world.

For some species, aquaculture is very successful and environmental harm is minimal. But for other species, aquaculture can cause problems. Natural landscapes, such as mangroves, which are rich ecosystems and also protect coastlines from storm damage, may be lost to fish farms (**Figure** below). For fish farmers, keeping costs down may be a problem since coastal land may be expensive and labor costs may be high. Large predatory fish at the 4th or 5th trophic level must eat a lot, so feeding large numbers of these fish is expensive and environmentally costly. Farmed fish are genetically different from wild stocks, and if they escape into the wild they may cause problems for native fish. Because the organisms live so close together, parasites are common and may also escape into the wild.

Household Use

Think about all the ways you use water in a day. You need to count the water you drink, cook with, bathe in, garden with, let run down the drain, or flush down the toilet. In developed countries, people use a lot of water, while in less developed countries people use much less. Globally, household or personal water use is estimated to account for 15% of world-wide water use.

Some household water uses are non-consumptive, because water is recaptured in sewer systems, treated, and returned to surface water supplies for reuse. Many things can be done to lower water consumption at home.

- Convert lawns and gardens to drip-irrigation systems.
- Install low-flow shower heads and low-flow toilets.

In what other ways can you use less water at home?

Recreational Use

People love water for swimming, fishing, boating, river rafting, and other activities. Even activities such as golf, where there may not be any standing water, require plenty of water to make the grass on the course green. Despite its value, the amount of water that most recreational activities use is low: less than 1% of all the water we use.

Many recreational water uses are non-consumptive including swimming, fishing, and boating. Golf courses are the biggest recreational water consumer since they require large amounts for irrigation, especially because many courses are located in warm, sunny, desert regions where water is scarce and evaporation is high.

Environmental Use

Environmental use of water includes creating wildlife habitat. Lakes are built to create places for fish and water birds (**Figure** below). Most environmental uses are non-consumptive and account for an even smaller percentage of water use than recreational uses. A shortage of this water is a leading cause of global biodiversity loss.

Summary

- Consumptive water use takes water out of the ecosystem; non-consumptive water use includes water that can be recycled and reused.
- People can use less water by having efficient systems for water use and by reusing and recycling water where possible.
- Some water must remain in the environment for recreational use for humans and to support ecosystems.

Review

1. Why do people in developed countries use so much more water than they used to?
2. Why don't localities and people use water in the most efficient way, rather than sometimes in wasteful ways?
3. What is aquaculture and why is it going to be increasingly important in the future?

Extended Review

1. Since so little water is drinkable, what could be done to make undrinkable water drinkable?
2. How much of the world's population doesn't have safe water?
3. Do people around the world die from water-related diseases?
4. How much water does the average person in North America use per day?
5. How much water does the average person in Europe use per day? What percentage of North America's use is that roughly?
6. How much water does the average person in Mozambique and other developing countries use per day? About what percentage of North America's water use is that roughly?
7. What happens to water availability as population grows?

Vocabulary

- Describe how humans use water in a variety of ways.

References

1. Joy Sheng, based on data from the Food and Agriculture Organization of the United Nations, 2012. [Water use in different regions of the world](#) . CC BY-NC 3.0
2. Courtesy of the Agricultural Research Service/US Department of Agriculture. [Picture of drip irrigation](#) . Public Domain

