

# 1

## The World's Fresh Water

*“There are stories that remind us that our ancestors live in, and through, Water and that Water connects us with our past and our futures, flowing through time, sustaining us today as it sustained our great-great-grandmothers.”*

Ardith Walkem,  
lawyer, member of  
the Nlaka'pamux  
First Nation



Sockeye salmon, bright crimson after a 400-kilometre journey from the Pacific Ocean, seek mates in the crystal-clear waters of the Adams River in southern British Columbia.

Human life on Earth depends on fresh water—that is, water with a low concentration of salt, usually less than 1 percent. Although three-quarters of our planet is covered with water, only 3 percent is fresh water. We can go for weeks without food, but only a few days without water. Even ocean fish depend on the addition of fresh water to keep oceans from becoming too salty.

As you learned in Unit 1, Topic 5, fresh water is continuously renewed by rain and snow as part of the hydrologic cycle: the same amount of water exists on Earth today as when the dinosaurs roamed. Freshwater ecosystems, including rivers, lakes, groundwater, and wetlands, support a wide variety of species on which people depend to survive. Yet, within the last 50 years, human activities have transformed freshwater ecosystems and put at risk the survival of many habitats and their plant and animal species. This topic looks at the different ways in which freshwater collects and flows on Earth's surface and underground, and investigates Canada's share of the world's fresh water.

### KEY TERMS

- wetland
- tributary
- watershed
- flood plain
- levee
- meander
- oxbow lake
- delta
- groundwater
- aquifer

## The Importance of Fresh Water

Fresh water supports agriculture, fishing and forestry, manufacturing, and recreational activities; provides a means of transporting goods and people; and produces energy. Fresh-water ecosystems supply nutrients and sediments, and help regulate floods and droughts. The availability of fresh water affects every aspect of our lives, everywhere around the world.

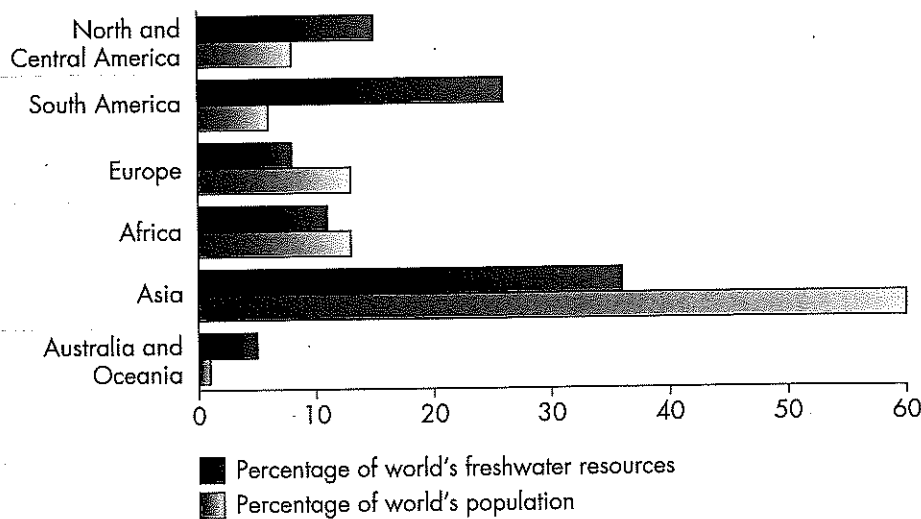
As a result of burgeoning populations and the rising demand for water, twice the volume of fresh water is being withdrawn from the world's freshwater sources compared to 50 years ago. Water is a scarce commodity in many countries. Figure 3.1.2 compares the percentage of the world's population by region with the available fresh water in that region.

Canada is fortunate to have abundant, available fresh water—7 percent of the world's supply—and Canadians are the highest per capita users in the world. Some facts:

- Canada's rivers discharge 7 percent of the world's renewable water supply.
- Almost 9 percent of Canada's total area is covered by fresh water.
- Canada has a quarter of the world's wetlands—an important source of fresh water.
- Canada has more water under the ground than on the surface.
- The Great Lakes are the largest system of fresh surface water on Earth.
- 40 percent of Canada's boundary with the United States is composed of water.



**Figure 3.1.1** The importance of water in the activities of daily life is one of the themes expressed in *Netsilik River* by Inuit artist Pitseolak Ashoona. How do you use fresh water, directly and indirectly, in your daily life?



**Figure 3.1.2** Percentage of world population and available fresh water by region. Which regions have the greatest imbalances?

# UNIT THREE The World's Water

## Surface Water

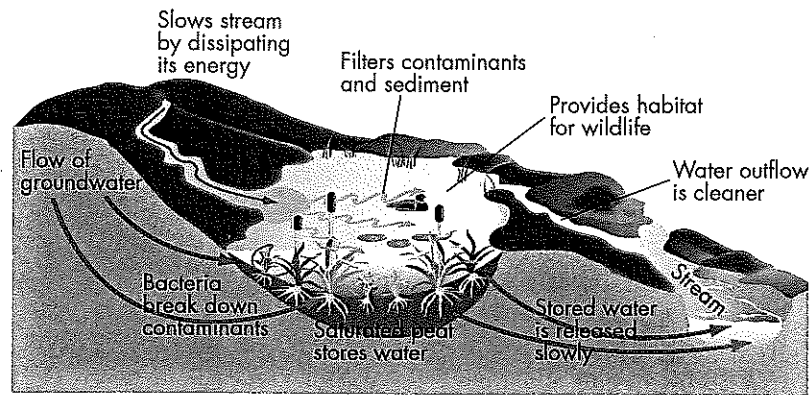
Fresh water on Earth's surface collects in streams, rivers, ponds, lakes, and wetlands, mostly as a result of precipitation (rain, snow, sleet, and hail).

Lakes form when water accumulates in natural and human-made depressions. They vary in size from small ponds to large bodies like the Great Lakes, which hold close to 20 percent of the world's freshwater supply.

Streams move surface water from the continents back to the oceans. The continuous flow of water, as well as evaporation from lakes and ponds, is balanced by water entering the cycle from groundwater, rivers, and precipitation.

## Wetlands

**Wetlands** are "wet" because water has saturated the soil to the point that it is impossible to walk on. Wetlands play a role in cleaning, filtering, and storing fresh water, and in supporting habitats for many plants and animals (Figure 3.1.3).



**Figure 3.1.3** How a wetland functions. What types of wetlands are in your region? Choose a wetland near you and create a visual profile, identifying its type and the plants and animals it hosts.

The Canadian Wetland Classification System identifies five kinds of wetlands: swamps, marshes, bogs, fens, and shallow open waters (Figure 3.1.4).

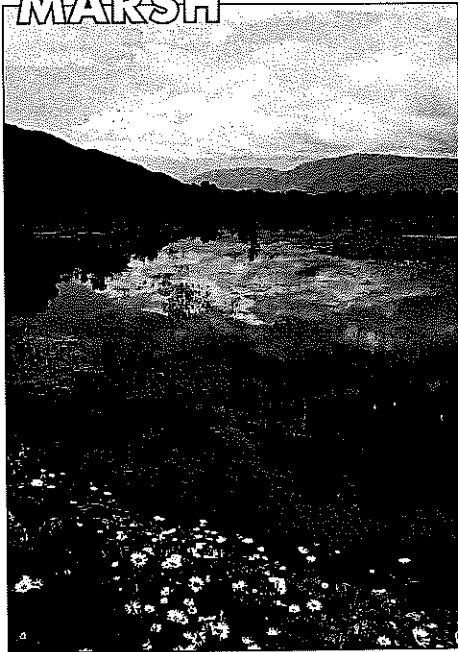
**Figure 3.1.4** Kinds of wetlands

A *swamp* is a wetland that contains trees growing through great expanses of water, like this swamp forest at Tow Hill Ecological Reserve, Haida Gwaii, British Columbia.



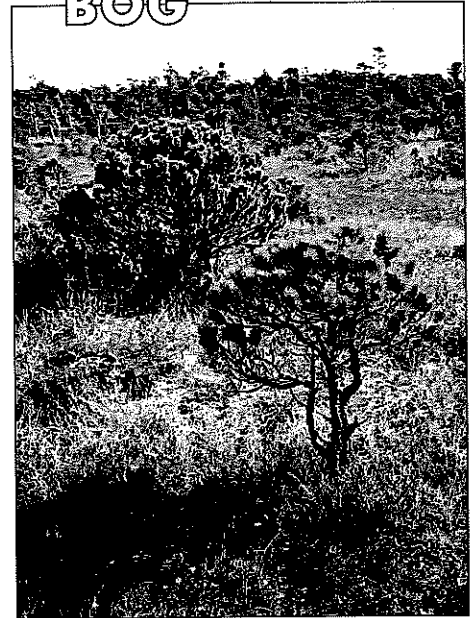
Figure 3.1.4 Continued

## MARSH



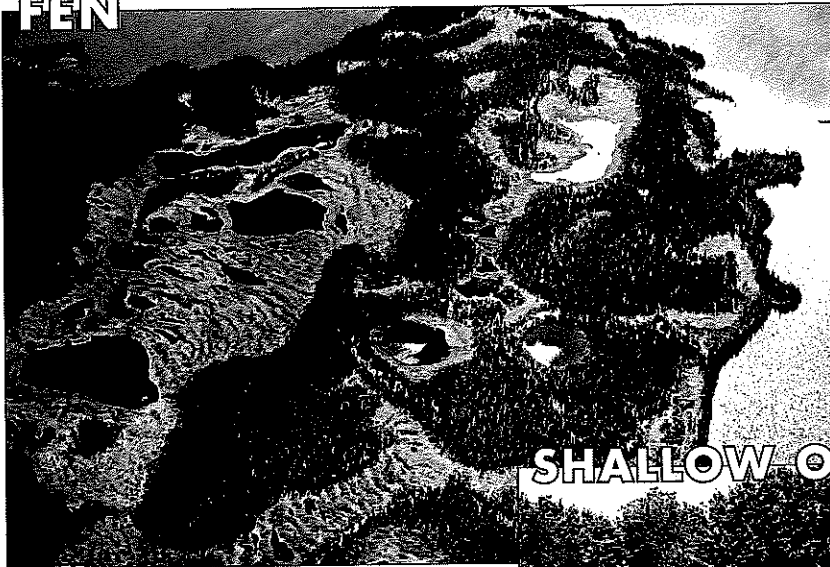
*Marshes*, like this one in the Kootenay Mountains in British Columbia, have rich, fertile soil capable of supporting a variety of vegetation. Marshes are shallower than swamps and are dominated by grasses and low herbs rather than trees.

## BOG



*Bogs*, like this one in Yukon Territory, are formed by rain- and snowfall, and are the most common type of wetland in Canada. Bogs accumulate acidic peat (deposited dead plant material), such as mosses and lichens.

## FEN

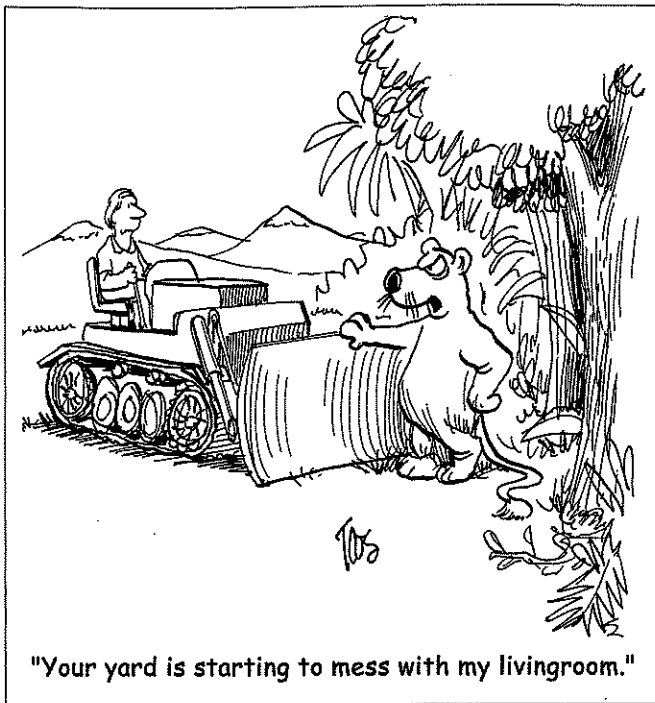


*Fens*, like this one in Labrador, are wetlands that are fed by surface water, such as rivers and ground-water. Unlike bogs, they have neutral or alkaline, rather than acidic, water.

## SHALLOW OPEN WATERS

*Shallow open waters* are small bodies of standing or gently flowing water, like this pond in Quebec. They include pools, oxbow lakes, and channels, and unlike lakes, maintain a consistent water temperature throughout.





**Figure 3.1.5** What issue related to wetland conservation does this cartoon highlight?

Agricultural drainage and urbanization have had a major detrimental effect on wetlands. Scientists estimate that half the world's wetlands have been lost since 1900. Loss of wetlands—when they are drained or paved over for housing, or when wells are drilled to meet human demands—can threaten groundwater supplies.

With one-quarter of the world's wetlands, covering 14 percent of its lands, Canada contains the largest concentration of wetlands in the world. Because wetlands bridge the aquatic and terrestrial spheres, their preservation and maintenance are complex, as they contain many different habitats (including woodlands, valleys, and streams) for wildlife and fish. The Canadian government has adopted a policy of wetland conservation with the goal of “promot[ing] the conservation of Canada's wetlands to sustain their ecological and socio-economic functions, now and in the future” (Canada Environmental Assessment Agency, Benchmark 52/6).

Canada also participates internationally in the *Ramsar Convention on Wetlands of International Importance* (1971), which seeks to conserve the world's wetlands. Each member country designates its internationally significant wetlands and commits to maintain the ecological character of these sites, including their ecologically sound use. As of 2009, Canada had identified 37 sites, some protected by provincial law and others that are managed by federal agencies.

## REVIEW AND REFLECT

1. Create a diagram that shows the distribution and use of fresh water in your local area. Label any streams, rivers, ponds, lakes, and wetlands, and include annotations indicating their importance to your area's freshwater supply.
2. What challenges do you think the federal government faces in trying to fulfill its mandate to “promote the conservation of Canada's wetlands to sustain their ecological and socio-economic functions, now and in the future”?

Q#1

## Running Water

Of all Earth's processes, running water may have the greatest impact on the landscape and on people. Running water has shaped much of the world's physical environment. We depend upon rivers and streams for energy, irrigation, and transportation. Fertile flood plains have supported agriculture and human settlements for millennia.