

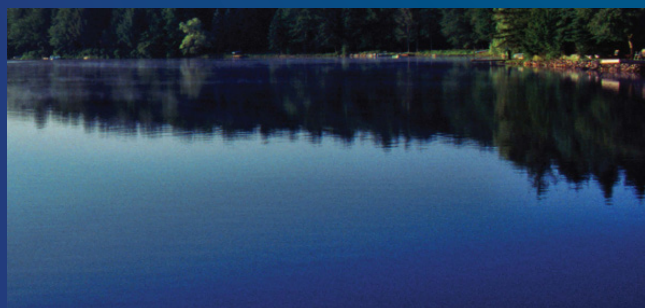
**“A MUST-READ AND
REFERENCE FOR
HYDROGEOLOGY
STUDENTS,
TEACHERS AND
PRACTITIONERS.”**

**—BOB LEECH,
SENIOR SCIENTIST,
AECOM**

Groundwater is essential for life in arid and semiarid regions. It is also important in humid regions, and is one of the fundamental requirements for maintenance of natural landscapes and aquatic ecosystems. Many of Canada's most sensitive ecosystems are dependent on groundwater. Yet, groundwater remains a relatively unknown resource, one which is difficult for the Canadian public and for decision makers to recognize and/or understand.

Most fresh water—other than that frozen in glaciers—is found underground. In fact, all of Earth's water found in lakes and rivers (surface water) accounts for only a tiny fraction of the world's available freshwater resources (less than one percent). Ninety-nine percent of the Earth's freshwater supply is groundwater found in aquifers. These numbers are for the world as a total entity. Here in Canada, we do not know the ratio between available surface freshwater resource (all rivers and lakes), and groundwater in aquifers, although we believe there is more groundwater than surface water, as with the rest of the world. Should this hypothesis be confirmed, the consequences would be enormous, making groundwater a strategic resource in coping with climate change, droughts, and pollution.

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A photograph of a small stream flowing over mossy rocks. The water is blurred, suggesting a long exposure, and the rocks are covered in green moss. The scene is peaceful and natural.

GLOSSARY

Alluvial
Applying to environments, processes, and sediments of rivers or streams.

Alluvial fan
A low, relatively flat to gently-sloping mass of loose sediments, shaped like an open fan or cone deposited by a stream where it issues from a narrow mountain valley.

Astetology
A condition in which properties depend on direction (e.g., differing hydraulic conductivity of an aquifer in different directions).

Aquifer
Any water-saturated body of geological material from which enough water can be drawn at a reasonable cost for the purpose required. An aquifer is only a relative term and is best illustrated by extreme examples. An aquifer in an arid prairie area would supply to water to a single farm, for example, may be adequate if it can supply 1 m³/day. Such an aquifer would not be considered sufficient by any industry looking for cooling water in the order of 10,000 m³/day. An aquifer is commonly thought of as water-bearing material from which water is most easily extracted. An aquifer is by no means equivalent to a single geologic, lithographic, or stratigraphic unit; in fact, two consecutive layers of sand and limestone, may form a single aquifer.

Aquitard
A water-saturated sediment or rock whose permeability is so low it cannot transmit any useful amount of water. An aquitard allows some movement of leakage between the aquifer intervals it separates.

Artesian
A condition which applies to aquifers by types of low-permeability where hydrostatic head is higher than the surface. If the hydrostatic head is higher ground surface, the well will flow at without pumping.

Artesian condition
(See Artesian)

Back storage
Surface water that flows into the base of a stream, reservoir or lake when no flows increase above groundwater in. When surface water levels remain water is stored as groundwater. As its levels fall below those of groundwater will flow back to the stream.

Bedrock
Solid rock exposed at ground surface or to which unconsolidated sediments.

Bedrock aquifer
Bedrock having the ability to transmit quantity of water to a well completed as to a surface water body. The parent bedrock's porosity is due to either primary or secondary openings (fractures) at joints.

Figure 19-10

Figure 19-11

Figure 19-12

Figure 19-13

Figure 19-14

Figure 19-15

Figure 19-16

Figure 19-17

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Figure 19-212

Figure 19-213

Figure 19-214

Figure 19-215

Figure 19-216

Figure 19-217

Figure 19-218

Figure 19-219

Figure 19-220

Figure 1



Alfonso Rivera is the chief hydrogeologist of Natural Resources Canada's Geological Survey of Canada. He obtained his Ph.D. degree with honours at the National School of Mines of Paris, France in 1990. Dr. Rivera designed and implemented the NRCan Geological Survey of Canada's Groundwater Program and was its manager from 2002 to 2012. Dr. Rivera has made significant contributions to groundwater sciences, and has led highly productive research teams in Canada, Switzerland, Germany and Mexico.

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