



Name: \_\_\_\_\_



## Learning Activity 2.1

### Natural Resources—Sort and Predict

1. Use the information from the introductory section as well as your general knowledge to complete the following learning activity. As you work through the remainder of the learning activity, check back on your predictions and make any necessary corrections.
  - a) Read the list of resources that follows and sort the resources into four different categories by placing them into the appropriate boxes.
    - i) Within the mineral resources category, you must sort terms between two subcategories: metallic and non-metallic.
  - b) Three categories are identified, but you will have to come up with a name for the fourth category. For words that you are unsure of, predict in which category they might belong.
  - c) In the brackets after each category name, indicate whether the resources in that category are renewable (R) or non-renewable (N).

Word Bank					
potash	oil	limestone	coal	diamonds	precipitation
rivers	plywood	paper	wetlands	iron	gold
lumber	nickel	salt	wells	groundwater	gravel
copper	lakes	berries	natural gas	particleboard	

Water Resources ( )	Mineral Resources ( )		Forest Resources ( )	
	Metallic	Non-Metallic		

## Major Natural Resources

Let's take a look at the major natural resources available to us. In the following section, you will find descriptions and examples of water, forest, fuel, and mineral resources, as well as brief descriptions of fish and land resources.

### Water Resources

**Water:** We are all very familiar with this important resource. In fact, our lives depend upon water. We use it every day for drinking and cleaning. We see it around us in the form of streams, lakes, and precipitation. Agriculture and industry rely on it. Without water, life as we know it would not exist. Earth is sometimes called the blue planet because nearly three quarters of its surface is covered by water. Water is a renewable resource; however, that does not mean we can afford to pollute our rivers, lakes, and oceans.

Water occurs in three physical states: liquid, gas, and solid. We are most familiar with water in its liquid form as **land runoff** or **surface water** in streams, rivers, ponds, lakes, and oceans. Liquid water can also be found as **groundwater** within the many spaces and pores in soil, sand, gravel, and porous rock. Drinking water can be obtained from wells that tap groundwater.

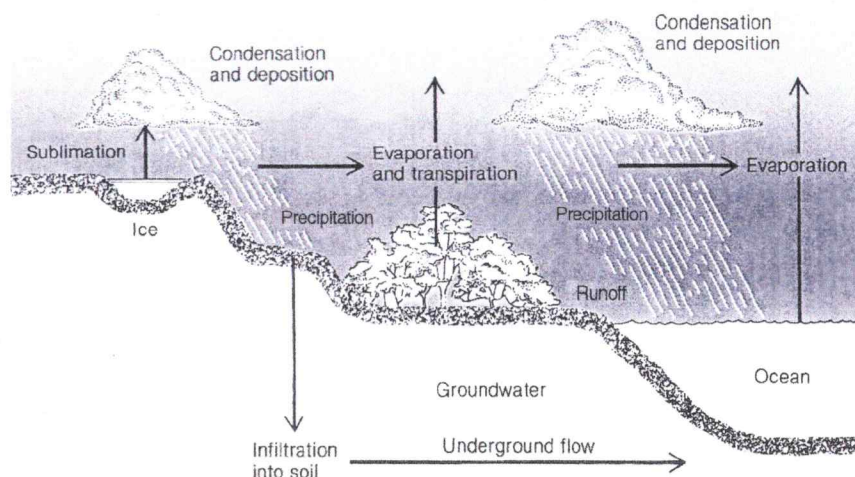
Water is classified as either **salt water** (oceans and seas) or **fresh water** (lakes, rivers, wetlands, and groundwater). The health of Earth's salt water and fresh water is critically important to life on Earth. Both are part of the hydrologic cycle and, together, support and sustain the many varieties of life on our planet.

As part of the hydrologic cycle, liquid water evaporates into the atmosphere in the form of a gas known as **water vapour**. Water vapour is an important part of our atmosphere as it provides humidity, forms clouds, and results in all forms of **precipitation**.

Water also occurs in a solid state (snow, ice, and glaciers) when it reaches temperatures below the freezing point. Fresh water and salt water freeze at different temperatures. Fresh water freezes at zero degrees Celsius while salt water does not freeze until several degrees below zero because of its high salt content. Most frozen water (water in a solid state) is found in mountain glaciers and continental ice sheets such as those in Greenland and Antarctica. You are likely most familiar with water in its solid state as snow in winter or as ice cubes in your freezer at home.



Water is in constant motion as it changes states and makes its way through the hydrologic cycle. Surface water evaporates and becomes a gas in the atmosphere. There, it **condenses** to form clouds and precipitation. Some rainfall becomes groundwater, but much of it runs off the land into streams, lakes, rivers, and, eventually, the ocean. Precipitation in the form of snow usually stays on the ground much longer, often for a season (winter) or even for centuries (in the case of glaciers) in cold regions. Ice can evaporate directly into the atmosphere, without having to melt first, in a process known as **sublimation**. Once back in the form of surface water, it evaporates again and the cycle repeats itself.



Moran, Joseph M., and Michael D. Morgan. *Meteorology: The Atmosphere and the Science of Weather*. 3rd ed. New York, NY: MacMillan Publishing Company, 1991. 127.



The use of water can be either instream use or withdrawal use. **Instream** use refers to the use of water without removing it from rivers and lakes. Examples of instream use include the generation of hydroelectric power, recreation activities, transportation activities, and fishing. **Withdrawal** use, as the term implies, means that water is removed from rivers and lakes, although most of it is usually returned after use. Withdrawal water is used in manufacturing and agriculture, as well as in thermal electric generating stations. Withdrawal water is also consumed by humans, animals, and plants.



Canada has a wealth of water resources, compared to most other countries in the world, with about 20% of the world's total groundwater resources. Canada also has approximately 20% of the world's fresh water, although less than half of this is available for human use. Canada has many large lakes and numerous rivers. Manitoba boasts over 100,000 lakes! It is no wonder that many Canadians take water for granted. Although we drink less than three litres of water per day on average, Canadians are the second largest per capita (per person) users of water in the world, at over 300 litres per day. The





five countries of the world with the largest available freshwater supplies are (in order from the largest) Brazil, Russia, Canada, China, and Indonesia. (See [www.worldwater.org](http://www.worldwater.org).)



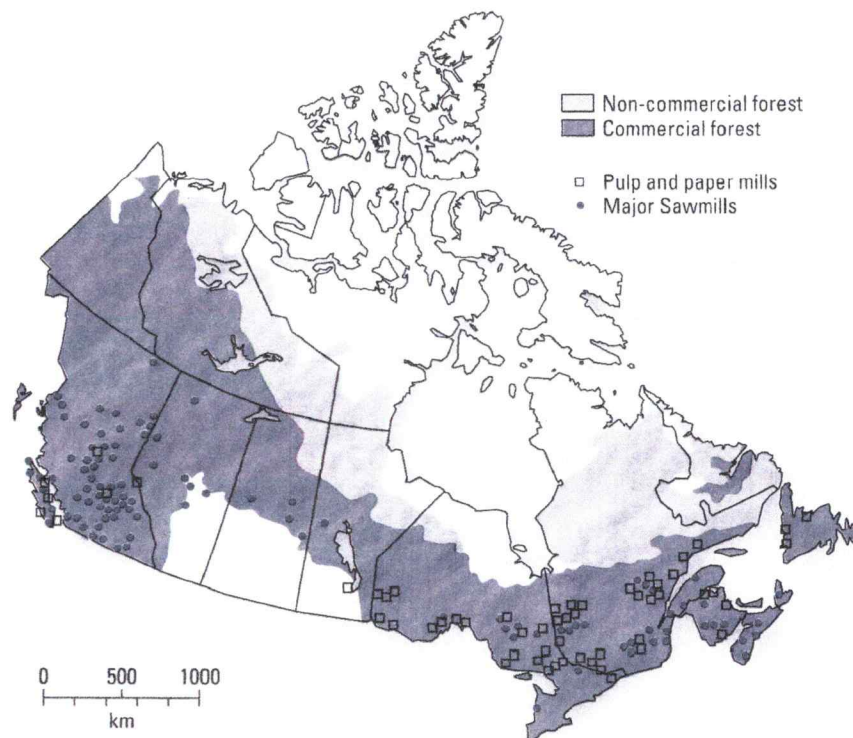
Unfortunately, water resources are not evenly distributed in Canada or in other areas of the world. In Canada, areas such as the prairies frequently experience water shortages and **drought**. Generally, dry areas of the world such as deserts do not have enough freshwater resources. The availability of water can also be inconsistent. An area may get too much rainfall and experience flooding one year, while suffering drought conditions another year. The use of water to generate hydroelectric power often results in flooding and loss of land for other uses. Management of water resources, ensuring the presence of a reliable water supply, and the effects of pollution are important water resource issues in Canada and around the world.

### Forest Resources

Most Canadians know that Canada is a land of vast forests that stretch across the country, from Newfoundland to British Columbia. Forests cover almost 50% of Canada's land area, although only about half of that is suitable for commercial forestry. The only countries in the world with larger forested areas are Russia and Brazil. Look at natural vegetation maps in your atlas or online for other major forested regions in the world. Forests are considered to be a renewable resource because they can be replanted by humans or regrown naturally over time.



Forests can be classified in a number of ways. They can be classified by tree species. **Coniferous trees** such as spruce, pine, and fir are cone-bearing trees with needle leaves. Lumber from coniferous trees is often called **softwood** lumber. In Canada, coniferous forests are found throughout most of the Canadian Shield and in the Cordilleran regions. **Deciduous trees** such as poplar, maple, and birch are usually broad-leaved and lose their leaves over the winter. Lumber from deciduous trees is **hardwood** lumber. Deciduous forests are found in the Great Lakes—St. Lawrence Lowlands region and in the southern fringes of the Canadian Shield. Some areas, such as much of Atlantic Canada, have mixed forests that include both types of trees.



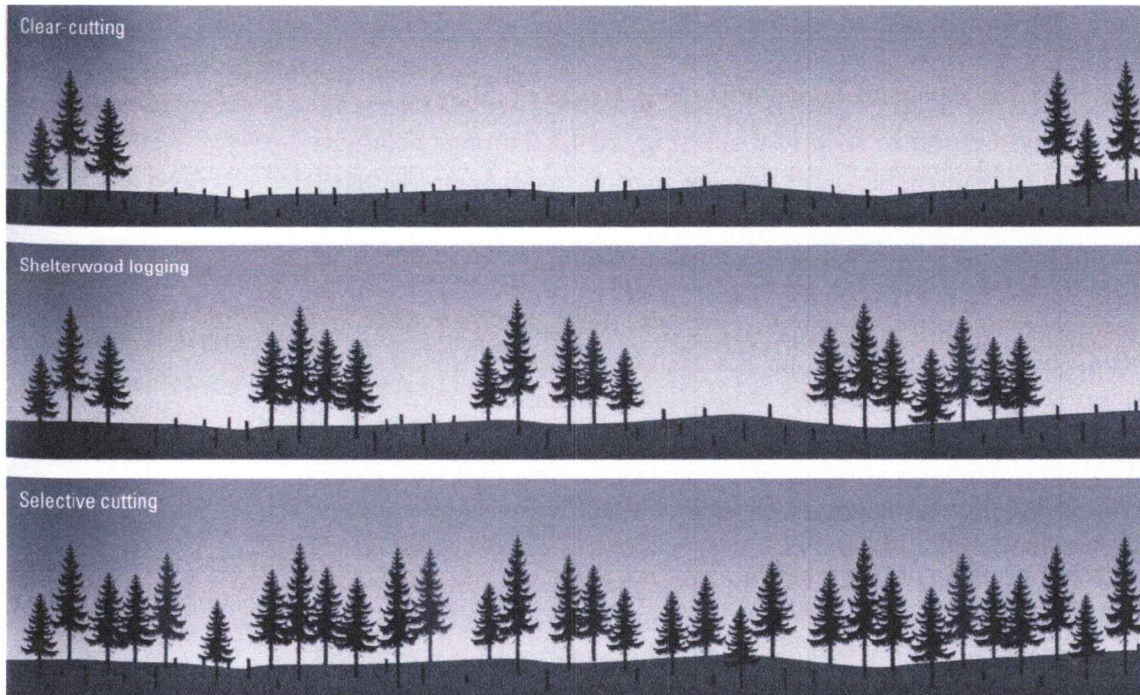
Clark, Bruce W., and John K. Wallace. *Geographic Issues of the Twenty-first Century*. Don Mills, ON: Pearson Education Canada Inc., 2005. 300.

Forests can also be classified according to their commercial value. Commercial forests have trees that are large enough and grow quickly enough to be harvested easily for making lumber products, as well as pulp and paper. Commercial forests in Canada include most of the Cordilleran region, the southern parts of the Canadian Shield, and all of the Atlantic and Great Lakes—St. Lawrence Lowlands regions. Commercial forests are also located in the Cordilleran region of the United States of America.



A number of cutting methods are used in the forest industry. The most common method is **clear-cutting**, where all the trees in an area are cut. In **selective cutting**, only trees of a certain size or species are cut. **Shelterwood logging** involves the clear-cutting of small areas while other trees are left standing to reseed the open spaces. There is controversy over which cutting methods are best. Forest companies often prefer clear-cutting since it is fast and economical. Those concerned about the environment often prefer selective cutting to encourage faster regrowth of forests and to save habitat for wildlife. However, recent research has indicated that even selective cutting, like clear-cutting, can cause a significant loss of wildlife in an area.





Clark, Bruce W., and John K. Wallace. *Geographic Issues of the Twenty-first Century*. Don Mills, ON: Pearson Education Canada Inc., 2005. 305.



**Non-commercial forests** have smaller trees that take longer to grow. These forests grow in cold and dry conditions in the north and are usually hard to reach. The northern parts of the boreal forest in the Canadian Shield are non-commercial forests.



Forests are important for many reasons other than just providing wood products and paper. They also provide habitats for many kinds of life, including animals, birds, insects, plants, and others. In the process of **photosynthesis**, trees remove **carbon dioxide** from the atmosphere and return oxygen to the atmosphere. Forests hold a lot of water, which helps reduce flooding. Tree roots hold the soil in place and reduce erosion. Wetlands in forested regions help to purify water. Forests also provide areas for hunting and trapping by many **First Nations** and other people. Certain tree species also provide edible berries. Furthermore, forests are important for tourism and recreational use. As you can see, forests are an important renewable resource that provide us with many different and valuable things. This is why conservation and **sustainable** practices are of utmost importance.

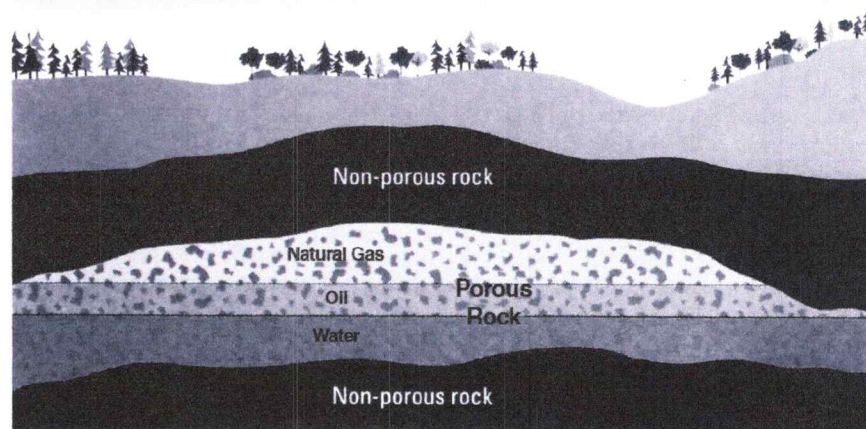
## Fossil Fuels



A fossil fuel is any mineral that can be burned to produce energy. Oil, natural gas, and coal are examples of fossil fuels. These fuels originate from the remains of marine animals and plants that lived in shallow seas and oceans millions of years ago. As the remains of these organisms fell to the sea floor, layers of **sediments** covered them up and accumulated for long periods of time. After millions of years, the weight of the sediments compressed the layers near the bottom into **sedimentary rock**. Pressure, heat, and the action of bacteria changed the organisms into **hydrocarbons** often called **crude oil**. Oil and gas originated with marine animal life, while coal originated with marine plant life.



Oil and gas fill and move through porous spaces in sedimentary rock. Since oil is lighter than water, it will always float above groundwater and move upward. Natural gas is lighter than oil and will rest on top of oil. Oil and gas are “trapped” when they move up against **impermeable** or **non-porous** rock layers that do not allow liquids to pass through them. Geologists look for new oil and gas deposits in areas of sedimentary rock where they think such **traps** exist. In some places, such as the Athabasca tar sands in Alberta, oil seeps upward into sand deposits from which it can be extracted.



Clark, Bruce W., and John K. Wallace. *Geographic Issues of the Twenty-first Century*. Don Mills, ON: Pearson Education Canada Inc., 2005. 344.



Fossil fuels are found on land that was once covered by shallow seas as well as under the ocean floor. In Canada, the largest oil and gas deposits are in Alberta, with smaller deposits in Saskatchewan, Manitoba, British Columbia, and Ontario. Manitoba's deposits are in the southwestern part of the province near the towns of Virden and Melita. Canada also has large offshore oil and gas deposits. These are located on the **continental shelf** off the Atlantic coast and in the Beaufort Sea in the Arctic region.



The largest oil deposits in the United States of America are found in Texas, while those in Mexico are in the Gulf of Mexico coastal region. Approximately half of the world's petroleum deposits are located in the Middle Eastern countries, with the largest reserves in Saudi Arabia. Countries in other regions with significant oil deposits include Russia, Venezuela, Norway, Indonesia, Nigeria, and Angola. One of the largest offshore deposits in the world is in the North Sea between the United Kingdom and Norway.



The production, refining, and transportation of fossil fuels have a profound effect on the environment, polluting soil and water. The biggest problems surrounding fossil fuels are the effects of their extraction and use on the environment. The burning of fossil fuels produces large amounts of carbon dioxide and other **emissions** that cause air pollution and **global warming**. Many people are concerned about our heavy reliance on fossil fuels in industry and transportation. They are seeking ways to reduce the use of oil and gas and are looking for alternative sources of energy with fewer harmful effects on the environment. People are also increasingly concerned with issues related to the transport of oil and gas, including pipeline ruptures and train tanker-car accidents. Coal mining is still a common economic activity in many parts of the world, although there has been a decline in the use of coal in recent decades. Some of the world's largest coal deposits are found in the southeastern United States of America, the Ukraine, and China.

### Metallic and Non-metallic Minerals

Minerals occur naturally within our planet. They are non-living and are located in and among rocks. **Minerals** can be divided into three categories for the purpose of this course:

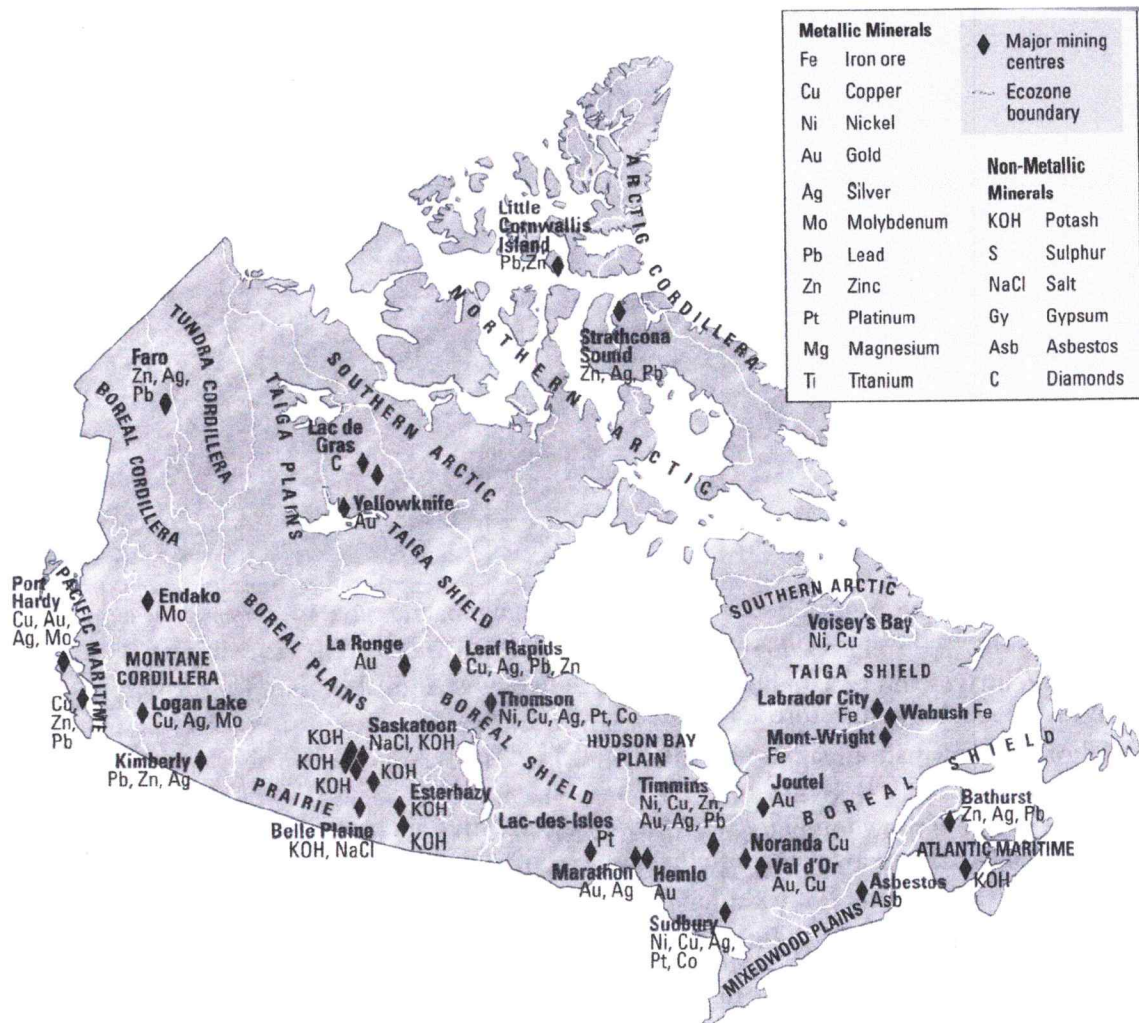
1. metallic: gold, copper, and nickel
2. non-metallic: gravel, potash, diamonds, and limestone
3. fossil fuels: oil, gas, and coal



**Note:** Fossil fuels were previously discussed.

We often take minerals for granted because so many common items around us are made from them. Any items containing plastics, metals, cement, and stone are produced from minerals. Minerals are non-renewable resources.





Clark, Bruce W., and John K. Wallace. *Geographic Issues of the Twenty-first Century*. Don Mills, ON: Pearson Education Canada Inc., 2005. 321.

## Metallic Minerals

Metallic minerals produce a metal when they are processed. Metallic minerals include iron, nickel, gold, silver, and copper. Metallic minerals are found in igneous rock. Metals are found in molten rock (magma) deep beneath Earth's crust. Geologic forces push magma upward into cracks and spaces in the igneous rock within Earth's crust. When magma cools and solidifies, minerals are concentrated into layers according to their density. Minerals can also be concentrated when hot molten rock comes into contact with existing rock inside Earth's crust. Concentrations of minerals are known as ore bodies. Geologists looking for metallic minerals will look for concentrations of minerals in areas of igneous rock.





The Canadian **Shield** is composed of igneous rock and is the largest source of metallic minerals in Canada. Thompson (nickel), Flin Flon (copper, nickel, and zinc), and Snow Lake (copper and nickel) are mining towns located in the Manitoba portion of the Canadian Shield. Igneous rock is also found in the Cordilleran and Atlantic regions, as well as in some mountains in the Arctic. Numerous metallic minerals occur in these regions.

Metallic minerals are found in most mountain systems around the world and in shield landscapes on all continents. Iron ore is produced in several countries around the world including Brazil, Australia, and China. Gold is produced in many countries including South Africa, the United States of America, and Australia. Canada also produces gold.

### Non-metallic Minerals



**Non-metallic minerals** produce non-metal materials when they are processed. Minerals that are not metallic or fossil fuels are usually referred to as non-metallic or industrial minerals. These include sand, gravel, salt, potash, gypsum, diamonds, and others.



Many non-metallic minerals occur in areas of **sedimentary rock**. The Canadian Interior Plains and most of the Great Lakes—St. Lawrence Lowlands are composed of sedimentary rock.



Canada is the world's largest producer of potash, which is used in agricultural fertilizers. Most of Canada's potash deposits are in Saskatchewan. Other major potash producers around the world are Russia and Belarus. In Manitoba, the limestone quarries near Stonewall and the gravel deposits near Bird's Hill north of Winnipeg are examples of non-metallic (industrial) mineral **extraction**. Construction minerals such as sand and gravel are found throughout most regions of Canada. In 1991, diamonds were discovered in Canada and, in 1998, the first diamond mine opened northeast of Yellowknife near the Nunavut/Northwest Territories boundary. Other major diamond-producing regions in the world are southern Africa, Russia, and Australia. Many different non-metallic minerals are found throughout the world.

It is hard to imagine how we could survive without mineral resources. The extraction and processing of minerals is also an important part of the economy and creates many jobs. Mining, however, has a number of negative effects on the environment. Removal of topsoil, excavations in the earth, as well as water and air pollution associated with mining and processing are common problems. Further problems occur when there is a sudden change in the demand for minerals or when ore bodies are mined out. In some cases, towns that are dependent on mining may not be able to survive when their mines shut down. The Manitoba town of Sherridon, north of Flin Flon, is an example of such a town. The towns of Lynn Lake and Leaf Rapids in northern



Manitoba have declined considerably in recent years due to the depletion of ore bodies and the closing of major mines.

### Fish as a Resource

Fishing is one of Canada's oldest industries. Many First Nations Peoples relied on fishing as a food source long before Canada became the nation we know today. European fishing vessels visited the Atlantic coast long before settlement began. Fishing has remained an important economic activity throughout much of Canadian history.



Canada's fishing industry is located in three major areas: the Atlantic fishery, the Pacific fishery, and the **freshwater** fishery found in the lakes and rivers throughout Canada. Sport fishing and **subsistence** fishing (to provide your own food) are important aspects of fishing in Canada, although they are not major contributors to Canada's economy. Cod is the most common fish in the Atlantic region, although other species are also caught. **Shellfish**, such as lobster and shrimp, have become important catches of the Atlantic fishery. The most common catch in the Pacific region is salmon. Freshwater fish include pickerel, whitefish, trout, and perch. The freshwater fishery is concentrated in the Great Lakes region, Lake Winnipeg, and Great Slave Lake. Major fishing grounds are located in most coastal areas around the world.

Although fish are a renewable resource, the Canadian fishing industry is in a crisis situation. In the Atlantic region, the overfishing of cod by Canadian and foreign fleets led the government to close the cod fishery in 1992. Several years later the salmon fishery in the Pacific region was reduced due to declining numbers of fish. Good management of the fishing industry, including fishing treaties with other countries, will be required to allow the replenishment of this important, renewable resource.

## Land as a Resource



Land can be considered a natural resource in different ways. The First Nations Peoples of Canada relied on the land for day-to-day survival. They used the land for hunting, trapping, and fishing. They also used the land for gathering fruit, berries, and edible plants. The land provided materials such as logs, stones, clay, and sticks for constructing shelter, and making tools and weapons. In several parts of Canada where climatic and soil conditions were favourable, First Nations Peoples practised **horticulture** to produce a variety of vegetables. Canada's First Nations Peoples considered the land a **sacred** resource to be managed carefully so it could keep providing for them from generation to generation.

Land is also a renewable resource for farming purposes, particularly for crop growing. Through wise farming practices such as **crop rotation**, proper cultivation, effective drainage, and appropriate use of fertilizers and chemicals, soils can stay fertile for long periods. Poor management causes soil to deteriorate and lose its fertility very quickly. The fertile soils of the Canadian Prairies, the Great Lakes—St. Lawrence Lowlands, and the valleys of the Atlantic and Cordilleran regions have allowed Canada to become a major producer of agricultural products. In the United States of America, the Interior Plains and the Southeastern Lowlands are the main crop-growing regions. Aside from North America, other regions with large areas of fertile soils for commercial crop production are located in Europe, Russia, Southeast Asia, and parts of South America.



**Note:** If you have access to the Internet, you can find additional information on natural resources. A good starting point is the Natural Resources Canada website. Go to [www.nrcan.gc.ca](http://www.nrcan.gc.ca) and click on “subject listings” to find information on selected resources in Canada.