Unit 3

(Pages 236-244 & 351-362)

Economic Issues In Canada

Introduction

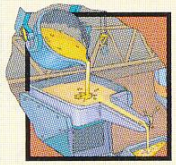
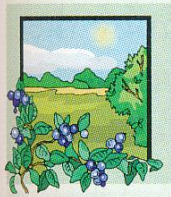
- A ***natural resource*** is anything found in nature that can be used by people. They can be:

1. ***Renewable resource*** –such as forests or fish, that can be replaced by natural environmental processes, unless badly mismanaged.

2. ***Non-renewable resource*** –such as fossil fuel and minerals, when they are used they are gone forever.

3. ***Flow resource*** –such as water and wind, are neither renewable or non-renewable.

Types of resources

RENEWABLE RESOURCES	NON-RENEWABLE RESOURCES	FLOW RESOURCES
 • wild animals hunted for food	 • metallic minerals such as copper, iron, and aluminum	 • water
 • wild plants gathered as sources of food or grasses that feed livestock	 • non-metallic minerals such as diamonds, potash, sand, and gravel	 • wind
 • forests harvested for lumber and paper	 • fossil fuels such as coal, oil, and natural gas	 • sunlight
 • soil for producing agricultural crops		

Natural Resources – The Big Picture

- Natural resources play an important role in Canada's economy.
- Natural resources are the base materials of our society.
- They contribute to good quality of life for Canadians and their communities.

Our Economy Depends on Natural Resources

Canada as a whole, enjoys a healthy economy and prosperous lifestyle. This prosperity is the result of:

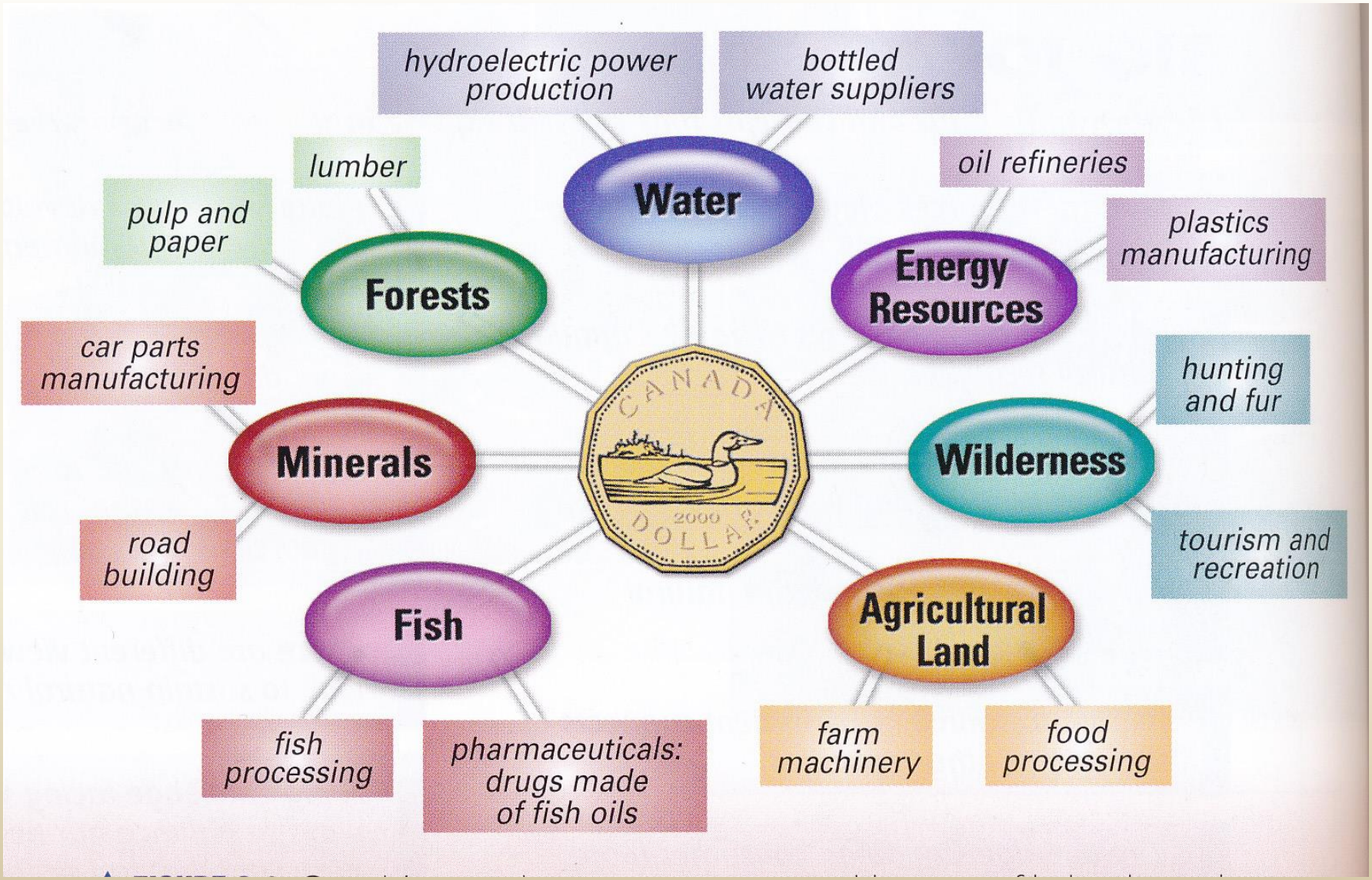
- A strong **natural resource** base. (examples; fish, minerals, forests, agricultural land.)

- Skilled workers to harvest and work with these resources.

- Favorable patterns of world trade and strong export markets.

- Innovations (new ideas and developments) and ingenuity (creativity).

Our economy depends on……



Sustainable resource system

- The ability to last into the future without diminishing quality.

Natural Resources and You

- Almost every product you use on a daily basis was at one time extracted from the earth as a natural resource.

IMPORTANT: A resource is only a resource when we have:

(i) A need or want for it
(ii) The technology to harvest it
(iii) A way to profit from it

• **Developing countries** (or less developed) are poor with little resources. Examples of developing countries would include countries of Africa and Asia.

• **Developed countries** (wealthy, industrialized) represent about 20% of the world's total population but consumes about 80% of the world's resources.

Word Power

The following terms are used to describe the way people use natural resources.

- Extract
- Develop
- Manage
- Conserve
- Preserve
- Protect
- Degrade
- Sustain
- Traditional

Refer to page 241 for definitions of these terms.

Complete questions 2 and 3a & b. (activate your learning.)

Natural Resources: An Economic Perspective

• Extracting natural resources brings money into a countries economy by the following:

(i) Providing jobs
(ii) Exports of raw materials to other countries.

Exports are sales of products or services to another country.

- Economic value of our natural resources are measured in two ways:

1. Dollars (millions or billions)
2. GDP (Gross Domestic Product)

The ***GDP*** is an **economic indicator.** It measures the value of all the goods and services produced in one country in one year.

NATURAL RESOURCE SECTOR	CONTRIBUTION TO ECONOMY, % OF GDP		EXPORTS (billions of dollars)		NUMBER OF PEOPLE EMPLOYED	
	2005	2010	2005	2010	2005	2010
Forests	3.1	1.8	$45	$21	361 000	195 000
Minerals and mineral products	4.0	2.8	$50	$84.5	389 000	320 000
Primary agriculture	2.2	1.7	$26	$20	349 000	345 000
Energy *(including oil and natural gas)*	5.9	6.7	$67	$80	241 000	257 000
Fisheries	1.4	0.3	$4.3	$3.9	61 000	53 000

Valuing Resources

Valuing resources are measured by the following;

1. The amount of **money** brought into the economy.
2. **Ecological** benefits

   example: the ability of trees to produce oxygen and remove carbon dioxides from the atmosphere.
3. **Aesthetic** benefits

   example: green open spaces of farmland and different types of wildlife.

Using Resources – The Trade-Off Challenge

Environmental and Natural Systems vs Trade-off

- When we take natural resources out of the earth, there is damage to the environment and to natural systems.
- On the other hand, we use natural resources because of the trade-off, we need the raw materials and we need the jobs that they provide.

Riding a Wave of Change

Changing patterns of resources used.

Trends – A general direction of change.

Example: a changing trend in fashion or music…

Refer to page 244.

Changing Technology

Technology has sometimes been called a "Double – Edge Sword."

Example: Our dependence on cars to drive us to school, work and even the corner store has drastically reduced the amount of physical activity in our lives.

The Big Players - Transnational Corporations

Transnational Corporations are large international companies that operate in several countries.

For example, Vale, based in Brazil, employs 126,000 people in 38 countries with 50,000 working in ongoing projects.

- Vale is the world's leader in iron ore production and one of the largest nickel producers in the world.
- Vale operates Voisey's Bay nickel and copper mine in Labrador and the processing facilities in Long Harbour.

Sustainable Development of Resources

Sustainable – the ability to last into the future without diminishing quality.

Environmental Assessment – a detailed study that tries to determine the potential environmental impact of a proposed development.

Read the case study – The Price of Power…Pg. 246-247

Question… After reading this case study, does the economic benefits outweigh the environmental impacts. Why or Why Not?

Aboriginal People and Natural Resources

When natural resources are located on land to which Aboriginal people have claimed or hold title to, a **land claims agreement** is signed between the Federal, provincial and Aboriginal governments.

The following is found in an agreement:

1. Aboriginal groups will have substantial annual revenues that will ensure long-term economic stability.

2. Aboriginal groups will have access to training and employment opportunities.

3. Aboriginal businesses will benefit with opportunities for contracts.

Example of an Agreement;

November 2011 the Innu of Labrador signed the **New Dawn Agreement**.

Activate your learning…Page 249
Do the following questions…1, 4a,b, 5a,b,c & 6

Taking Care of Business:
Canadian Industries

The work that Canadians do can be classified in terms of **industry**.

Industry – refers to particular types of labor that are done in exchange for pay.

Economy – a system in which a country produces and distributes goods and services in order to create wealth.

All economic activities in Canada fall into four industries or sectors:

1. Primary Industry

- Any economic activity concerned with the extraction of natural resources or the gathering of resources. Canadians who work in primary industries are those who work directly with natural *resources.*

- ***Example****: forestry, mining, farming and fishing.*

2. Secondary Industry

- Often referred to as the **manufacturing industry**.
- Any economic activity that is concerned with the **processing of extracted resources** into various forms.
- It is the manufacturing of the raw materials into a “finished good.” It involves conversion of extracted resources through: (A) physical labor, (B) Mechanical energy, and (C) Technology.
- **Example**; automotive plant, airplanes, paper, etc.

3. Tertiary Industry

- Any economic activity concerned with the **provision of services** and the sale and use of economic services and goods, (the service sector).

- The largest group of Canadians work in the tertiary industry.

- As Canada becomes more industrialized, there was a shift from primary industries to tertiary industries.

- **Example**; Doctors, Lawyers, banking, sales, etc...

4. Quaternary Industry

- Any economic activity concerned with the **production of specialized services**, such as research, software design and information technology.

- **Example**; High-tech, research and communication industries.

Why is Canada moving toward a knowledge-based (more quaternary) economy?

1. We can run out of resources (**primary**) such as forests or oil.

2. We can be out-manufactured (**secondary**) by other countries that build their products faster or cheaper.

3. You can find service industries (**tertiary**) that are more efficient than those in Canada.

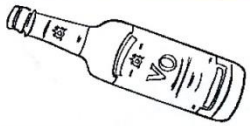
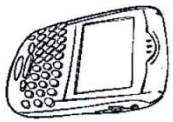
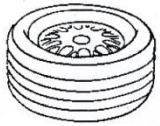
Knowledge Economy – the creation of information to produce economic benefits.

Innovation – the creation of new ideas.

Note: The trend in employment in Canada suggests that there is a significant increase in the number of jobs that are part of the knowledge economy (quaternary industry).

Where Knowledge Matters

EXAMPLE: Waterloo, Ontario has moved away from manufacturing products toward developing more high-tech products.

PRODUCTS ONCE MADE IN THE WATERLOO REGION	PRODUCTS NOW MADE IN THE WATERLOO REGION
whiskey 	personal computer goods 
workboots 	beer 
TVs 	potato chips 
skates 	cars 
shoes 	tires 

Networking – means exchange information, contacts and experience with people for business purposes.

Note: It have been recognized that this shift from manufacturing to high-tech is a result of things like innovation, networking, adaptation, an educated workforce and hard work.

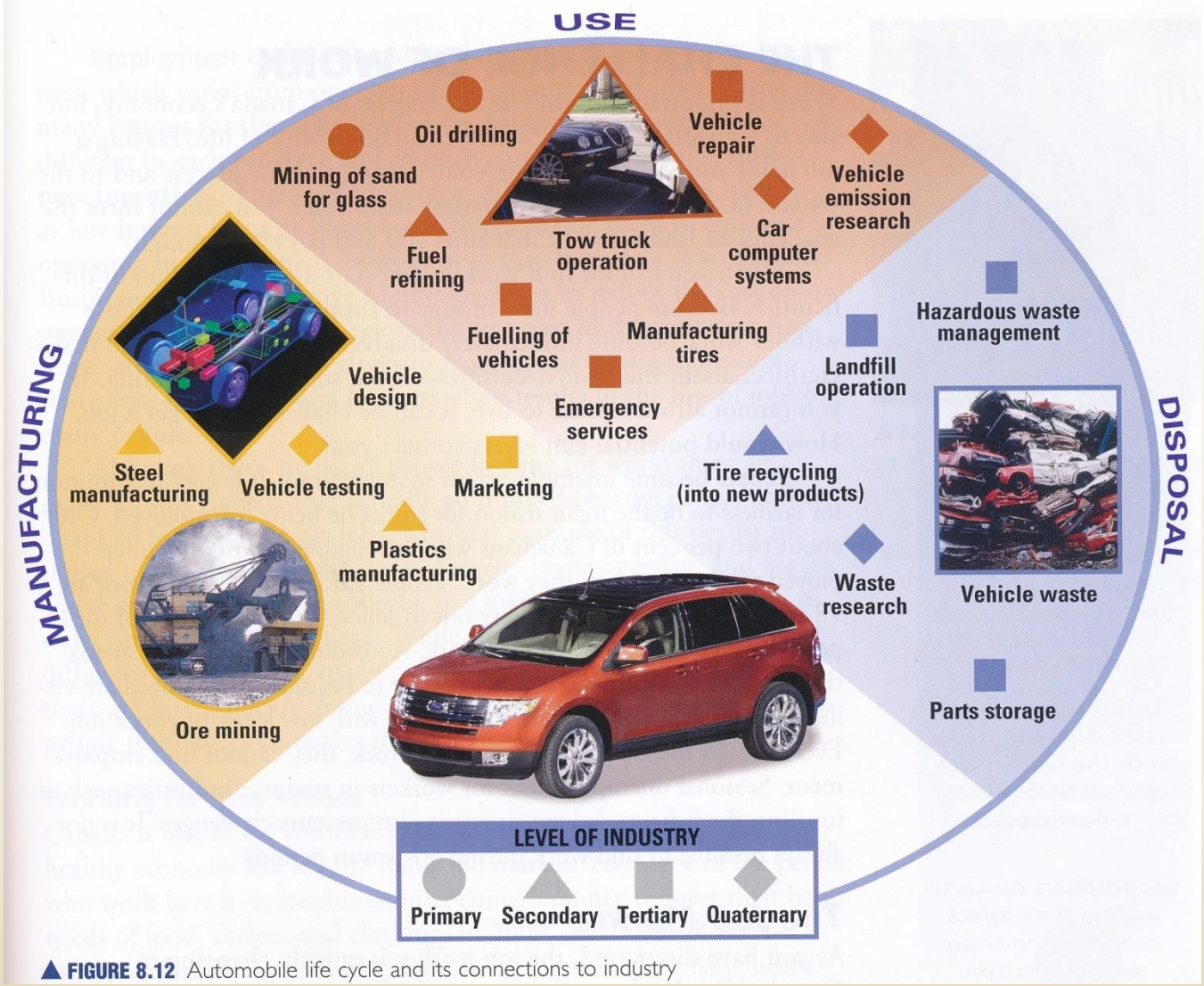
Connections among Industries

- All four levels of industry are important to all Canadian economy and to the work that Canadians do.

- None of the industries can stand alone.

- **Example**: Canadian industries that are related to cars.

- **Primary**: Metals mined for frames
- **Secondary**: Manufacturing of cars
- **Tertiary**: Selling of cars
- **Quaternary**: Research into new features related to car safety or fuel efficiency.



▲ **FIGURE 8.12** Automobile life cycle and its connections to industry

Activate your learning…Questions; 1, 2a,b & 3…pg 363

Pages 250 - 311

Canada's Agricultural Land Resource

Agriculture – An Essential Primary Industry

- Agriculture provides what you eat.

- Agriculture generates 1.7 % of Canada's gross domestic product. (GDP)

- Agriculture provides jobs to 1 in 86 Canadians.

It all starts with the land….

- Agricultural land is considered a ***renewable resource*** because if it is properly cared for, crops can grow there year after year.

- Only about **7%** of the total land area of Canada is ***arable*** or suitable for growing crops.

- Most land in Canada is stony, hilly, and too much or too little wetness.

- Canada's best farm land is found along the southern border of Canada.

Deciding what to grow?

Factors affecting agriculture

The most important factors affecting farming are **climate, landforms and soil**.

Other factors include:

- **demand by consumers** for certain products.
- **transportation facilities** that are available.
- **closeness to market**, where food products are brought and sold.
- **competition** that you may have from other low-cost growers.
- **changing prices** for food on the world market.

Challenges Farmers Face

Farmers face a number of challenges. They include the following:

1) **Natural hazards** such as early frost, drought, floods and animal diseases such as **mad cow disease (BSE)** in beef and **avian flu** in poultry.

Mad Cow Disease **-** is a fatal disease in cattle which cause sponge-like holes in the brain and destroys the animal's nervous system.

2) **high cost** of fuel and equipment.

3) **low crop prices**, which can cause financial issues for farmers

4) **competition** from more heavily **subsidized** farmers in other countries (farmers who receive money from their governments to help cover their costs)

5) competition from **large, industrialized factory farms**, some owned by big corporations.

World Market Connections – Farm Subsidies

- Prices for many farm products, especially grain, are determined by the world market.

- Cost, however, to grow the same product maybe higher in some countries.

- The governments of some countries, like Canada, pay a subsidy to many farmers.

Trends in Agriculture

They include the following:

- Changing consumer demands.
- Changing technology.
- Fewer farms but larger farms.
- Increasing control of agriculture by transnational corporations.
- An increase in industrial agriculture, known as factory farms.

Market Trends

Consumers are demanding farmers to produce healthier products.

Example; Eggs…. Refer to page 254.

Changing Technology

Technology is often seen as the solution to many problems. However, sometimes there are unpredictable consequences.

Example: Pesticides pose some risk to the natural environment, some have proven to be dangerous to human health.

The Food System

Agribusiness is a unique farming system. For example, one huge transnational company or corporation is responsible for the following:

1. *Buying the food* from the farmers or *growing the food* themselves.
2. *Process* the food.
3. *Market* the food.

Note:
This type of farming system squeezes out the small scale farmers and the small grocery stores because they receive very small percentage of the profit in the food system.

Factory Farm

These farms are large-scale form of agriculture where large numbers of animals are kept in confined spaces and treated with hormones and antibiotics to maximize growth and prevent disease.

Activate your learning…Page 257

Do questions 1, 4 a & b, 5 a.

Sustainable Agriculture
– Feeding Canada into the future.

Sustainable Agriculture – farming that will last into the future.

Sustainable agriculture features include:

1. Meeting Canadians' needs for food wherever possible so we don't have to rely on food imported from different countries.

2. Making efficient use of fossil fuel to run machinery.

3. Protecting surface and ground waters as well as air and soil quality.

4. Reducing the use of chemicals.

5. Providing jobs and profitable industry.

6. Supporting small farms and urban agriculture.

7. Encouraging positive contact between farmers and consumers.

Organic Agriculture

Organic agriculture is the process of growing plants and animals without using synthetic fertilizers, pesticides, growth hormones or antibiotics.

Note: Organic agriculture is a growing trend in Canada.

Activate your learning…. Page 259
Do questions 1, 2 & 4

Where are all the Fish?...Declining Fish Stocks

- In 1992 the Atlantic cod fishery in Canada collapsed.

- The federal government placed a moratorium (ban) on the cod fishery.

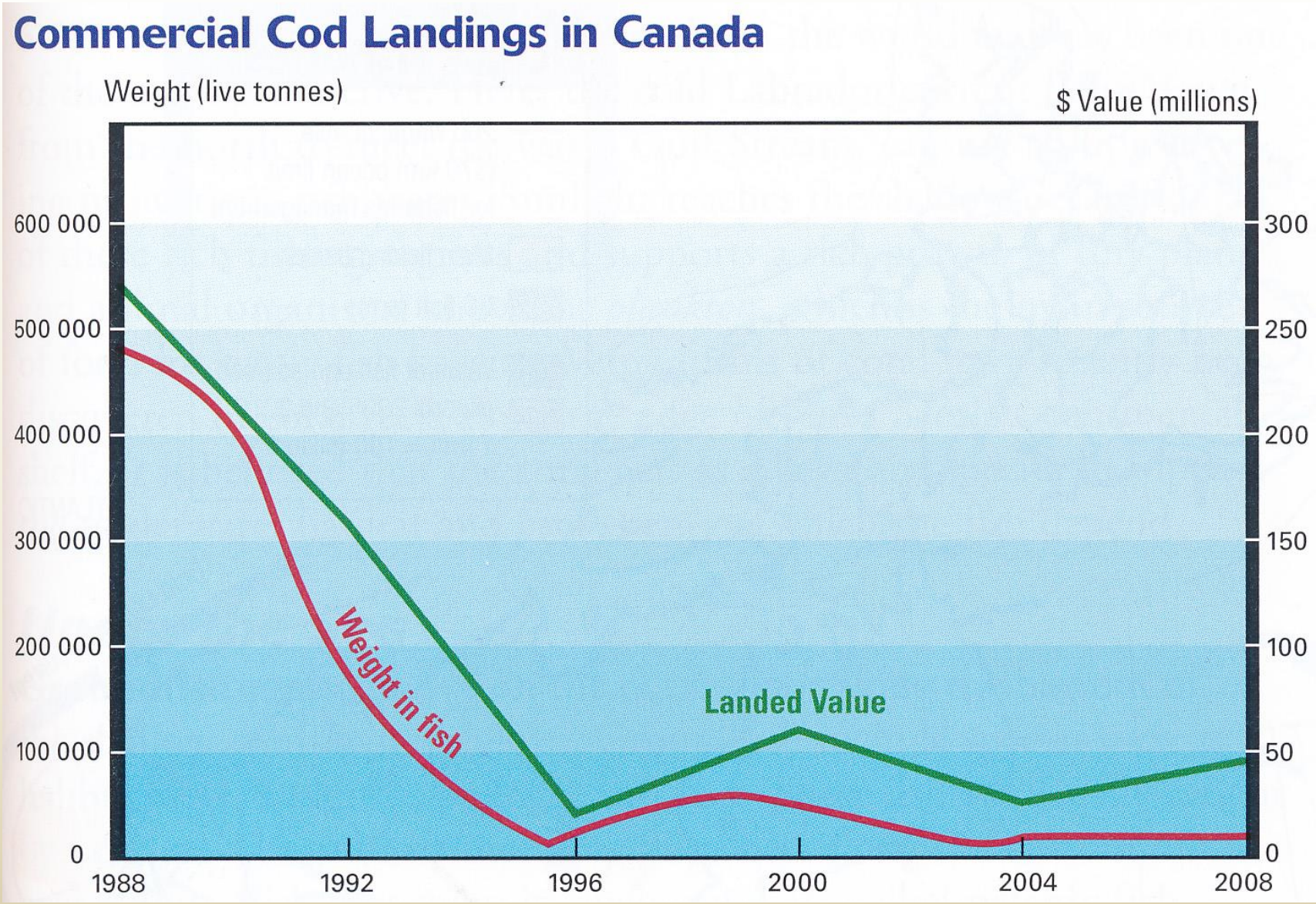
- The fishery in Newfoundland and Labrador employs more than 20,000 people, mostly in rural areas.

- Total production in 2010 for Newfoundland and Labrador was valued at $942 million.

- Salmon stocks have also declined in Atlantic Canada. Today 350,000 wild salmon return to our rivers, however in the mid-1970's, 1.5 million were counted.

- Wild salmon fishery on the west coast has also been in serious decline.

Commercial Cod Landings in Canada



Impact in People in Coastal Communities.

Fishing is important to coastal communities for the following reasons:

1. Economy
2. Culture
3. Tourism
4. Aquaculture

Aquaculture - is fish farming (in pens or cages)

The Background On Canada's Fisheries.

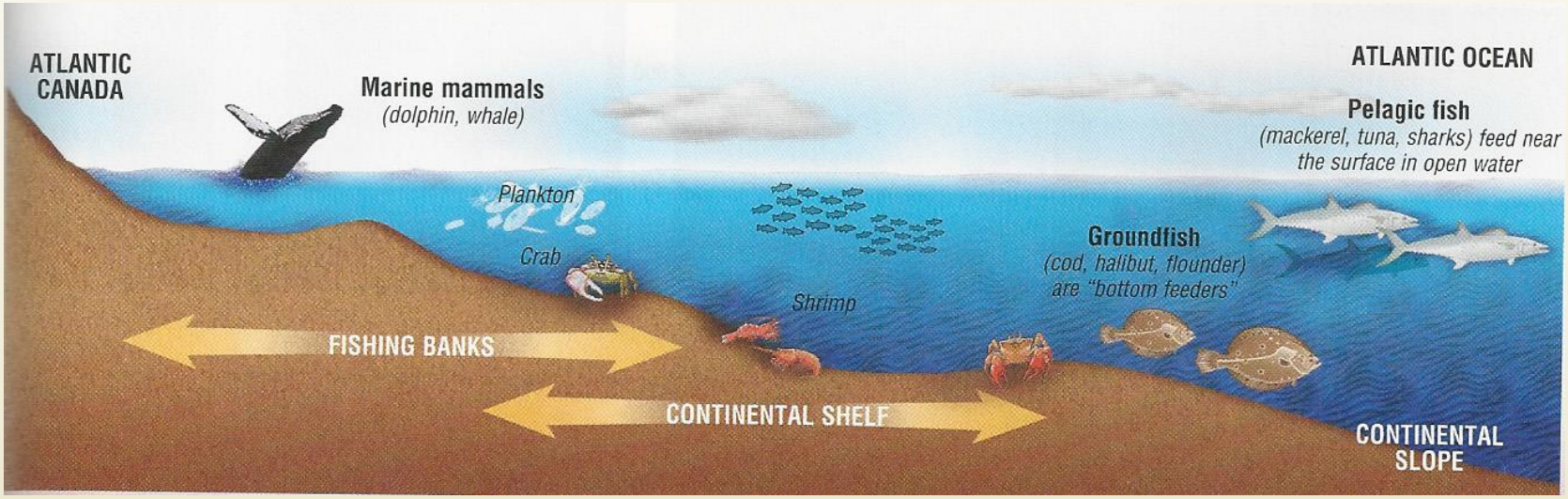
Fisheries – refers to commercial fishing operations, mainly on Canada's oceans and large freshwater lakes.

Continental Shelf – is the best fishing areas in the warmer shallow waters before the sea bed drops off into deep waters.

Fishing Banks – the best fishing areas located in the warm shallow waters of the continental.


Canada's Ocean Fisheries
200 Nautical mile (370 km) ocean limit for fisheries management
Main fishing banks
BC fish farms
2005
2010
Value of fish and seafood exports 2005 and 2010
1 mm = 100 million
ATLANTIC OCEAN
Cold Labrador current
Warm Gulf Stream current
Black Tickle
BC
$995
$957
QC
$246
NL
$886.5
$780
NL
Grand Banks
Gulf of St. Lawrence
$208.8
$188
PEI
St. Pierre Bank
NB
$832.3
$783
NS
Sable Bank
Western Bank
Tail of the bank
$1.03
$794
Georges Bank
N
W
E
S
0 200 400 600
SCALE (in km)

The Grand Banks – is one of the largest fishing banks in the world



Conditions that produce favorable fishing grounds.

- Microscopic floating plants called **phytoplankton** that act as a food source for tiny animals called **zooplankton** that provide a diet for most commercial fish.

- Phytoplankton requires sunlight, (can only penetrate the ocean to a depth of 200m) and nutrients (sink to the bottom in deep water and are unavailable to the phytoplankton) to grow.

-Our shallow **continental shelf** and banks (most famous being the Grand Banks) on the shelf are ideal for phytoplankton.

-The turbulence created by the meeting of the cold Labrador Current and warm Gulf Stream churns up the nutrients necessary for growth of phytoplankton.

Under the Sea

Canadians catch 3 categories of fish, namely: **groundfish**, **pelagic fish** and **shellfish**.

- *groundfis*h: fish that feed and are caught near the ocean floor such as, cod, pollock, haddock, halibut and redfish.

- *pelagic fish*: fish that feed and are caught near the surface, such as salmon, herring, mackerel, tuna, and capelin.

- *shellfish*: molluscs and crustaceans, shrimp, lobster, oyster, scallop, mussel.

Trends in Canada's Fisheries

Three main trends in the Canadian fisheries:

1. The demand for fish is growing.

2. Cod and salmon stocks are declining, however fishers are turning to other species such as shellfish.

3. Aquaculture or fish farming is increasing.

Pushing Fish Resources to the Limit

When fish resources are pushed to the limit it brings about a collapse to the fishery. The following contributes to a collapse of the fishery:

1. Overfishing
2. Destructive fishing practices
3. Misguided government policies
4. Improved technology
5. Global climate change and its effect on ocean temperature
6. Increase in the seal population

Changing Technology

Many inventions have made finding and catching fish easier. These include:

1. Diesel engines
2. Radar
3. High-tech electronic and computer technology to locate certain species
4. Detail maps of the ocean floor
5. GPS (Global Positioning System)
6. Factory fishing trawlers
7. Otter Trawl nets

Important Terms and Facts….

Overfishing - means catching too many fish, which puts future fishing stocks at risk.

Bycatch - undesired fish and other marine species that accidentally gets caught in nets while fishing, which is often discarded dead.

- up to 80% of the total catch in some fisheries are bycatch.

- most bycatch is caught by trawlers and draggers.

Quota - is the amount of species of fish that may be caught by one boat or by a group of fishers in a year.

- Fishers obtain the quota from the Federal Government.

SNOW CRAB QUOTAS—EAST COAST FISHERY				
LOCATION	**QUANTITY** *(live weight tonnes)*			
	2003	2005	2008	2010
Southern Gulf of St. Lawrence *(New Brunswick, Nova Scotia, Prince Edward Island, and Quebec)*	17 148	32 336	18 519	7 437
Newfoundland and Labrador	56 240	49 943	52 469	51 832

Read “Media Watch”….

do questions, 1, 2, & 3 - Page 267

Can Aquaculture Solve the Fish Crisis?

-The depletion of fisheries, along with increasing demand for fish and seafood, has led to rapid growth in aquaculture.

- In Canada, aquaculture is found on the east and west coast.

- Most fish farms raise salmon

- Other species raised include:
    - shrimp
    - trout
    - catfish
    - mussels
    - cod

What people say about Aquaculture

POINT OF VIEW

WHAT SUPPORTERS OF AQUACULTURE SAY

- Farmed fish are rich in omega 3 fats and are equally as healthy to eat as wild fish.
- Aquaculture is the main economic base of many coastal communities.
- Farmed fish provide a large supply of protein and food security as wild fish stocks decline worldwide.
- Divers regularly inspect the ocean floor and check for holes in nets.
- New containment technology reduces the escape of fish into the wild.
- Antibiotic use is strictly controlled by vets and used for diagnosed conditions only.
- Contaminants in farmed salmon are below the levels set by Health Canada.
- Salmon farming is a highly regulated industry with more than 50 different provincial and federal requirements.

WHAT OPPONENTS OF AQUACULTURE SAY

- Farmed salmon contains more fat than wild salmon and more toxic contaminants like PCBs and pesticides that may affect human health.
- Waste products from fish, uneaten food, and dead fish sink to the ocean bottom and pollute natural habitat.
- Fish are raised in densely packed net cages so diseases spread quickly.
- Sea lice, rampant on fish farms, escape and weaken wild salmon stocks.
- Antibiotics and pesticides to prevent disease and sea lice contaminate water in which wild salmon swim, kill other species, and may be harmful to consumers.
- Net cages often tear, allowing farmed salmon to escape, which affects wild salmon.

Resolving the Fisheries Crisis

- Federal and provincial governments must work together to determine what went wrong.

- Fishers must have reduced fish quotas.

- Continued research is needed to collect more accurate information.

- Include stakeholders including scientists, fishers, aboriginal people and environmental groups in developing policies to protect and conserve the fisheries.

Sustainable Fisheries

- Buy fish where the fish stocks are in good shape. Example: snow crab

- Buy fish that are caught in a friendly way. For example: hook and line not by large trawlers.

- Have low bycatch and good reasonable quotas.

Activate your learning ….
Questions 1,3, 4a,6 & 7….P.271

Digging for Minerals

Canada – Potash Capital of the World

Potash – is a non-metallic mineral.

Non-metallic minerals are minerals that do not contain any metals.

Potash is an important non-metallic mineral for the following reasons:

1. It is richer in **potassium** which is important for plant growth.
2. It is used for **fertilizer**.
3. It is also used for making soap, animal food, medicines and water softener.

Note: Canada produces more potash than any other country in the world and 95% of it is mined in Saskatchewan.

Why Dig up Minerals?

MINERAL	PRODUCT/USES
ALUMINUM *(bauxite ore)*	cans, packaging, sports equipment, car and aircraft parts
CADMIUM 	highly toxic but used in nickel-cadmium rechargeable batteries and nuclear reactors to control fission
COPPER 	electric wiring, electric motors in household appliances, plumbing, roofing, cooking pots
GOLD	jewellery, dentistry, electronics
IRON 	steel for construction, auto parts, magnets, appliances, paints, cosmetics

MINERAL	PRODUCT/USES
NICKEL	stainless steel used in kitchen utensils—stainless steel pots and tableware, jewellery
POTASH 	fertilizer, ceramics, soap, water softener
SILVER	photography equipment, electronics, jewellery
URANIUM	nuclear power plants, cancer-treatment equipment
ZINC 	sunscreen, rust inhibitor, galvanized steel for roofing and car parts

Hunting for Treasures – Finding Minerals

- Mining is a **knowledge-based industry** that used high-tech computer and satellite technology to explore and find the location of ore bodies.

- **Open pit mines** are used when ore bodies are close to the surface of the earth.

- Metallic minerals, which are minerals that provide us with metals such as iron, nickel, copper, etc, produce a powerful magnetic field.

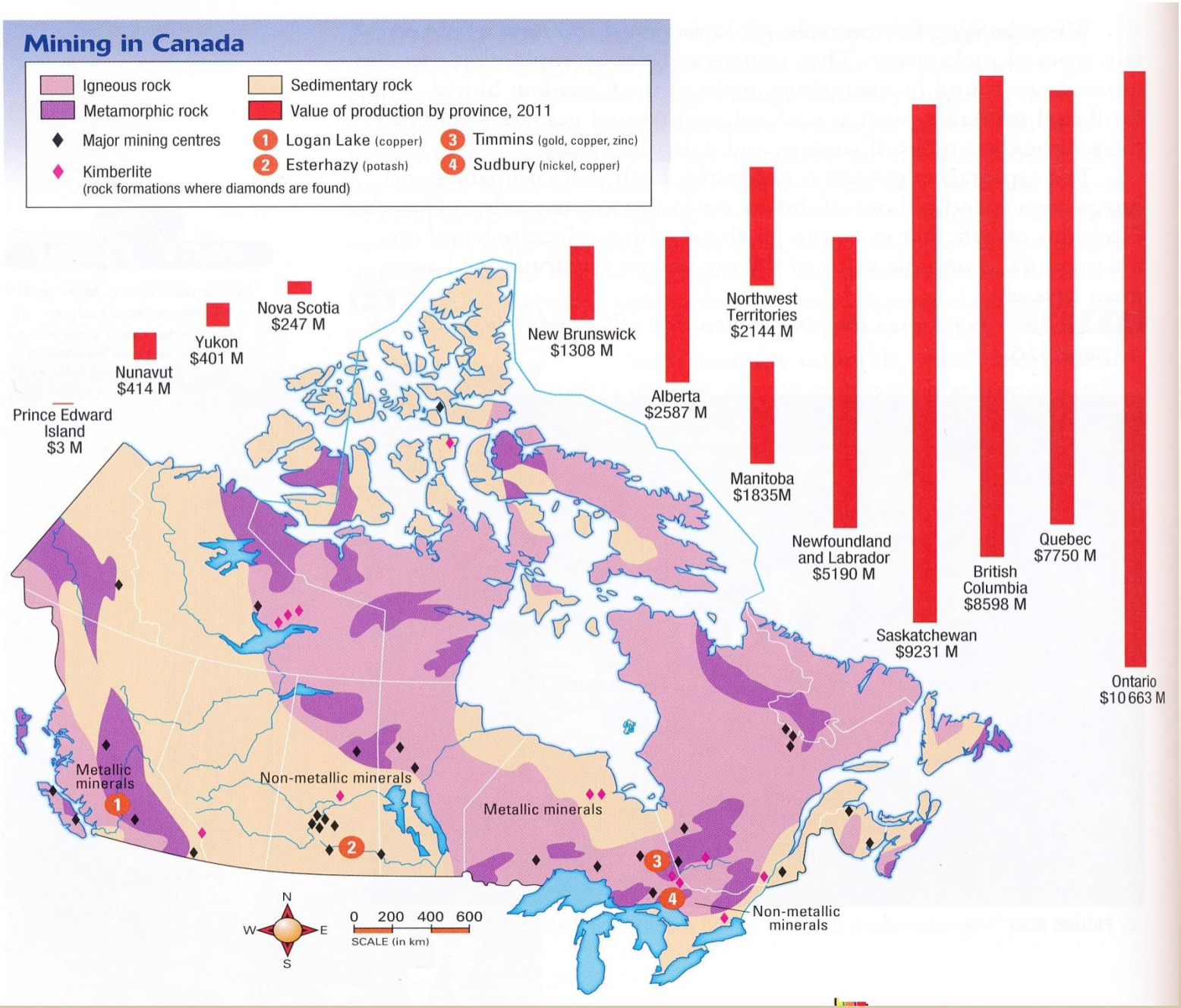
- **Magnetometers** are instruments that measure the Earth's magnetic force and are carried by helicopters over potential mineral bearing land.

Magnetometer

-Despite all high-technology equipment used to find minerals, prospectors and geologists must still go out in the field to:

- Study maps and air photos
- Collect rock and soil samples.
- Examine core sample rock to determine the amount of minerals in the ore.

- Metallic minerals are found in igneous rock and fossil fuel minerals, such as coal, oil and natural gas is found in sedimentary rocks.


Mining in Canada
Igneous rock
Metamorphic rock
Sedimentary rock
Value of production by province, 2011
Major mining centres
Kimberlite
(rock formations where diamonds are found)
1 Logan Lake (copper)
2 Esterhazy (potash)
3 Timmins (gold, copper, zinc)
4 Sudbury (nickel, copper)
Nova Scotia $247 M
Yukon $401 M
Nunavut $414 M
Prince Edward Island $3 M
New Brunswick $1308 M
Alberta $2587 M
Northwest Territories $2144 M
Manitoba $1835M
Newfoundland and Labrador $5190 M
Saskatchewan $9231 M
British Columbia $8598 M
Quebec $7750 M
Ontario $10 663 M
Metallic minerals
Non-metallic minerals
Metallic minerals
Non-metallic minerals
N
W
E
S
0 200 400 600
SCALE (in km)

Mining Towns

Canada has many single-industry resource towns.

Example: Labrador City – Labrador.

Mining and the Economy

- Ontario, Saskatchewan, British Columbia and Quebec produces about 80% of the total value of Canada's minerals.

- Newfoundland and Labrador represents **8.6%** of the province's total GDP.

- This is based on the value of mineral production like nickel, gold, and iron ore.

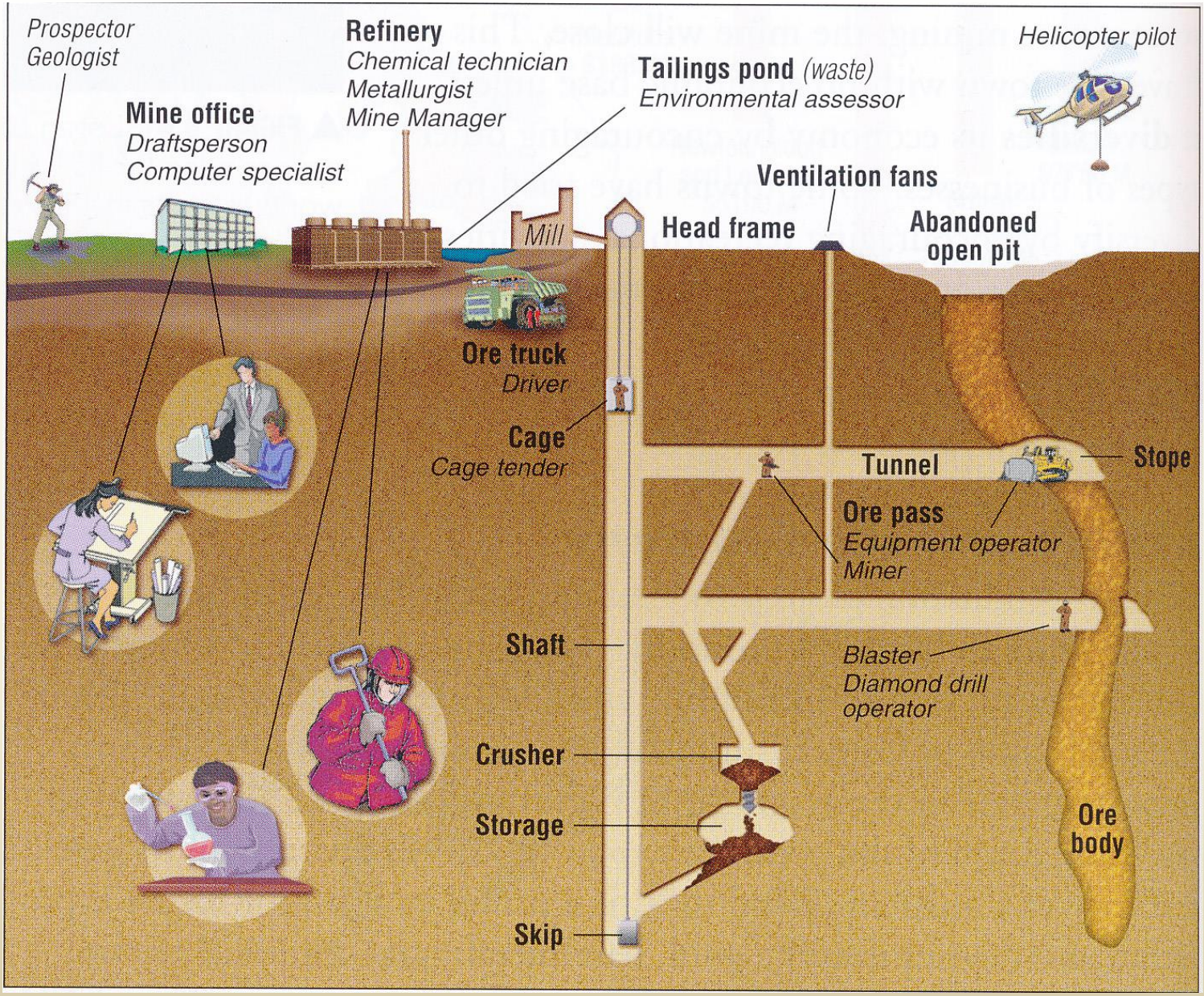
Global Connections

- Canada is a big player on the world mineral markets.

- Canada leads in all production of **uranium** and is among the leaders with other countries in the production of **gold, aluminum, zinc, platinum and salt**.

- Recently, Canada has become a leader in the production of **diamonds**.

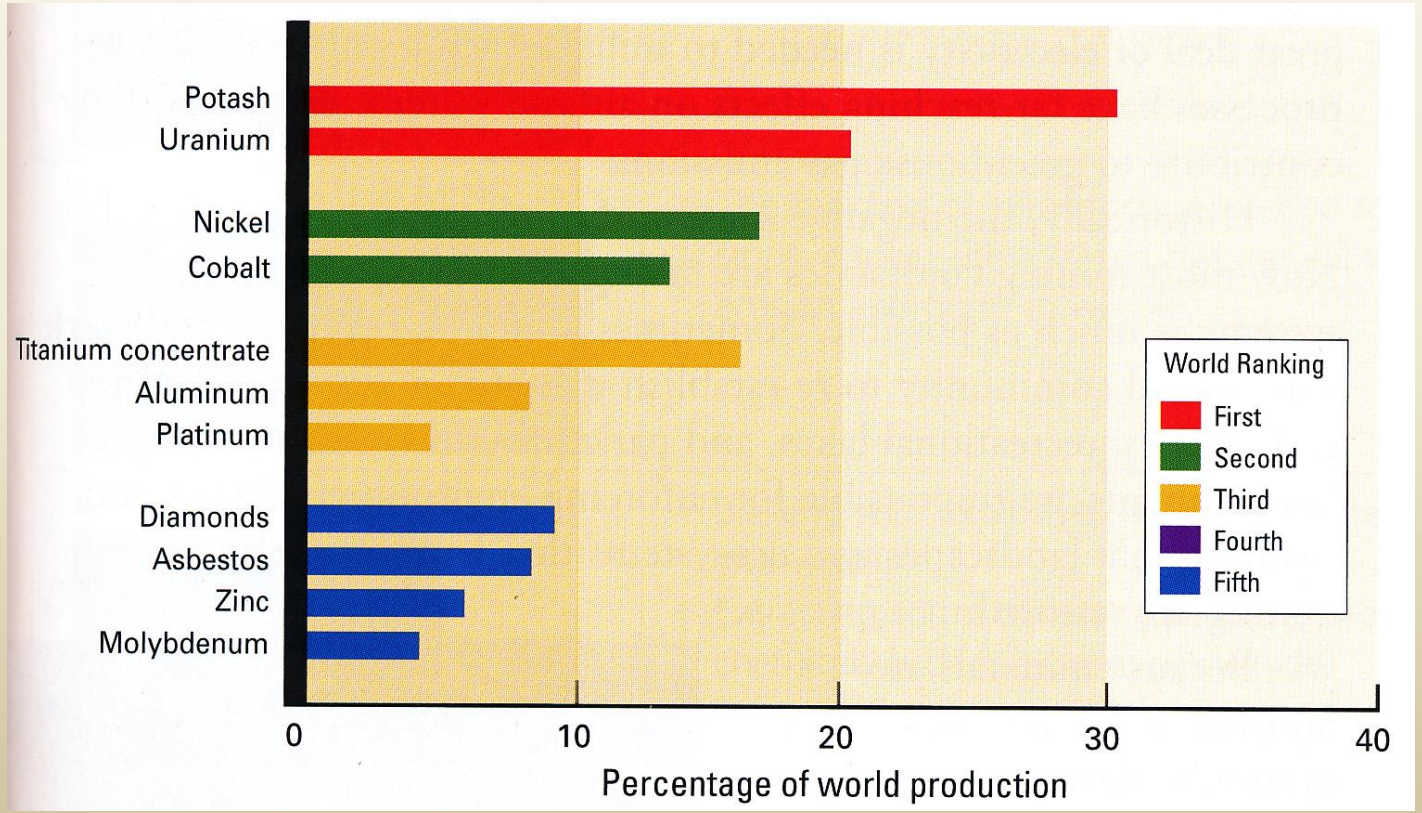
- Mining generates about **$80 billion** a year for Canada.


Prospector
Geologist
Refinery
Chemical technician
Metallurgist
Mine Manager
Tailings pond (waste)
Environmental assessor
Helicopter pilot
Mine office
Draftsperson
Computer specialist
Ventilation fans
Mill
Head frame
Abandoned
open pit
Ore truck
Driver
Cage
Cage tender
Tunnel
Stope
Ore pass
Equipment operator
Miner
Shaft
Blaster
Diamond drill
operator
Crusher
Storage
Ore
body
Skip

The Mining Trade

Balance of Trade – the difference between imports and exports in a particular country.

Canada in 2010 exported $85 billion worth of minerals. In that same year, Canada imported $67 billion (positive balance of trade)



A Balancing Act – Mining's impact on Natural Systems

The Environmental Impact of Mining

STAGE OF THE MINING PROCESS	IMPACT ON NATURAL SYSTEMS
EXPLORING FOR MINERALS 	• The building of roads or airstrips to help explore for minerals and drilling for ore samples causes the removal of natural vegetation, which can affect wildlife.
DEVELOPING THE MINE 	• The building of infrastructure needed to support a mine (roads, air-strips, a town site) can remove natural vegetation, causing soil erosion and harm to wildlife.
EXTRACTING THE ORE 	• Blasting with explosives may affect water drainage systems and wildlife. • Extracting some minerals out of the ore involves the use of toxic chemicals such as arsenic or cyanide.
PROCESSING THE ORE TO EXTRACT THE MINERALS: *Milling, Refining, and Smelting* 	• Improper storage of fuels or chemicals may cause pollution by leaking into groundwater and surface water. • Waste material like *slag* and *tailings* may contain heavy metals and chemical residues. • Air pollutants contribute to acid rain.
CLOSING THE MINE AND RECLAIMING THE LAND FOR OTHER USES 	• Pollutants may continue to leak from tailings' storage areas. • Former shafts and tunnels may be filled with tailings, which may leak chemicals into groundwater.

Acid Rain

Acid rain is one of the most serious environmental problems facing Canada and other industrial countries today.

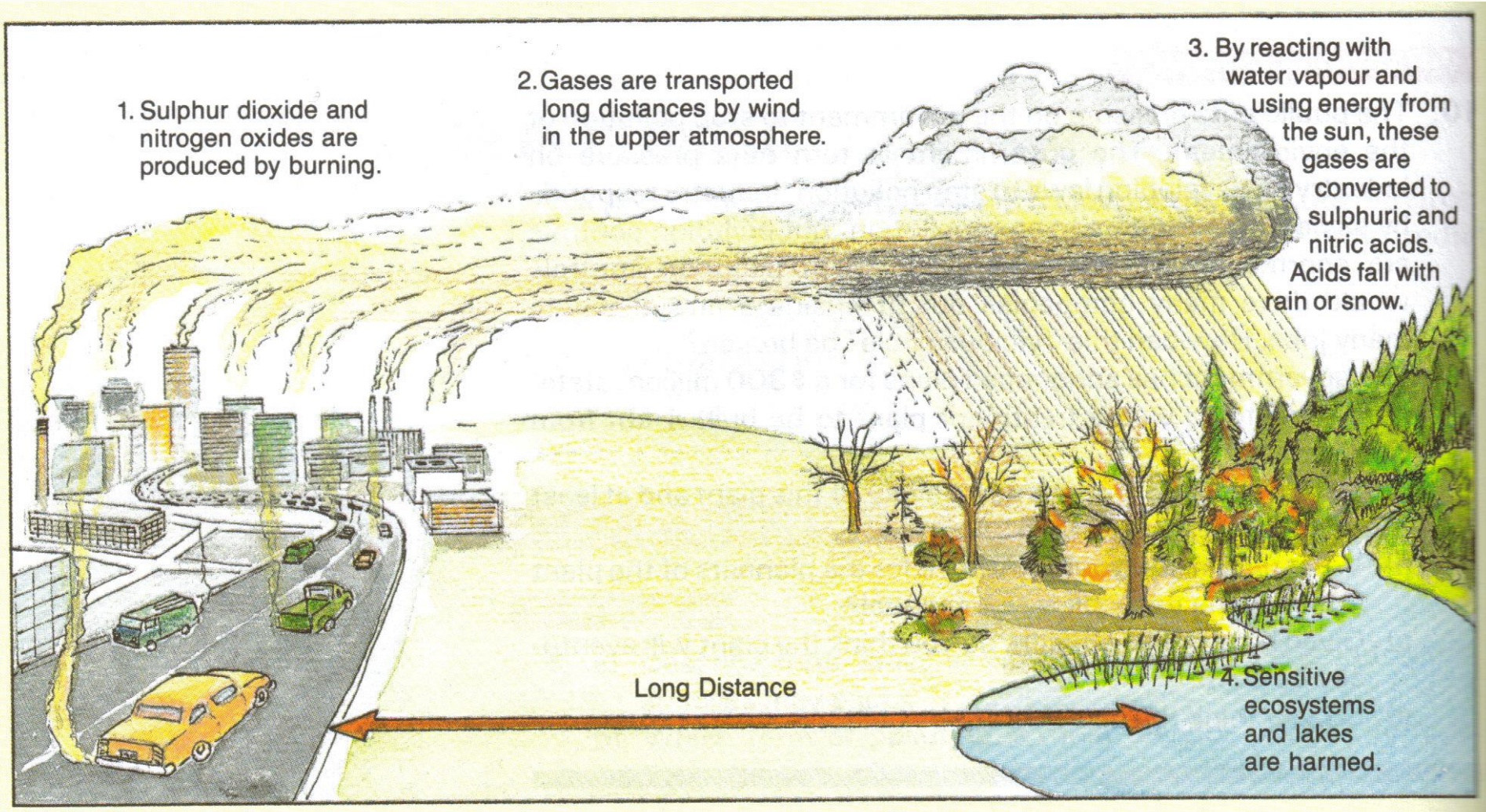
Formation and Deposition

There are 3 main steps in the formation and deposition of acid rain.

1) **Sulphur dioxide and nitrogen oxides** are produced as by-products of the burning of fossil fuels.

2) **Gases are transported** for long distances by prevailing winds

3) **Oxides react with water** and using energy from the sun, produce **sulphuric and nitric acids** which **fall with precipitation** or are deposited from fog.


1. Sulphur dioxide and nitrogen oxides are produced by burning.
2. Gases are transported long distances by wind in the upper atmosphere.
3. By reacting with water vapour and using energy from the sun, these gases are converted to sulphuric and nitric acids. Acids fall with rain or snow.
Long Distance
4. Sensitive ecosystems and lakes are harmed.

Harmful Effects of Acid Rain

- Fish exposed to acid rain become deformed because of a lack of calcium for their bones.

- Female fish fail to reproduce when the acidity level of the water rises.

- Statues and monuments that are located near industrial areas rapidly deteriorate and may become unrecognizable.

- The "dead" lakes created by acid rain have led to a decline in the tourist industry in many places.

- The health of humans may also be influenced when acidic water dissolves the interior of pipes, releasing high levels of copper, lead, aluminum, into drinking water.

Balancing Human and Natural Systems in Sudbury

- Sudbury, Ontario is the largest single source of Nickel in the world.

- Sudbury mines have reduced levels of pollution by investing hundreds of millions of dollars on **new technology to reduce emissions**.

Activate your learning
Do #s 1 & 2 Page 283

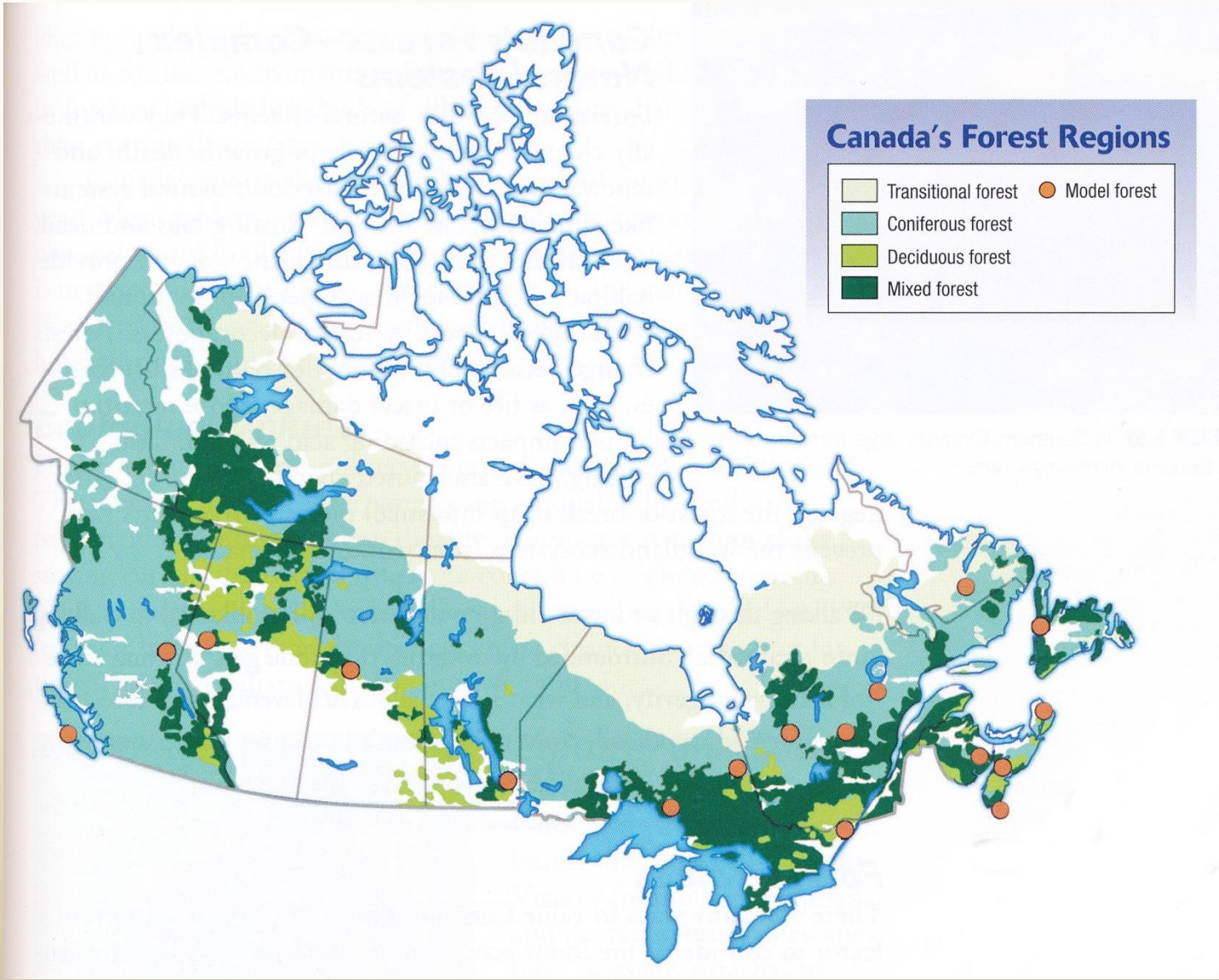
Canada: A country of Forests

- Half of Canada's total land area is covered by forests.
  (397.3 million hectares) **Note**: 1 hectare = 10,000 sq meters

- 57% is considered **commercial forest** or forested land that is capable of producing marketable products, such as **timber**

- **Timber** is wood that has been prepared for use as a **building material**.

Canada's Forest Region



Facts

- Forest covers **90%** of the total land area of **Atlantic Maritime** ecozone.

- Canada's largest forest region is the **Boreal Forest**.

- **Softwood forests** of mainly **coniferous** trees make up about 66%.

- **Hardwood forests** of mainly **deciduous** trees make up 12%.

Forest Values

- When valuing a forest the most important factor to consider is the forest **ecosystem**. Without a healthy ecosystem, the forests will not be productive, which means they will not be able to generate the forest products on which we so depend.

Economic Values

- More than **300 communities** in Canada depend on the forestry.

- **195,000 people** are employed directly with the forest industry in Canada.

- **5500 people** in the forestry industry in Newfoundland and Labrador.

- **Canada exports about $24 billion** worth of forest products each year.

- Most exports go to the **United States**.

Ecological Values

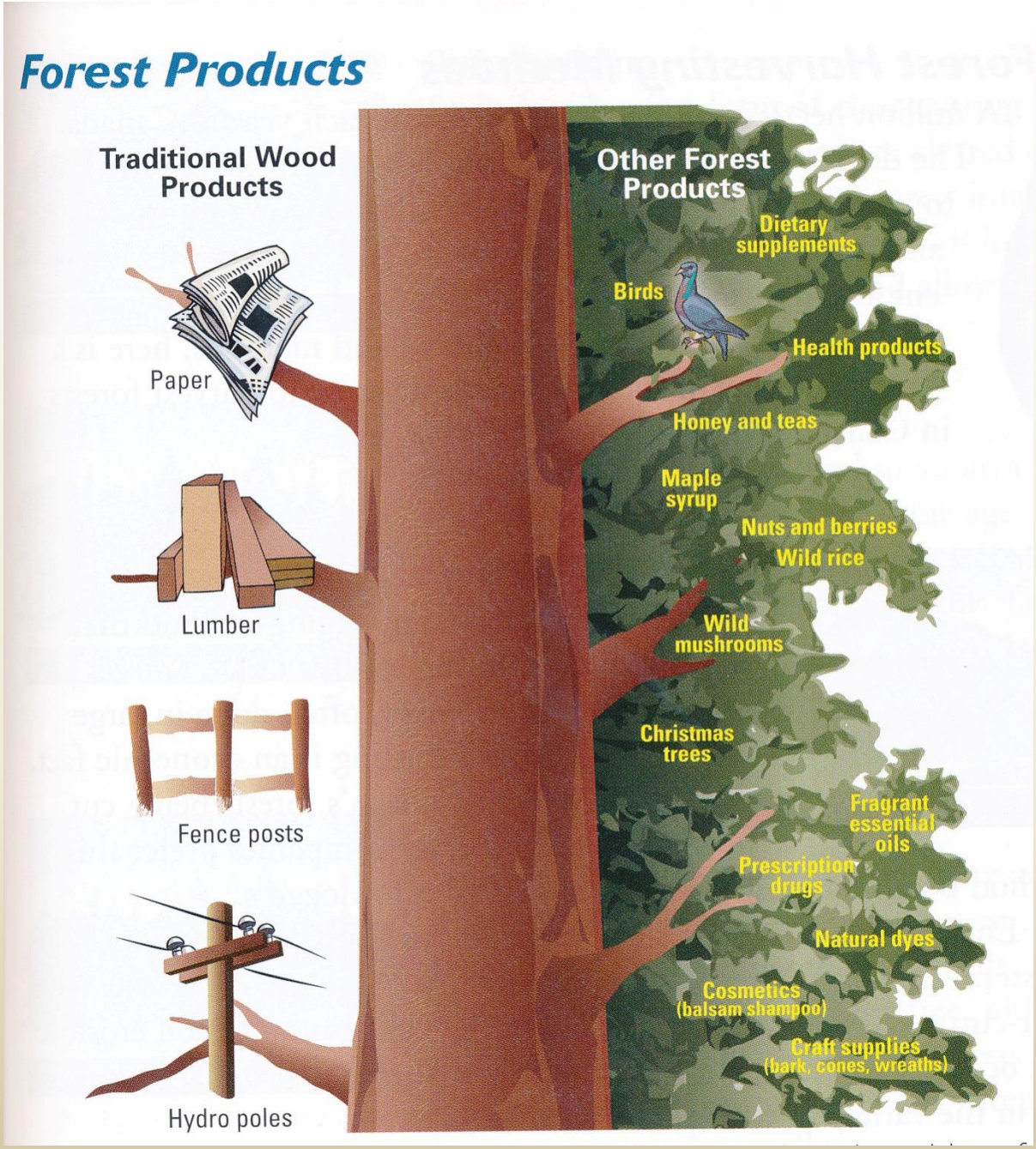
- Forests reduce soil erosion, recycle water and control water flow.

- Forests act as a huge air filter, improving air quality by producing oxygen and absorbing carbon dioxide.

Cultural and Social Values

- Forests provides places of scenic beauty and spiritual sanctuary.
- Forests provide recreation.
- Forests provide traditional food, medicines, and materials for Aboriginal people.

Forest Products



Who Owns Canada's Forests

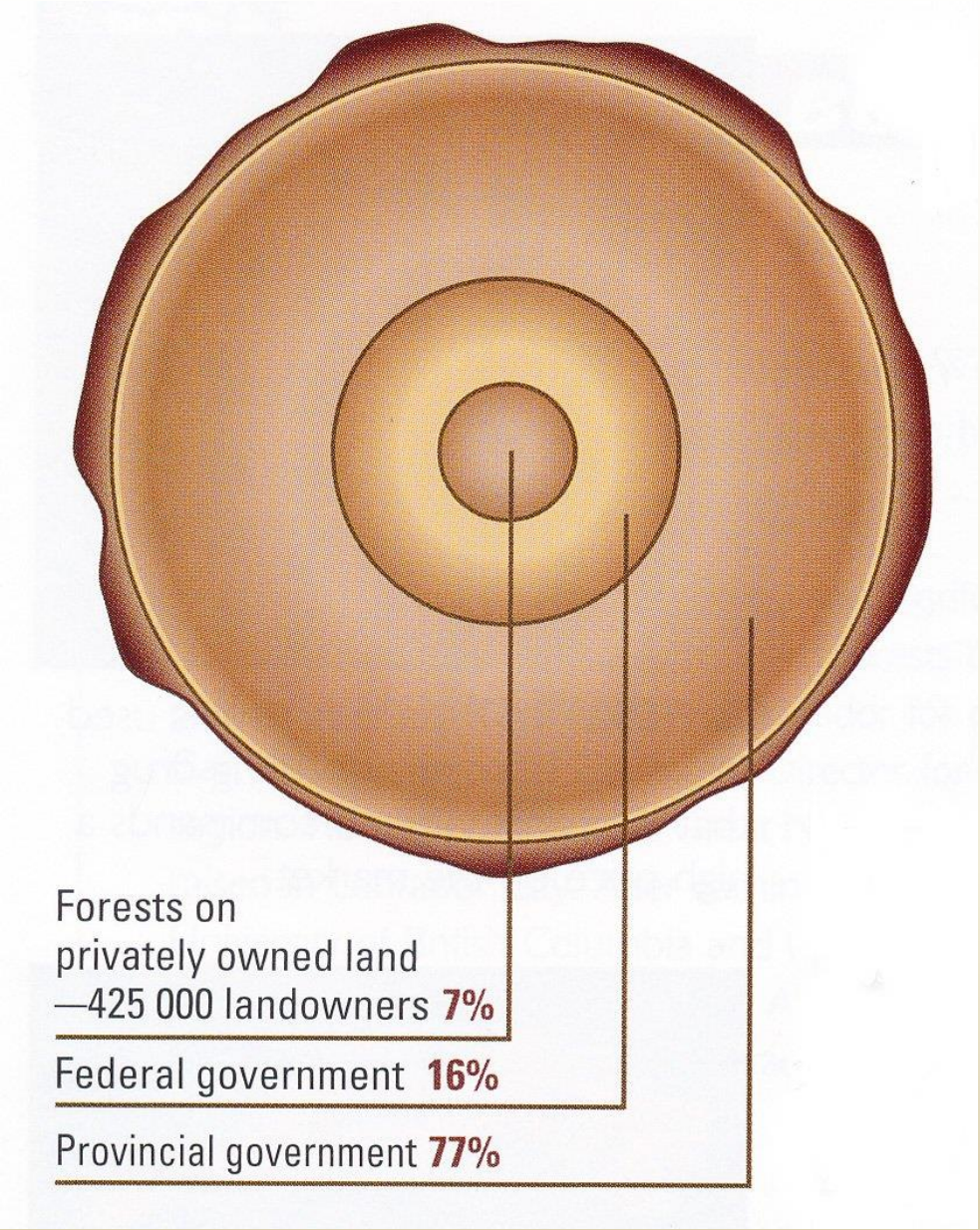
- **94%** of our forests are **publicly owned** and under the control of government.

- In the Atlantic Maritime ecozone, most of the forested land is privately owned.

- 90% of PEI, 68% of Nova Scotia and 50% of New Brunswick's forests are located on privately owned land.

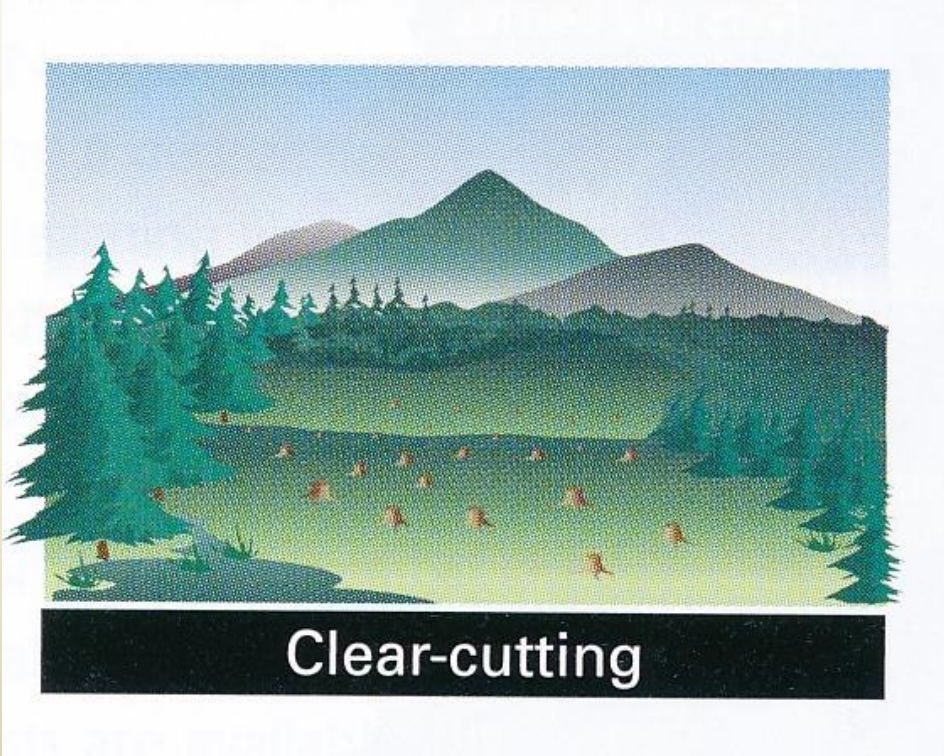
- Newfoundland and Labrador forests owned by the government are referred to as Crown Land.

WHO Owns Canada's Forests?



Forest Harvesting Methods

1. **Clear Cutting** - Is a logging method that involves clearing an area of all its trees at one time. 90% of Canada's forests are being cut this way.



Clear Cutting

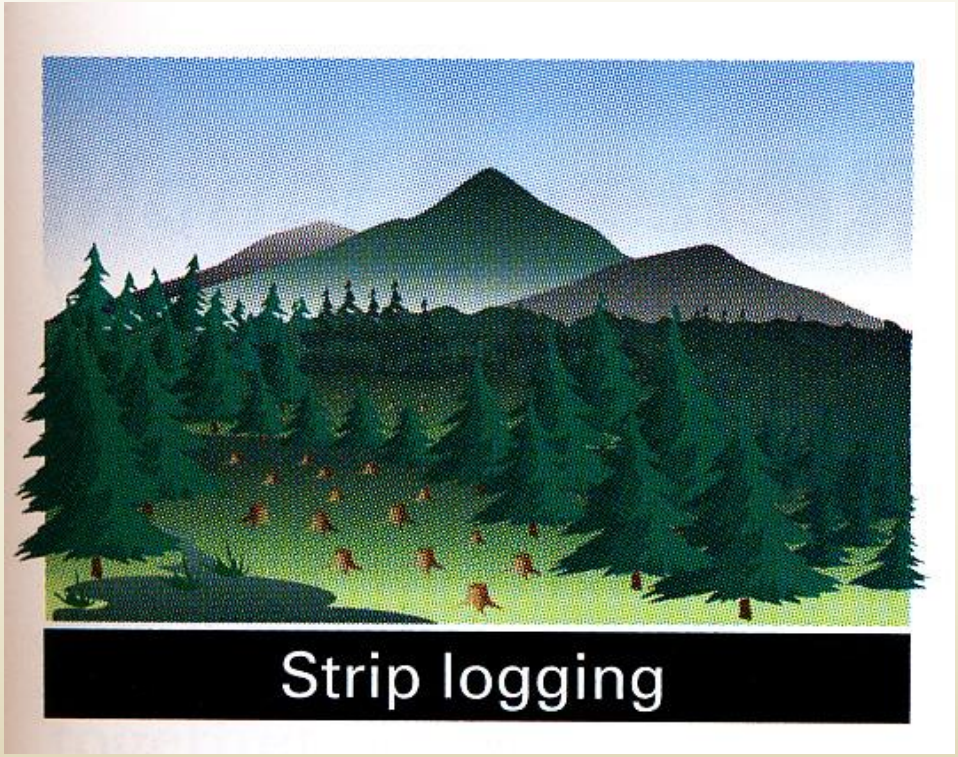
Advantages

- This method cost less to do for harvesting companies.
- Safer for loggers.

Disadvantages

- Soil erosion occurs when all the trees are removed.
- the loss of biodiversity in a variety of tree species.

2. **Strip Logging** - is a form of clear-cutting in which long strips of land are cleared of trees, leaving some island of forest intact.



Strip Logging

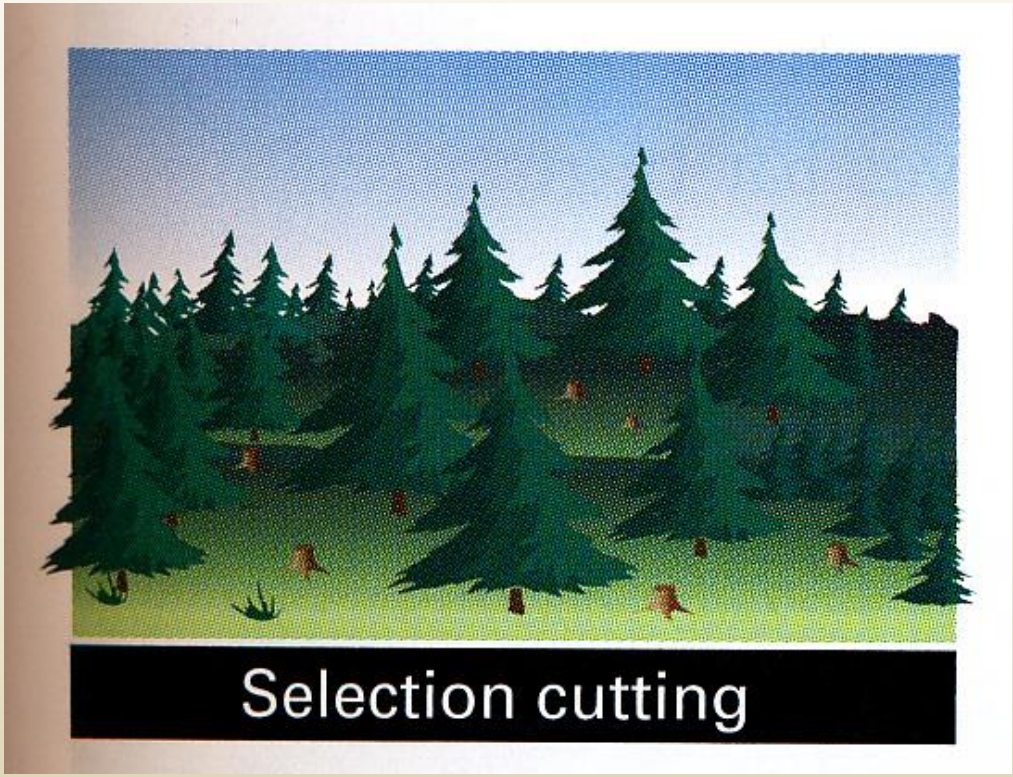
Advantages

- Reduces soil erosion
- Less disruptive to some wildlife
- Natural reseeding to take place

Disadvantages

- It requires large areas of land to be harvested
- More roads have to be constructed

3. Selective (or selection) Cutting – Occurs when only trees are harvested from the forest. These trees are removed because they are diseased.



Selective Cutting

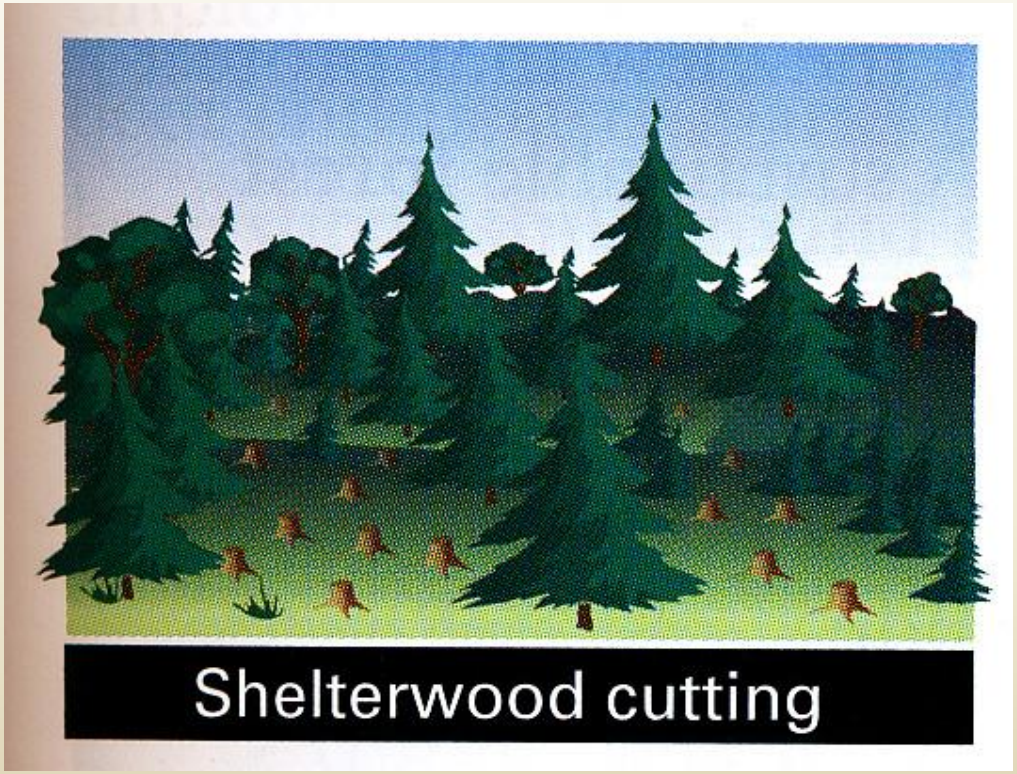
Advantages:

-Remaining trees provide shade needed for remaining growth of younger trees and seedlings
- it is less ecologically destructive
-Often left to regenerate naturally

Disadvantages:
-More expensive than other methods
- Care must be taken to not damage unharvested trees
- access roads must be maintained

-* Used where there are different types of trees of various ages.

4. **Shelterwood Cutting** - is used in an area of trees that are all generally the same age. The more mature trees are cut.



Shelterwood Cutting

Advantages

- Remaining trees provide the shade needed for the growth of younger trees and seedlings.
- It is less ecologically destructive.

Disadvantages

- It is a more expensive method of tree harvesting.
- Lower yields
- Care must be taken to avoid damage to unharvested trees.
- Access roads must be maintained to harvest trees as they mature.

Forest for the Future

A **sustainable forest management plan** is required in order to have a healthy forest. Government makes laws and policies to protect our forest.

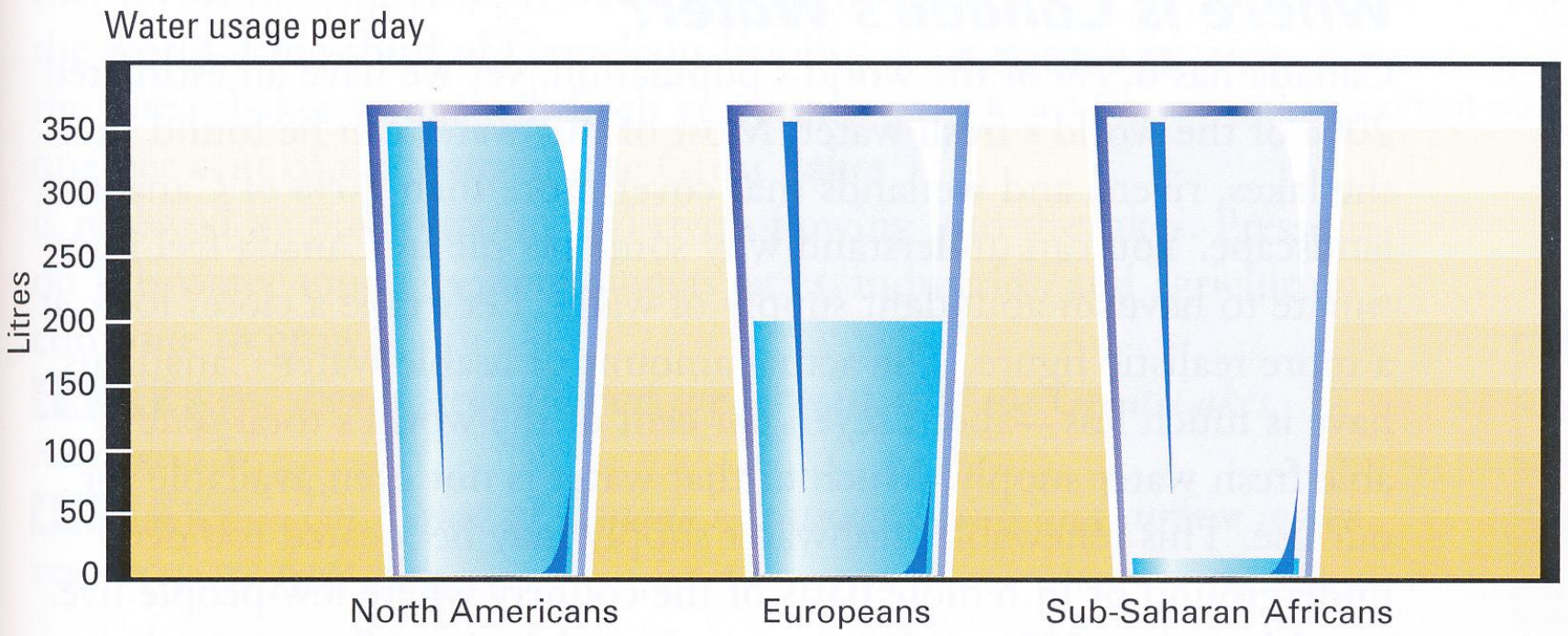
Ways to improve forest management include:

1. Leave a **band of forest around the shores of lakes and rivers** and avoid cutting on slopes to reduce erosion.

2. **Reduce the size** of clear cutting areas.

3. Set aside large enough trees of the forest to provide **intact ecosystems** for wildlife.

Water – The essence of life …..Pg 296



▲ **FIGURE 6.67** Canadians use much more water than people living in other parts of the world. This graph shows daily per capita use of water in residential areas. Water is also needed for agriculture, industry, energy, and recreation.

Views about Water

Two view points about water:

1. **Commons** – refers to nature's resources that belong to everyone. People believe that having clean water is a basic human right.

2. **Commodity** – an economic resource such as water that is exchanged for money. People believe that it may be owned privately and sold for a profit.

Where is Canada's Water?

- **20% of the world's fresh water** is found in Canada.

- Most of the water is in lakes, rivers and wetlands.

- Much of the water is not even available for our use.
    - It's located **too deep underground**.
    - It's **located in remote parts of the country** where few people live.
    - **More than 50%** of the water in Canada's rivers **flow into the Arctic** and is **unavailable for the densely populated southern ecozones** of the country.

Canada's Wetlands

- Canada has 25% of the world's total **wetlands**.

- **Wetlands** – are water in a marsh, swamp or fen that is either fresh or salty, standing of flowing and two to six meters in depth.

- **Fen** – an area of low land covered with shallow water.

- Wetlands play an important role in protecting local water quality by:
    - Filtering out sediments and pollution, even toxic chemicals.

The Great Lakes Watershed

- Largest fresh water system in the world.

- About **40 million people** in Canada and the United States depend on this water.

- Much pressure is put on this watershed because of population growth, industries and agriculture growth.

Global Connections

- More than **a billion people** have no access to clean, safe drinking water.

- **80% of the illnesses** that people experience in developing countries are **water-related**.

- The United Nations suggest that **50 litres** of water per person, per day is a **minimum level for drinking**, washing, waste disposal and food preparation.

- Some regions of the world only have access to **less than 10 litres a day** for their needs.

Diverting Water

- Communities located in the united States, South of the Great Lakes have experienced critical water shortages, spurring some enterprising business people to propose **water-diversion** schemes.

- **Water Diversion** – is the rerouting of water from one drainage basin to another.

Who Controls Canada's Water?

Public vs Private

	WATER AS A PUBLIC UTILITY	WATER CONTROLLED BY PRIVATE COMPANIES
Role of the consumer	• Citizen	• Customer
View of water	• Commons resource	• Commodity
Main decision makers	• Public officials • Water experts	• Companies • Individual households • Water experts
Main goals	• Protect the public interest • Follow laws and policies • Encourage conservation	• Maximize profit • Ensure efficient performance

Activate your Learning…. Do Questions 1 & 2….Page 305

Sources of Water Pollution

Protecting our Water Resources

- Safe drinking water is a priority for all Provincial Governments.

- Laws are in place for all drinking water standards in Aboriginal communities.

Treating Your Drinking Water

- **Pathogens**: a disease causing agent.

- A number of different methods are used to treat water and kill pathogens or bacteria and viruses that could make people sick.

- **Two Methods**;

  1. Treat water with chlorine (inexpensive method).

  2. Ozonation and Ultra-Violet light are the two main methods used to kill pathogens.