

# Environmental Sciences 11/12

## Final Exam

## Review Booklet

### Tips for Studying:

1. Answer each question in this review booklet
2. Rewrite your notes
3. Attend each lunch time tutorial your teacher holds
4. Make cue cards and quiz yourself
5. Look at the learning goals that are worth the most marks and MASTER those sections
6. Find a study group that BRINGS OUT THE BEST IN YOUR LEARNING
7. Teach your parents, relatives, siblings, or pets this information

GOOD LUCK ☺

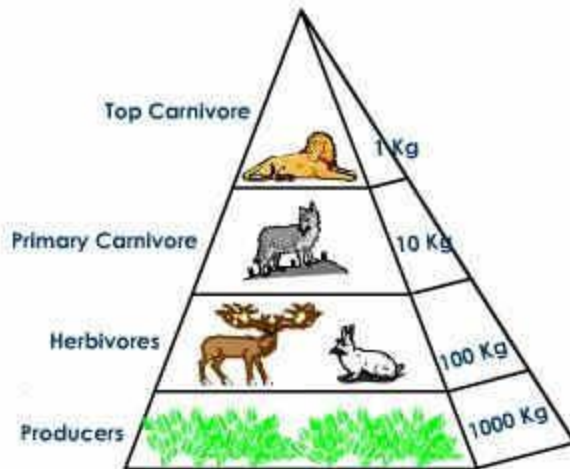
Continually SELF ASSESS using this learning goal chart

Learning Goals	Novice	Apprentice	Expert
<b>Unit#1: Local Okanagan Ecosystem</b>			
1. I can connect the roles of species in the local Okanagan ecosystems			
2. I can explain ecosystem stability and the factors that influence sustainability			
3. I can explain how humans can be a factor of change within an ecosystem			
4. I can discuss unsustainable and sustainable human practices			
5. I can explain First Peoples and traditional ecological knowledge			
<b>Unit#2: Earth's Water</b>			
6. I can explain bio-indicators of a healthy water system			
7. I can explain the health factors that contribute to healthy oceans			
8. I can explain the health factors that contribute to healthy freshwater systems			
9. I can plan for budgeted water use			
<b>Unit #3: Earth's Air</b>			
10. I can discuss global changes to Earth's atmosphere			
11. I can explain the implications of greenhouse gases			
<b>Unit #4: Earth's Land</b>			
12. I can explain factors impacting soil quality			
13. I can discuss global food security issues			
14. I can explain land management practices			
<b>Unit #5: Human Impact and Restoration</b>			
15. I can discuss human health and environmental impacts of population growth			
16. I can plan and take action on a restoration project			

## Learning Goal #1: I can connect the roles of species in the local Okanagan ecosystems

1. Define the following terms:

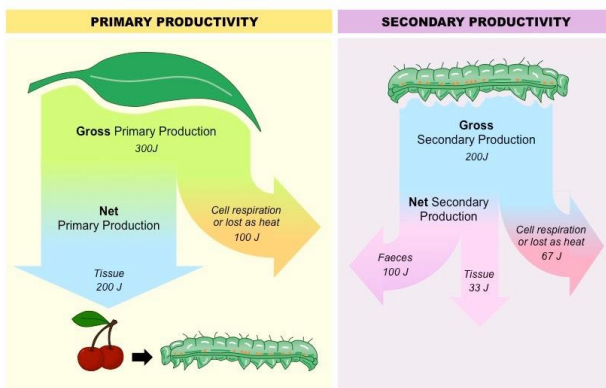
- a. Ecosystem Biomass – the amount of living materials in the ecosystem



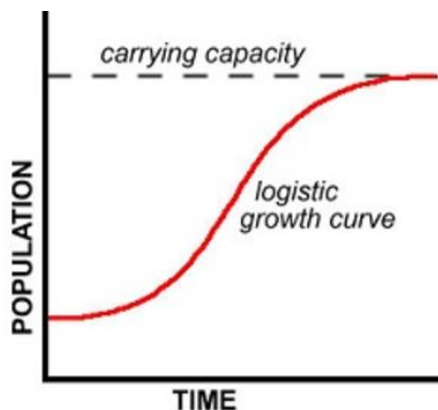
Upright Pyramid of biomass in a Terrestrial Ecosystem

Pyramid of terrestrial points upward, pyramid of marine points downwards

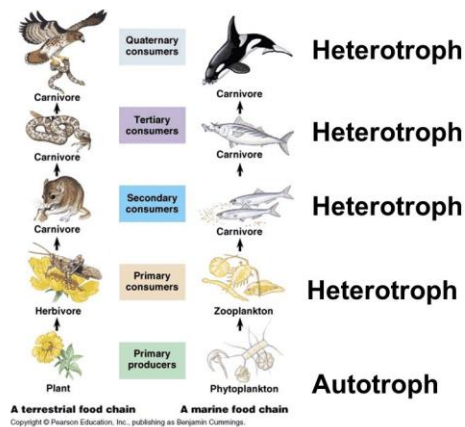
- b. Ecosystem Productivity – generation of biomass through generations



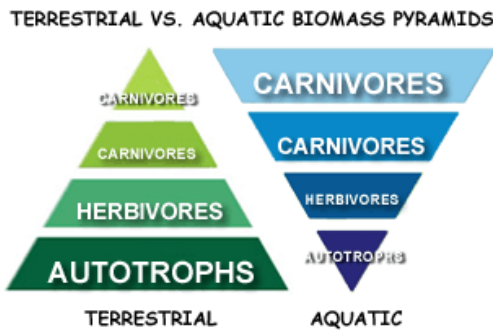
- c. Ecological niche – the role of an organism in an ecosystem
- d. Trophic cascade – the impact on the nutrition and food chain in an ecosystem. When one organism's population decreases that impacts all the other organisms lower in the food pyramid.
- e. Carrying capacity (K) – the amount of organisms that a population can handle. Once carrying capacity is reached the birth rate = death rate and the graph will level out.



2. Define the following: autotroph, heterotroph, and saprotroph and give an example of each.



3. What is the difference between a terrestrial and aquatic biomass pyramids? Explain WHY there is the difference.



4. Describe three different trophic cascades situations and how they have impacted the ecosystem. Use the examples that we have explored in our case studies.

a. **Yellowstone National Park**

- i. Wolves removed due to over hunting, which caused the elk population to increase due to decreased predation. Too many elk caused overeating of grasses. Also caused elk to become stationary, which increased the repercussions of elk overeating. This ended up changing the pathways of the creeks and rivers and caused the tree populations in the riparian zones to decrease. This caused a decrease in the bird population as well.

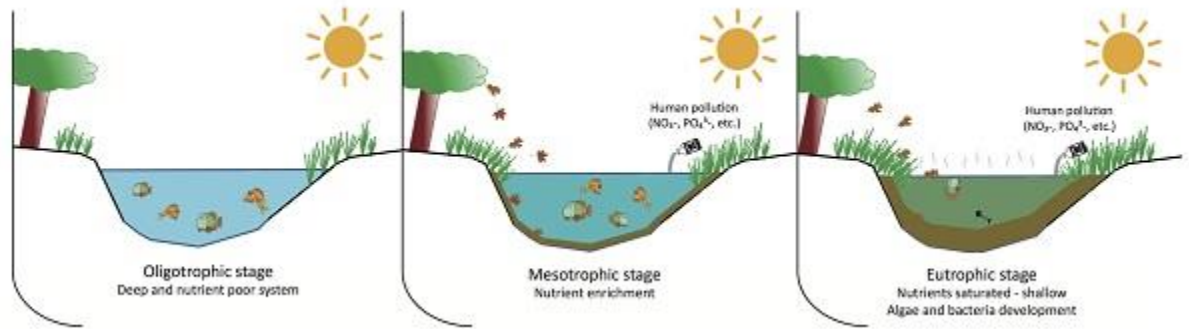
b. **Wolf and Caribou in BC**

- i. The caribou population is decreasing to such an extent that the herds are almost extinct. This will impact the lichen population (big food source of caribou). The lichen population will increase which will then be a competitor for the grasses and decrease the grass success. This will impact other ungulates such as deer, as well as smaller rodents which feed and build nests from grasses. This will also impact the beetle and insect populations, which will in turn impact the decomposition rate of organic matter, so there will be a build up of dead and decaying matter.

c. **Zebra Mussels**

- i. The mussels will filter feed faster which will make clearer water. The clearer water will allow sunlight to penetrate to the bottom algae better, which means that they will grow taller and bigger. They will eventually grow and cover the top of the pond, which will then block the sunlight to the bottom. All algae will die and rot. This will decrease the oxygen recycling in the

water, which will kill off the fish and snails. This will create a “Dead pond” as nothing will be able to survive the low oxygen.



5. What is an invasive species? What are some examples of invasive species in the Okanagan?

## Introduction and Background

Invasive Aquatic Species (IAS) is defined as any non-indigenous species knowingly or unknowingly transported and released by human activities into an environment other than its native habitat.

6. What is the difference between a native species, non-native species, and invasive species?

**Native species:** An animal or plant that have developed, occurs naturally, and have existed for many years in an area



Coyote



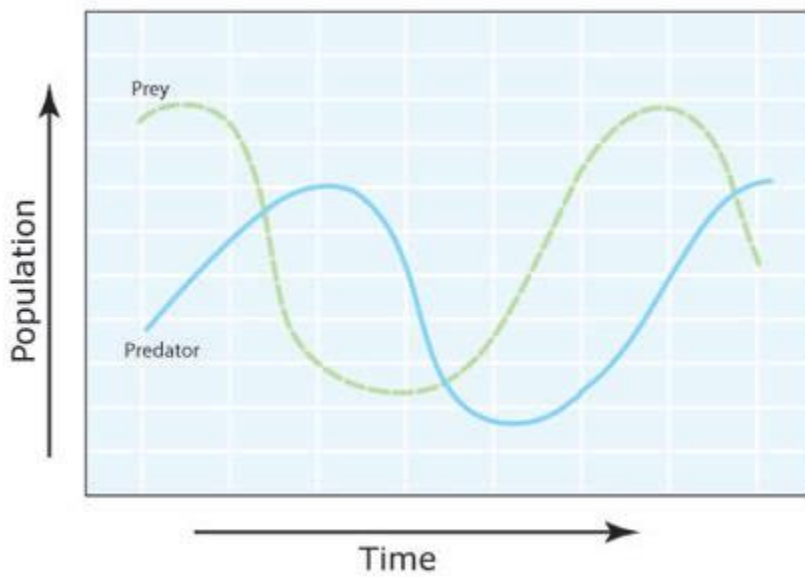
Mountain lion



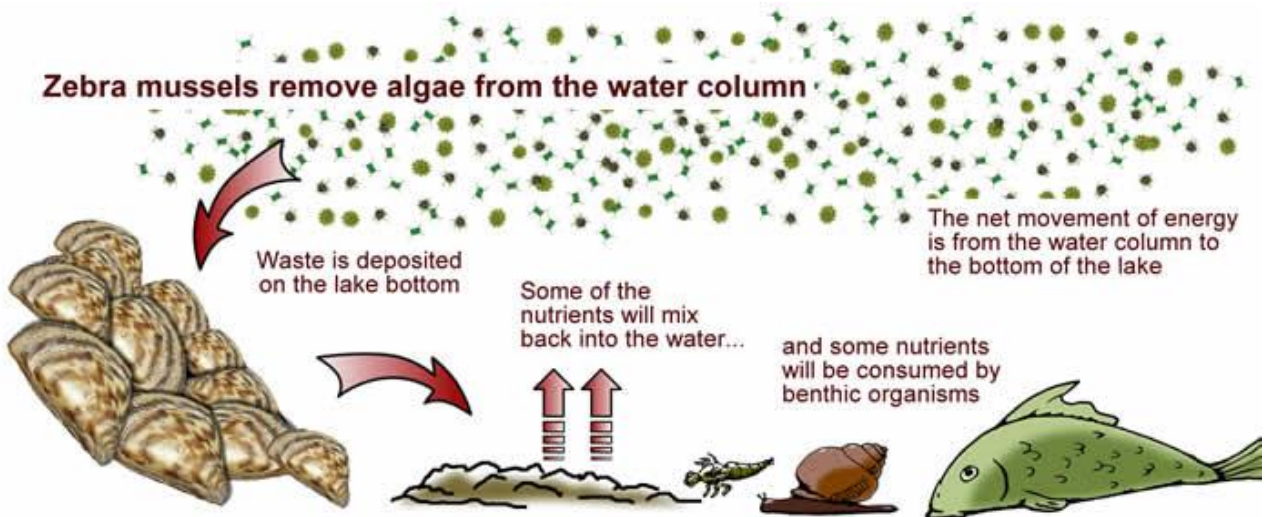
Sequoia Tree



7. How does predation impact a population?








8. What impact do zebra mussels have on a lake system? What are the possibly long term impact?



9. What are some examples of symbiotic relationships of organisms in the Okanagan? Explain what they are and define the three main types of symbiosis.

## Species Interactions

- \*There are 5 major types of symbiotic relationships:

- \*Predation 
- \*Parasitism 
- \*Competition 
- \*Mutualism 
- \*Commensalism 

10. What are three red listed and three blue listed Okanagan organisms. Explain what is happening in their ecosystems that have led them to their numbers? What is being done about it?

**Extirpated species** no longer occur in the wild in British Columbia but occur elsewhere.

**Endangered species** are facing imminent extinction or extirpation.

**Threatened species** are likely to become endangered if factors affecting them are not dealt with and trends reversed.

**Vulnerable species** are of concern because of characteristics that make them particularly sensitive to human activity or natural events.

### Missing from the South Okanagan!!

Six vertebrate species that once lived in the South Okanagan - the Pigmy Short-horned Lizard, White-tailed Jackrabbit, Burrowing Owl, Northern Leopard Frog, Sharp-tailed Grouse, and Sage Grouse - have disappeared from the region.

11. What are the 7 local ecosystems? What are defining characteristics of each?

Ecosystem	Defining Characteristic
Interior Douglas Fir	Squirrels, dense fir trees
Montane Spruce	High up on montains elevation, spruce trees, birds, and ungulates
Ponderosa Pine	Ponderosa pine trees, not dense forests, owls, etc, lots of pine needle litter
Bunchgrass	Very dry, only blue bunchgrass, no sage, snakes and rodents
Antelope Brush	Very dry, sage and antelope brush, rattle snakes
Interior Hemlock/Cedar	Small hemlock and cedar trees, dark brown soil
Cottonwood Riparian	Along creek or river, lots of birds, yellow cottonwood trees

**Learning Goal #2: I can explain ecosystem stability and the factors that influence sustainability**

1. What are some of the factors that has led BC to initiate a Wolf Cull starting in 2015? What are they hoping to impact? Why? What are BOTH SIDES of the story?

Caribou in Dawson Creek herd are very threatened and down to their last numbers. Biologists and Wildlife Management officers are hoping that removing their predators will help manage their population.

Wolf cull area in BC



2. What are some of the issues surrounding the Great Bear Rain forest? What is impacting the area? How can we play a role?



*Spirit Bear by Stephanie Waymen*

The rare Spirit Bear is known locally by several names;

- Kermode Bear, named after Francis Kermode, former director of the Royal B.C. Museum.
- White Bear or Ghost Bear is often used by local folks.
- Moksgm'oi by local First Nations.
- Ursus americanus kermodei by Scientists.
- Spirit Bear is a more recent name for the White Bear. Appropriate for a bear that is known for it's elusive, ghostly yet timid nature.

This rare White Bear is actually a Black Bear! Scientists are actively studying this rare genetic trait that is possibly due to a recessive gene, or could be due to a result of a concentration of gene in a given area. The Spirit Bear is *not* an albino.

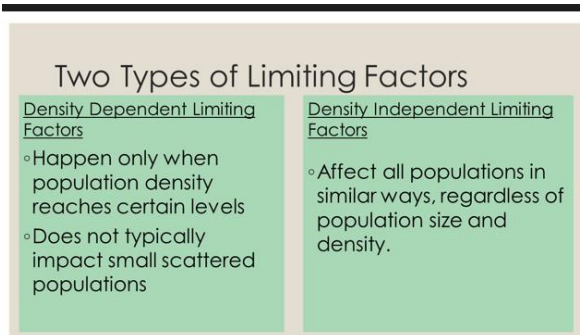
Scientists estimate there are 1,200 black and white Kermode bears in the coast area that stretches from around the northern tip of Vancouver Island northwards to the Alaska panhandle. On Gribbell Island, up to 30 per cent of the bears can be white while on the larger Princess Royal Island, about 10 per cent have the white coat.

competition with grizzly bears as the habitat of the grizzlies are infringing on the Kermode bear's habitat

Spirit bear protected by black bears are not

Black bears carry the recessive gene of the white fur

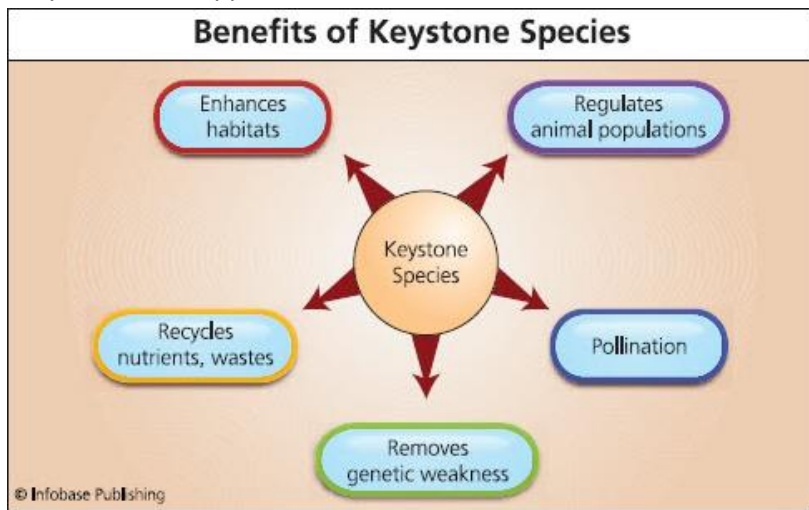
- What is the difference between density dependent and density independent limiting factors? Outline some examples of each.



- How does genetic diversity impact sustainability?

Genetic diversity allows organisms to be adaptive to a change in the environment. When there is low genetic diversity in a population (like in monocultures) you have a much less “flexible” population.

- What is a keystone species? Give an example of two that we have learned about. What is the trophic cascade if they were to disappear?



**Learning Goal #3: I can explain how humans can be a factor of change within an ecosystem**

- What are some examples of biological control that humans have played a role in? Outline four examples of what occurred, what the reasoning was and happened as a result of human involvement?

- Cane toad
- Ontario turkey
- Zebra mussels
- Prickly pear
- Parasitic Wasp
- Stink Bug

- What are actions that are currently being done to help improve some of our population of organisms? How are we communicating with our communities to help species at risk?

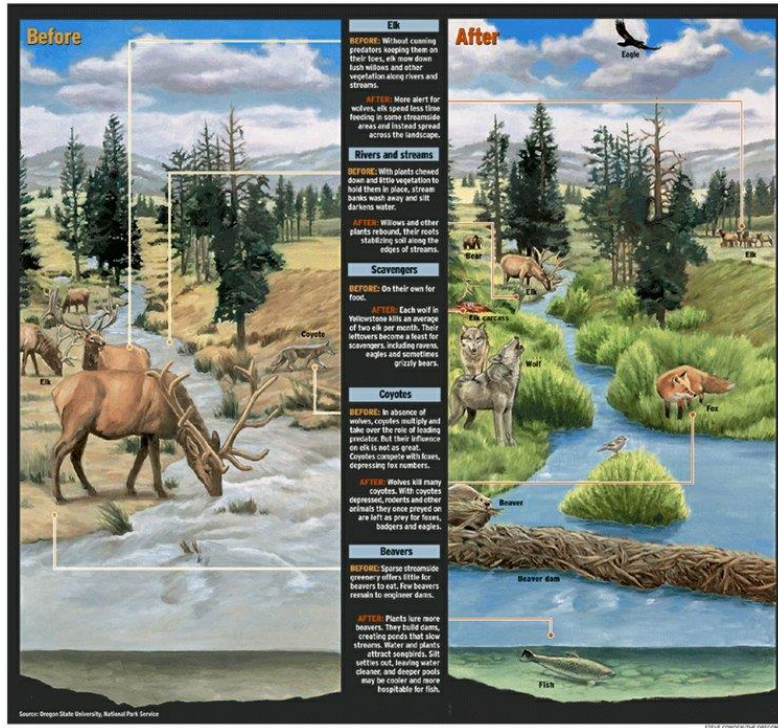
Protected land, national parks, habitat restoration, breeding programs



3. What do you think we could do better to help our species at risk? Come up with 5 things we could be doing to help.

See above, education, change our behavior, protect their land

4. Humans re-introduced wolves into Yellowstone National Park. Why? Has this been a factor of change in the ecosystem? How?



5. What is the BC Wildlife Act of 1996 and what does it protect?

This Act is current to December 26, 2018

See the [Tables of Legislative Changes](#) for this Act's legislative history, including any changes not in force.

**WILDLIFE ACT**  
**[RSBC 1996] CHAPTER 488**

**Contents**

**Part 1 — General Provisions**

- 1 Definitions and interpretation
- 2 Property in wildlife
- 3 Minister's powers
- 4 Power to designate wildlife management areas
- 5 Critical wildlife areas and wildlife sanctuaries
- 6 Endangered and threatened species
- 6.1-6.3 Not in force
- 6.4 Controlled alien species
- 6.5 Regulation of controlled alien species
- 6.6 Application of this Act to controlled alien species
- 7 Damage to land set aside for wildlife
- 8 Right of action
- 9 Damaging beaver dams
- 10 Financial responsibility
- 11 Hunting and trapping

6. What is SARA? How is the purpose?

Species at Risk Act

## Overview of the Species at Risk Act (SARA)

- Federal Act administered by
  - Environment and Climate Change Canada
  - Fisheries and Oceans Canada (DFO)
  - Parks Canada
- Currently over 500 species (including ~400 terrestrial species) on SARA Schedule 1
  - Approximately 170 terrestrial species at risk in BC



Short-eared Owl



Monarch

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Environment and  
Climate Change Canada

Environnement et  
Changement climatique Canada

Canada

### Learning Goal #4: I can discuss unsustainable and sustainable human practices

1. What are some of the negative impacts of humans on local ecosystem? Explain specifically how this impacts organisms and environments.

Urbanization

Development

Recreation

2. What are some things that we are doing to help our ecosystems and organisms be more sustainable?

Provincial parks, national parks

Breeding programs, aquariums, zoos, education

3. What are some changes we can make to our choices and behaviours that might positively impact local ecosystems?

Ethical consumerism, building garden corridors, education among community, buy local, small housing,

4. What are some careers that you could go into that would have a positive impact on our environment and sustainable practices?

Conservation officer, wildlife management, fisheries and wildlife biologist, environmental engineer, etc

### Learning Goal #5: I can explain First Peoples and traditional ecological knowledge

1. What is the traditional ecological knowledge?

## Traditional Ecological Knowledge

- ▶ *environmental knowledge that has been gathered by aboriginal peoples who have lived in and observed a particular area for generations.*
- ▶ *systems of experiential knowledge gained by continual observation and transmitted among members of a community.*

2. What are some of the organisms that Okanagan First Nations People have a special connection to? Explain the connection.

Bear, salmon, antelope brush, sage

3. The Okanagan First Nations see all parts of the ecosystem as living (water, soil, etc). How does this differ from the Western perspective of living and nonliving?

Abiotic factors are non-living (no reproduction, no breathing) such as soil and rocks and water

Biotic factors are living (reproduce, made of cells, breath) such as animals, plants, fungi, etc

First Nations believe that water and rocks are living and contribute to the energy of the earth. That we are all reliant on each other and feed off each other. If the water is harmed then it will contribute to a trophic cascade. If the rocks and soil is harmed it will also contribute to the trophic cascade.

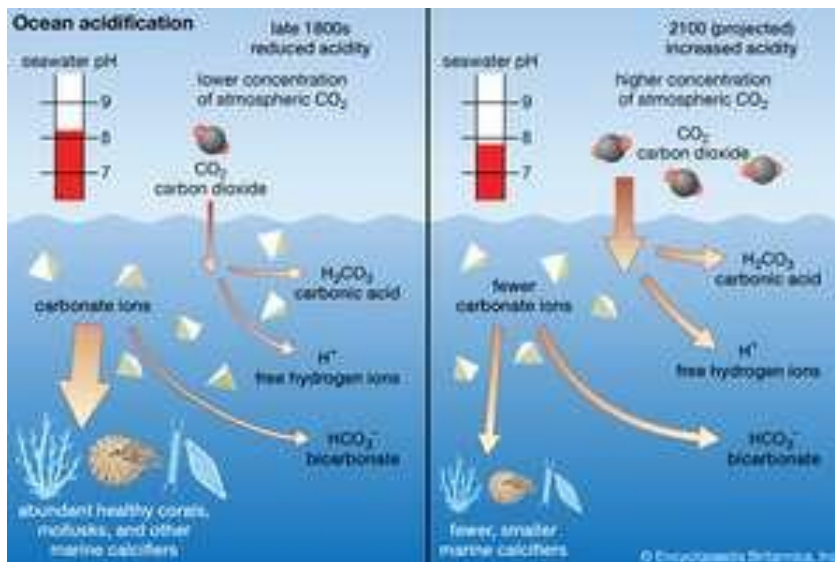
4. What is the BALANCE of our ecosystem? How does the need for BALANCE impact our actions?



We must balance what we take from the land. Out of balance behaviour is over hunting and over fishing. We must work towards a balance of resources and give back to the earth for decomposition and energy

## Learning Goal #6: I can explain bio-indicators of a healthy water system

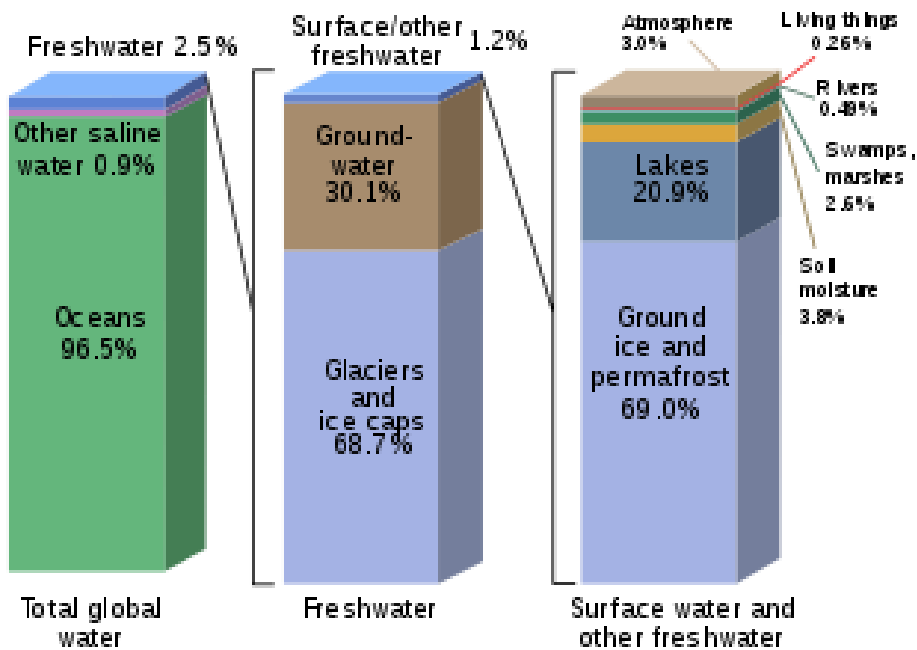
1. What was happening in with the population of Alaskan Sea Lions and why? Is this indicating a healthy system? Why or why not?
  - Population in decline due to a change of food source
  - Used to eat herring, but their population has declined due to over fishing
  - Now the sea lions have changed to eat Pollock
    - This is a low fat food source
    - The milk of mom's is not fatty enough and the young pups are not getting strong enough to be able to get back onto shore once in the water and are dying
2. What is a trophic cascade that might happen in a water system? Why? What might cause this?
  - Purples start fish – keep the algae population in check. If they die off then the algae will over grow. This impacts the light able to penetrate the surface and the lower algae will die. This will impact the oxygen in the water and the fish will be impacted as well
  - Kelp – forests of the sea
3. Why is sewage treatment an issue that impacts our water health?
  - Okanagan Lake turns over it's water every 80 years
  - Therefore, the water must be very clean when going into the lake.
  - Excess nitrogen or carbon could throw the entire system off and encourage algae growth with can cause eutrophication
  -
4. What is causing ocean acidification? What are the consequences of it? What can be done? What is being done?
  - Excess carbon dioxide in the air is having a reaction with the water molecules in the ocean which forms hydrogen ions, which cause acidity



**Learning Goal #7: I can explain the health factors that contribute to healthy oceans**

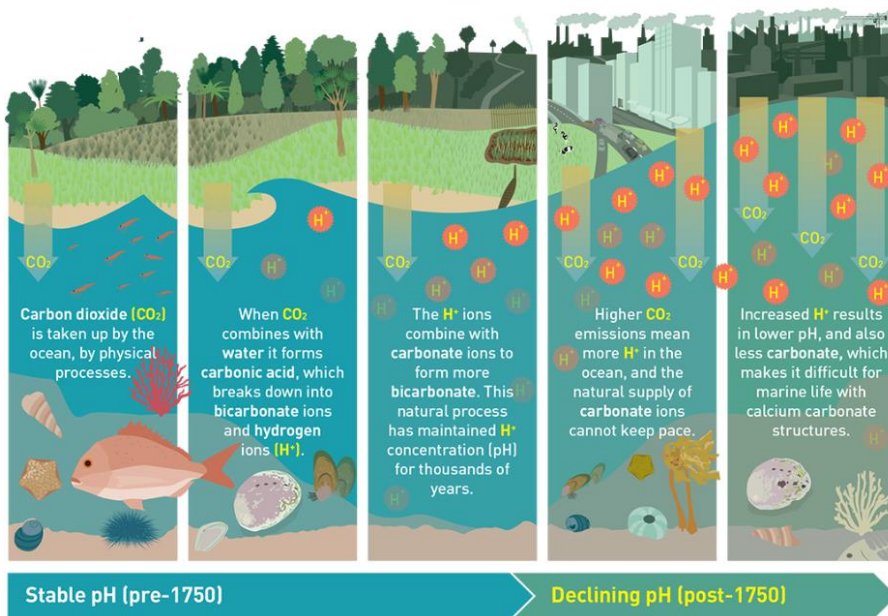
1. How much of the earth's surface is covered in ocean water? What does this mean for our water consumption?

Where is Earth's Water?

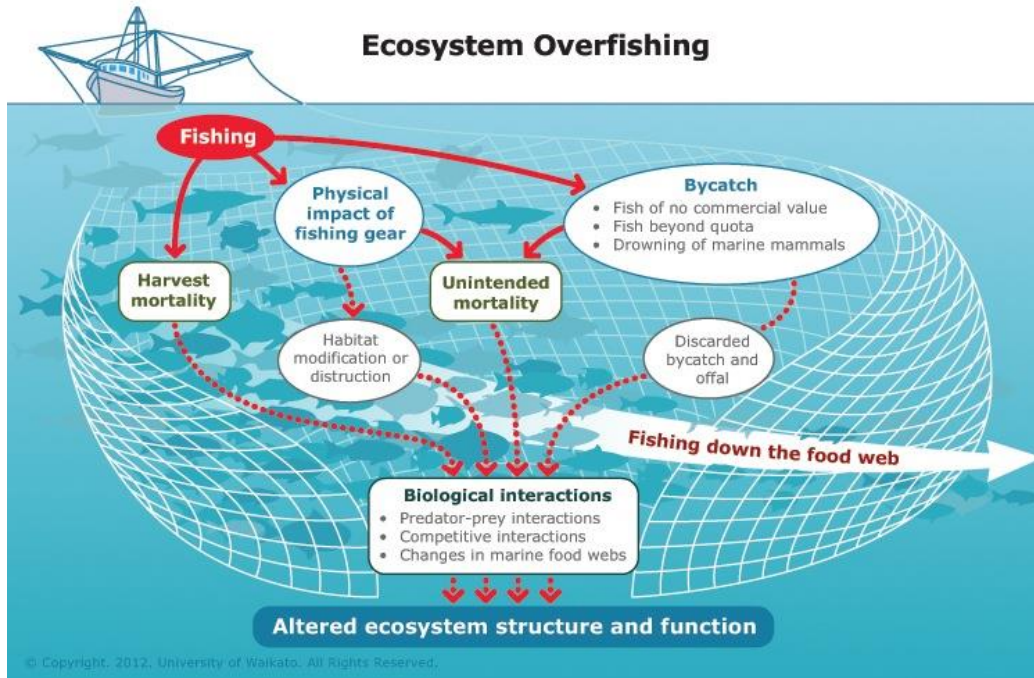


2. How is ocean acidification impacting aquaculture in BC? Why? What are aquaculturists needing to do?

- Weaker shells of bivalves (clams, mussels, oysters)
- Larvae not surviving
- Aquaculturists are needing to raise larval young in tanks and introducing them to ocean when they are strong enough to survive the acidity



3. What are the issues with overfishing? Use some of the statistics that show how overfishing is impacting our fish population.



# OVERFISHING | 1234567890#%\$ BY THE NUMBERS

Overfishing occurs when fish are caught faster than nature can replace their supply. If the exploitation of our oceans' resources continues at its current rate, we can expect to see the total collapse of all edible fish stocks within 40 years.

**top 5 consumers of seafood**  
Based on consumption per capita

1. Japan
2. China
3. United States
4. Indonesia
5. Russia

fishing stocks have seen a **90%** decrease from **1950** to **2011** in the past sixty years

50% of the world's population lives within 50 miles of the oceans. 48% of the carbon dioxide we produce is absorbed by the oceans. The oceans regulate the Earth's temperature and produces more oxygen than the rainforests. It is essential for life and human survival.

**77.9 BILLION** tonnes of fish are caught every year

**3x** the mass of every man, woman, and child in the United States

**70%** water  
**30%** land

**Bycatch**  
Bycatch is marine creatures incidentally caught. The percentage of bycatch is usually 50-90% of what is in the nets.

a single net can hold **500** tonnes of fish

or up to **13** jumbo jets

**2300m<sup>2</sup>** the opening of a net can be as large as 4 football fields

**Hook, Line, and Sinker**  
Long line fishing vessels deploy 1.4 billion hooks a year, each one with a small fish as bait.

1.2 billion people depend on fish as their source of protein in their daily diets.

**Tragedy of the Commons**

50% of all swordfish caught are tossed back into the sea.  
77% of the swordfish tossed back in are dead.

Only 2% of our oceans are protected, compared to the 12% of protected land.

**The State of Our Oceans**

- 52% fully exploited
- 20% moderately exploited
- 17% over exploited
- 7% depleted
- 10% recovering

Almost 80% of the world's fisheries are exploited. 90% of the stocks of large predatory fish species are already gone.

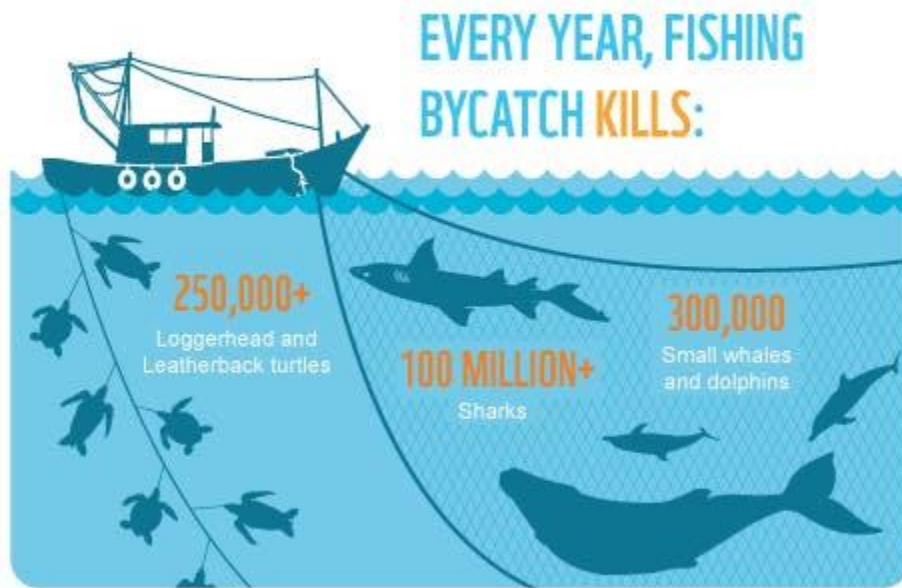
**8 Southern Atlantic Species in Severe Decline**

The numbers show the remaining viable population for each species. Numbers below 30-40% show evidence of exploitation.

Gag grouper	Snowy grouper	Warsaw grouper	Speckled hind	Red snapper	Vermillion snapper	Black sea bass	Golden tilefish
24%	10%	6%	5%	14%	27%	25%	27%

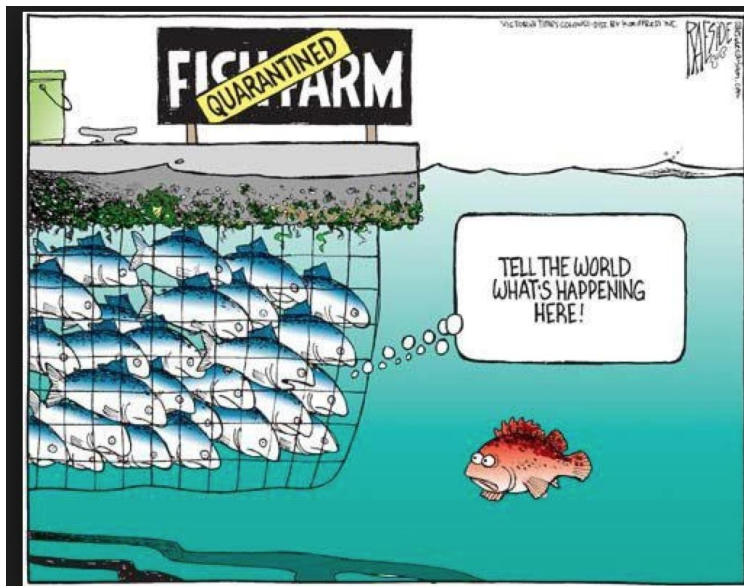
4. What is bycatch? What is the largest catch species that causes bycatch? What are the statistics on this? What could be done?

- Bycatch is organisms that are caught in the process but are not the intended catch
- Most bycatch is killed and dumped into the ocean
- Fishermen are not paid for bycatch



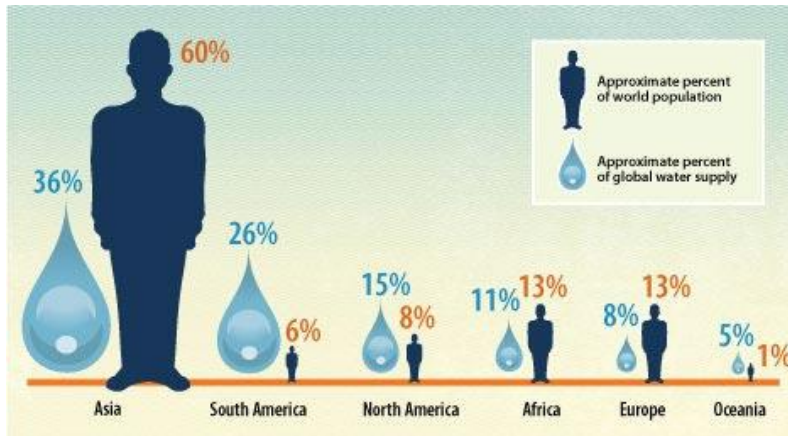
5. What are some of the issues around salmon farming? What is being done? Give an example of some proactive actions that are trying to solve this issue.

- High density leads to high disease in fish
- Sea lice also high
  - Impacts the young fry that are coming out of the rivers at a young age not very strong
- Atlantic salmon are being farmed as they are a larger fish so more money at market



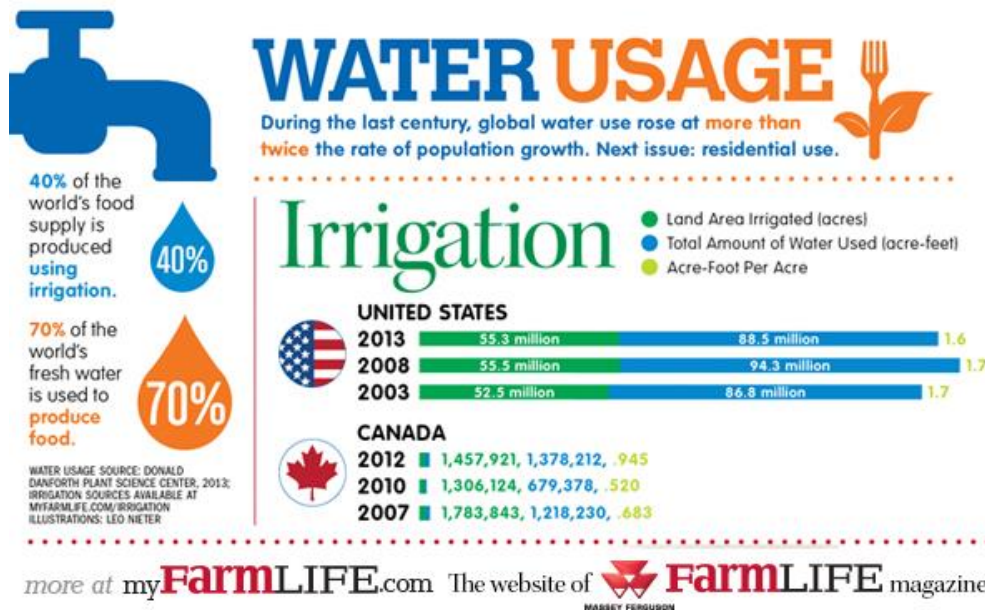
## Learning Goal #8: I can explain the health factors that contribute to healthy freshwater systems

1. How is water consumption tied to population? Is it always? What are some countries that have low water use per capita? What are some countries that have high use per capita? Use the below graphic.



- Each country uses a different amount of water based on population, agriculture needs, and lifestyle

2. How is farming and agriculture tied to water use?



3. If we as a community decided to reduce our water use by reducing our shower time, reducing our use of a dish washer, and sticking to lawn watering restrictions, would that impact our overall global water use? Why or why not? What needs to change?





INSTALL AERATORS ON BATHROOM FAUCETS

saves  
1.2 GALLONS  
per person/day



TAKE FIVE MINUTE SHOWERS INSTEAD OF 10 MINUTE SHOWERS

saves  
12.5 GALLONS  
with a water efficient showerhead



WASH ONLY FULL LOADS OF CLOTHES

saves  
15-45 GALLONS  
per load



INSTALL EFFICIENT, WATERSENSE-LABELED SHOWER HEADS



saves  
1.2 GALLONS  
per minute

OR

10 GALLONS  
per average 10-minute shower



TURN OFF WATER WHEN BRUSHING TEETH OR SHAVING

saves  
10 GALLONS  
per person/day

For more tips on reducing water use, visit [saveourH2O.org](http://saveourH2O.org)!



4. What are some of the statistics we use to find the health of a fresh water system? Why?
  - **Turbidity**
  - **Temperature**
  - **Acidity**
  - **Dissolve oxygen**
  
5. How does temperature impact freshwater systems and organisms?
  - **Warmer water does not hold on to dissolved oxygen (gets released into the air)**
  - **Warmer water often causes an algae bloom**
  
6. How does pH impact freshwater systems and organisms?
  - **Warmer water can damage the mucous layer of fish and gastropods, which makes them susceptible to fungal infections**
  - **Causing a decrease in the shell production of bivalves**
  - **Causing a bleaching of corals**
  
7. How does turbidity impact freshwater systems and organisms?
  - **The more turbid the water the higher the temperature as the darker particles hold on to heat**
  - **Light doesn't penetrate which can impact the algae and plant growth**
  
8. How does dissolved oxygen impact freshwater systems and organisms?
  - **Dissolved oxygen is what marine organisms rely on to respire**
  - **Very important for life in a water ecosystem**

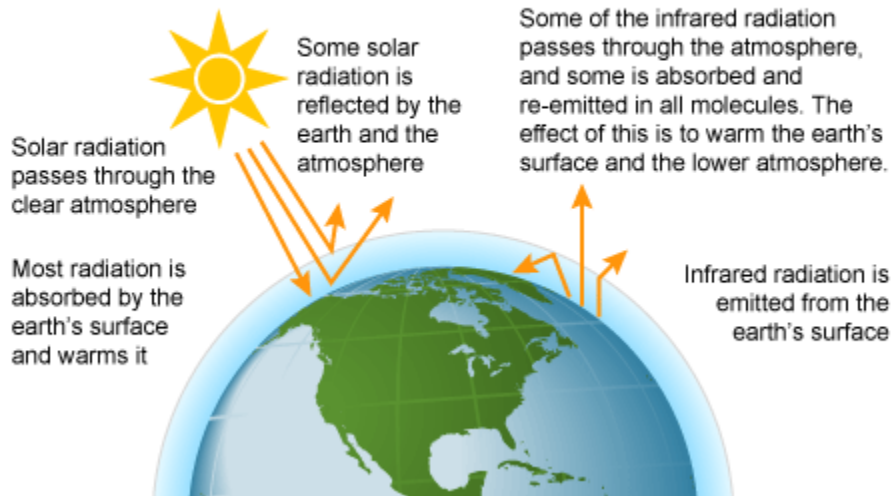
## Learning Goal #9: I can discuss global changes to Earth's atmosphere

1. Define the following terms:

a. Greenhouse gasses

A greenhouse gas is a gas in an atmosphere that absorbs and emits radiant energy within the thermal infrared range. This process is the fundamental cause of the greenhouse effect. The primary greenhouse gases in Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone.

### The greenhouse effect

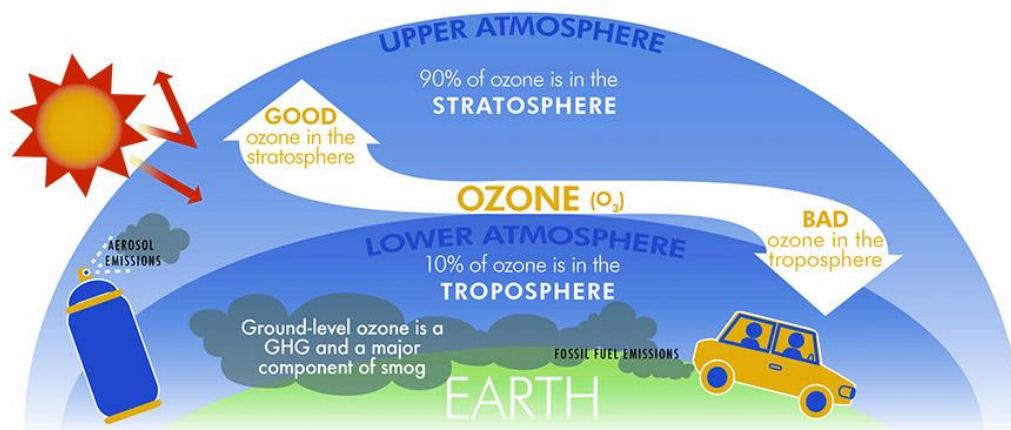


b. Climate

Climate is the statistics of weather over long periods of time. It is measured by assessing the patterns of variation in temperature, humidity, atmospheric pressure, wind, precipitation, atmospheric particle count and other meteorological variables in a given region over long periods of time.

c. Good ozone

The stratosphere or "good" ozone layer extends upward from about 6 to 30 miles and protects life on Earth from the sun's harmful ultraviolet (UV) rays.



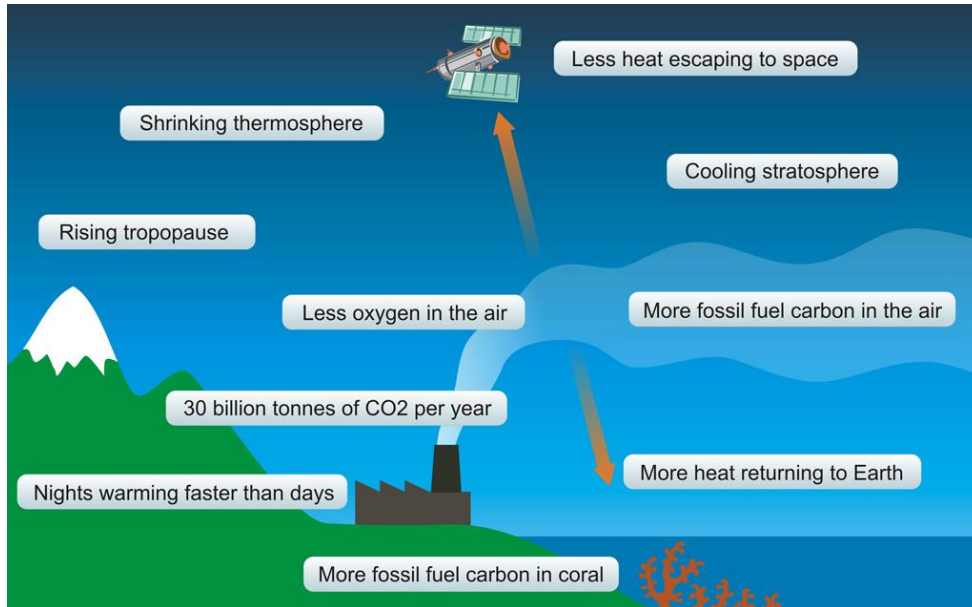
d. Bad ozone

Ground-level or "bad" ozone is an air pollutant that is harmful to breathe and it damages crops, trees and other vegetation.

e. Stratosphere

The stratosphere is the second major layer of Earth's atmosphere, just above the troposphere, and below the mesosphere. About 20% of the atmosphere's mass is contained in the stratosphere.

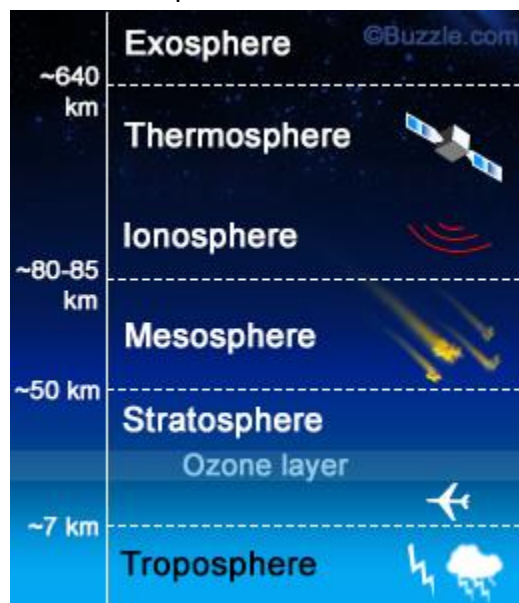
2. What changes have occurred on Earth due to global warming?



3. What are some of the implications to our organisms due to global warming?

- Higher temperature means more oxygen dissolving out of water (impacts freshwater and salt water fish)
- More drought for soil impacting plants and plant eating animals
- Less food for animals (decreased plant species)
- Change in ocean currents due to temperature change cause new locations for ocean animals
- Temperature changes impact coastal cities (more rain)

4. What are the various layers of Earth's atmosphere? What are characteristics of each layer?



5. What is the difference between good and bad ozone? What can we be doing to help solve both of these issues?

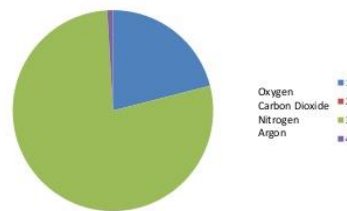
**Bad:** Ozone near the Earth's surface in the troposphere is an air pollutant with harmful effects on animals and their respiratory systems.

**Good:** ozone in the stratosphere protects living organisms by preventing harmful UV from reaching the Earth's surface, by converting it into heat.

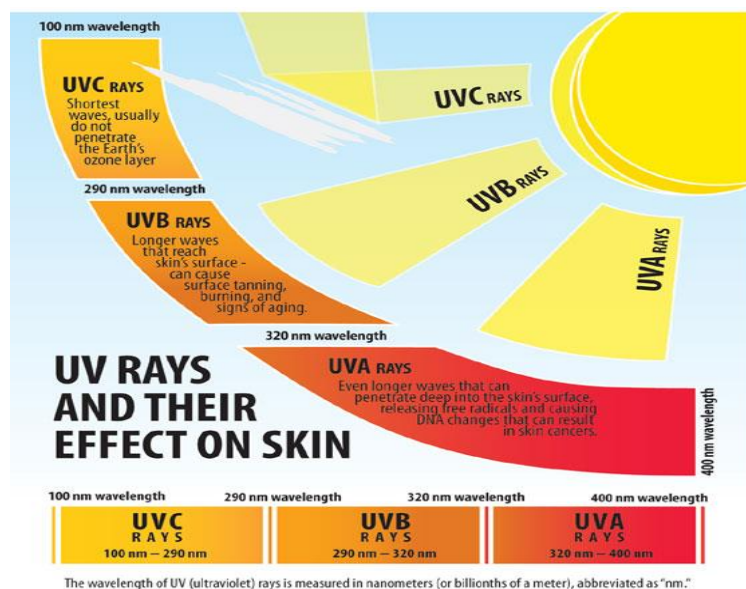
6. What is the percent of each gas in our atmosphere?

### Gases in the atmosphere

Gas	%
Oxygen	21
Carbon Dioxide	0.04
Nitrogen	78
Argon	0.9

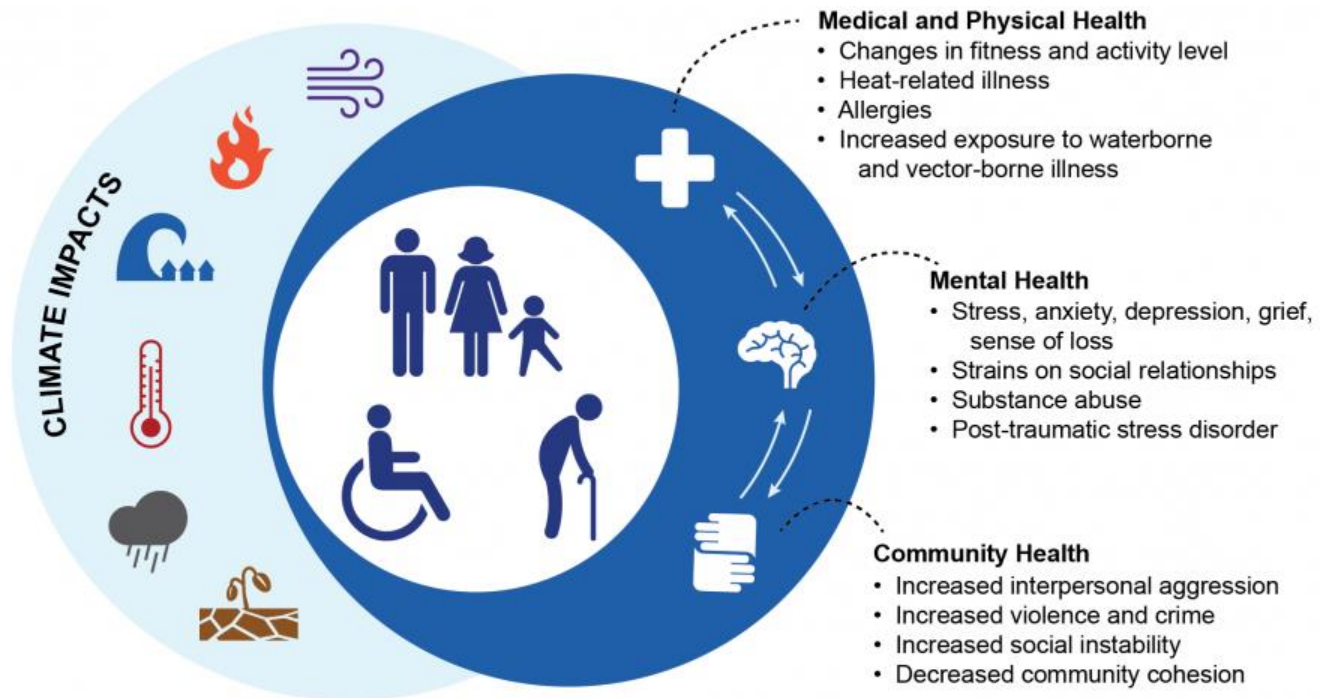
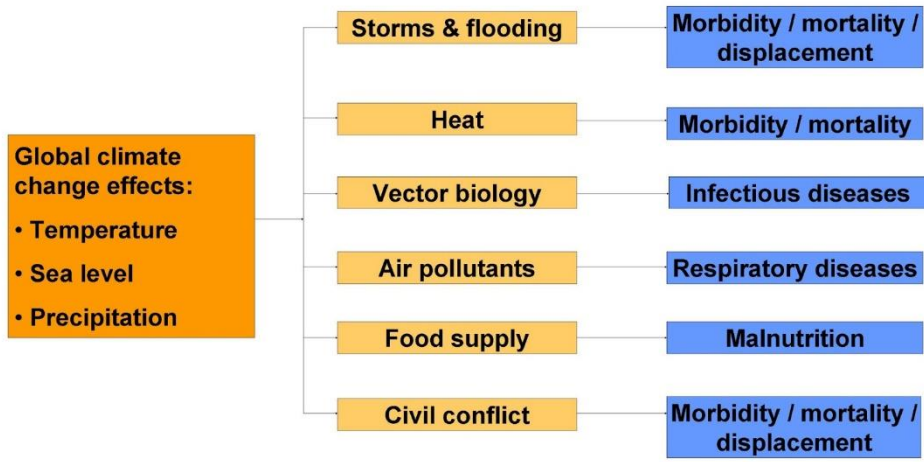


7. What are the three types of UV and what are characteristics of each type? What are the consequences of each?



8. How can global warming impact human populations?

## Potential Impacts of Global Climate Change on Human Health



9. How effective is recycling? What are the positives and the negatives of recycling?

# Recycling

Positives	Negatives
<ul style="list-style-type: none"><li>• Waste into inexpensive resources</li><li>• Decrease landfill impact</li><li>• Decrease needs for raw materials &amp; NRG</li><li>• Save \$\$\$</li><li>• Decrease pollution</li><li>• Incentives for recycling \$\$\$</li></ul>	<ul style="list-style-type: none"><li>• Weak regulation</li><li>• Changing prices of goods</li><li>• Throw away packaging more popular</li><li>• Policies favor extraction</li></ul>



**Learning Goal #10: I can explain the implications of greenhouse gases**

1. Outline the goal and the results of Montreal Protocol. Was it successful at making change? Why or why not?

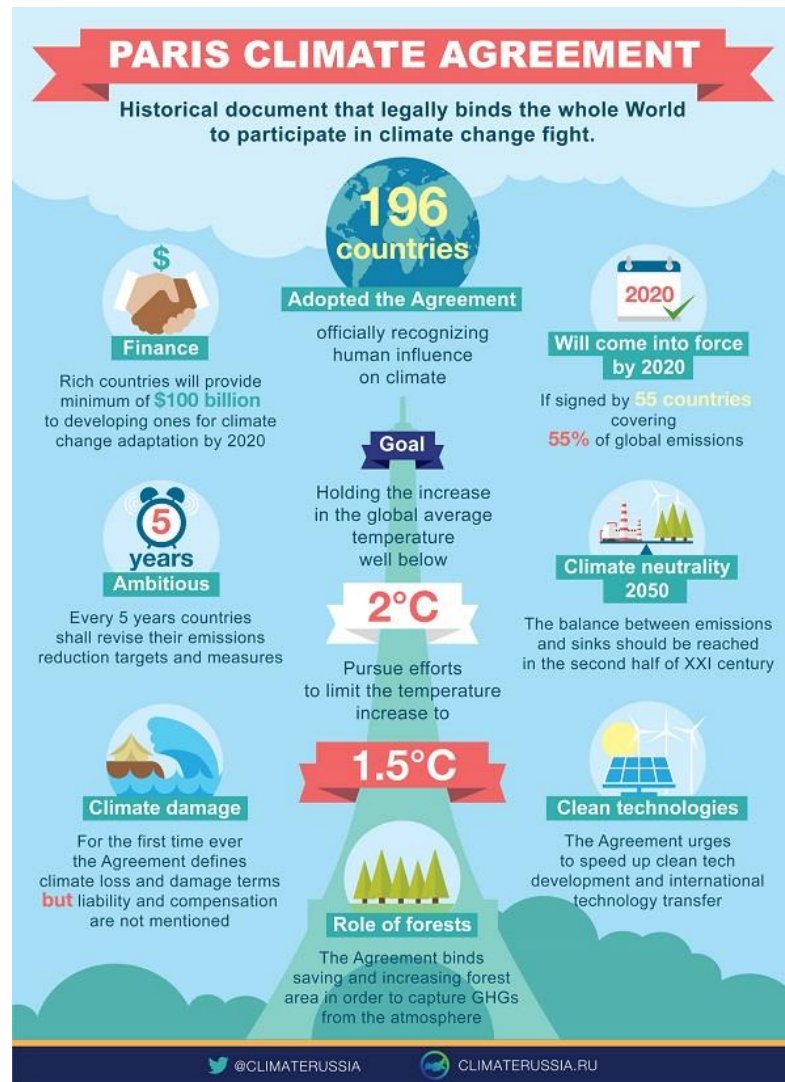
## The Montreal Protocol

- Goal: To reduce the emissions of chlorofluorocarbons (CFCs) gasses, which deplete the ozone layer.
- In 1987 22 countries agreed to reduce CFC emissions by 50%
- As scientific evidence mounted and demonstrated severe depletion to the ozone layer, the Montreal Protocol was revisited and strengthened in 1992.
- By 1996 rich countries stopped making CFCs!
- UN Secretary General Kofi Annan declared the Montreal Protocol to be "perhaps the single most successful international agreement to date."

2. Outline the goal and the results of Kyoto Protocol. Was it successful at making change? Why or why not?

- The **Kyoto Protocol** is a protocol to the NFCCC, aimed at combating global warming
- **GOAL:** stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system
- **INCLUDES:** a set of country-specific reductions of emissions of "greenhouse" gases that absorb and re-emit infrared radiation

3. Outline the goal and the results of Paris Protocol. Was it successful at making change? Why or why not?

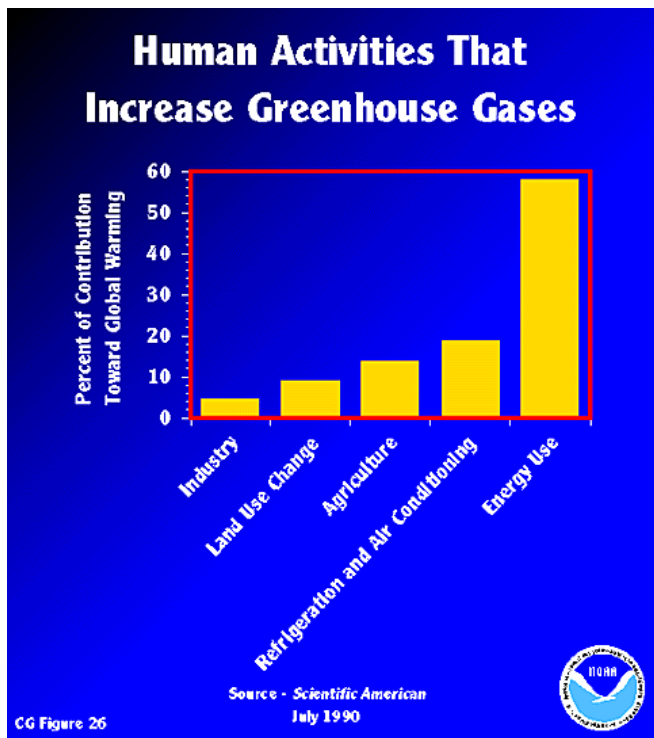


4. What are the consequences of high CO<sub>2</sub> in our atmosphere?

- Increase CO<sub>2</sub> in oceans lead to ocean acidification
- Increase CO<sub>2</sub> in air causes heat retention
- Increase CO<sub>2</sub> causes lower oxygen ratio in air
- Increase CO<sub>2</sub> causes reabsorption of heat

5. What are the human actions that are increasing greenhouse gases?





6. How can global warming impact our human health?

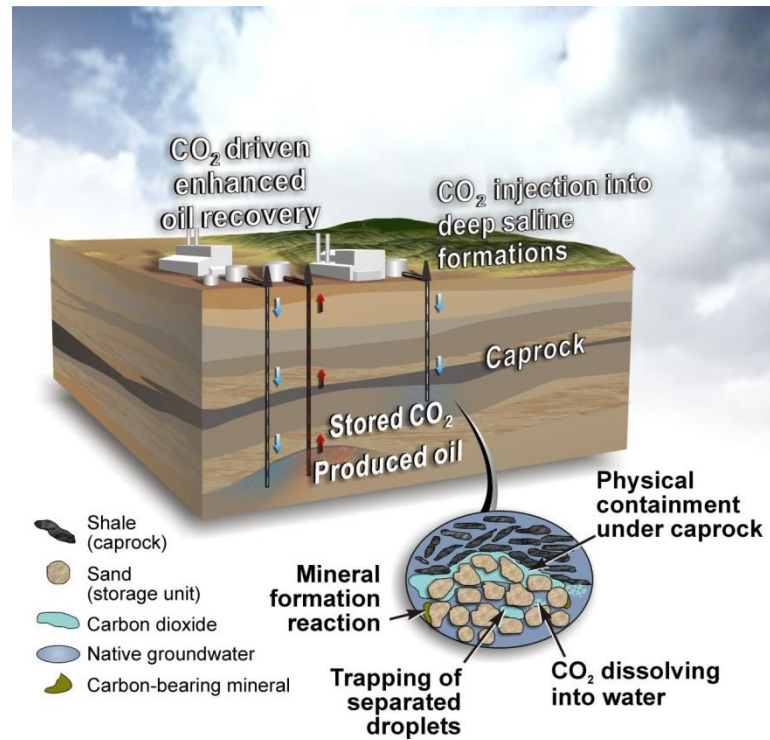
- Mental health issues due to change in seasons
- More severe storms causing more stagnant water which can cause more viral illnesses such as west Nile and malaria
- Melting of the ice shelf is releasing old viruses that can impact health of animals and plants

7. What adaptations can organisms make in order to survive and adapt to the increasing greenhouse gases

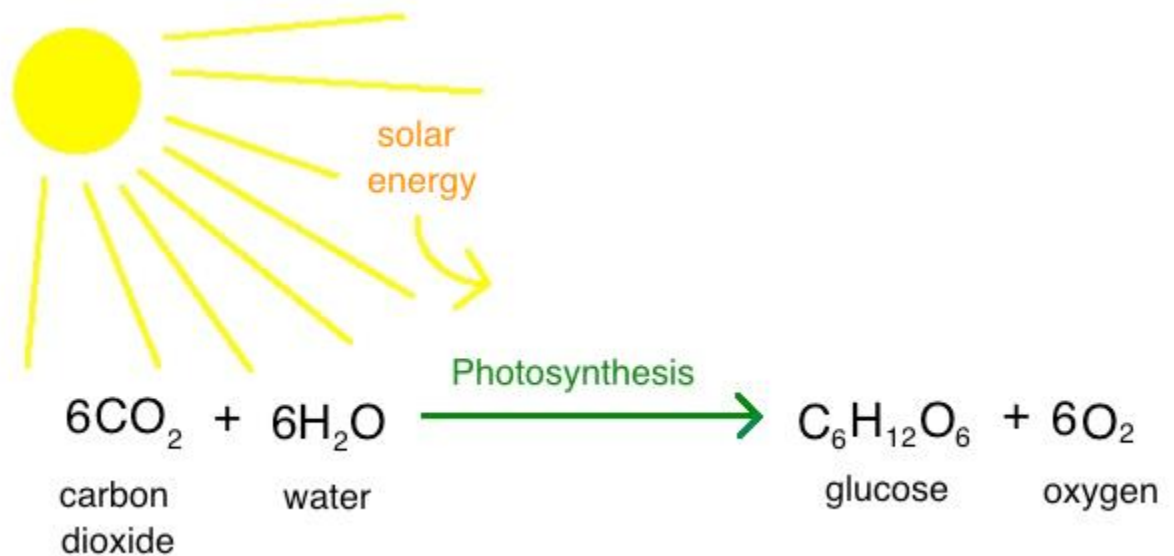
- Adapt to new environments
- Adapt to new carbon dioxide and oxygen amounts
- Change the rate of photosynthesis
- Adapt to survive lower pH in ocean

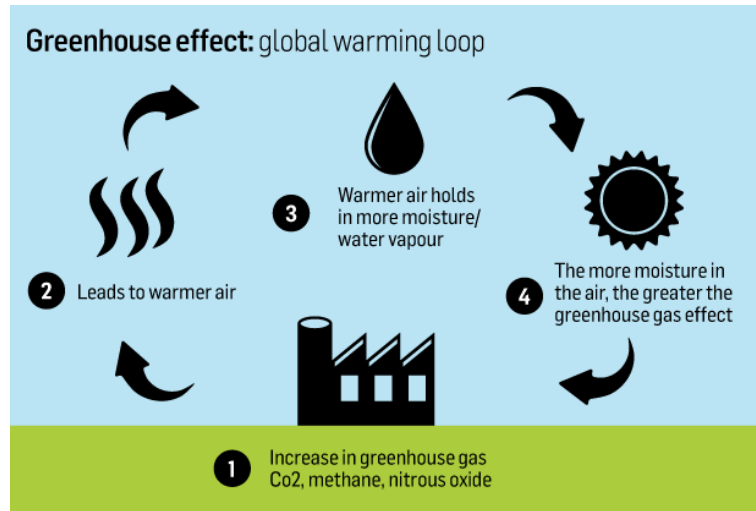
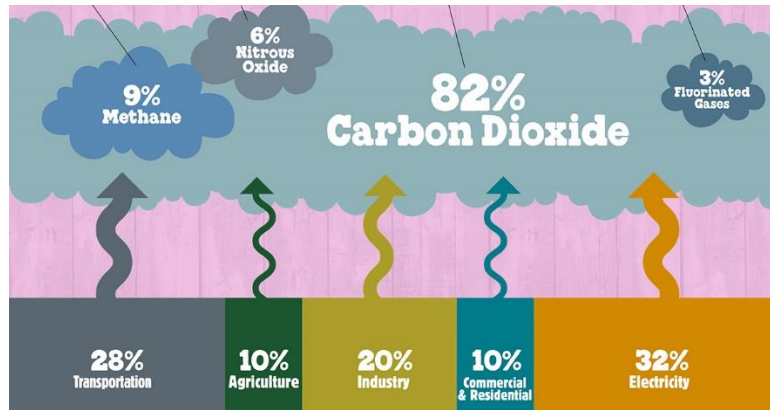
8. What is carbon sequestering? How does it work? What are some natural sources? What are some of the new technologies?

- Turn gas carbon dioxide into liquid carbon dioxide, which can then be stored in porous rock or below the ocean



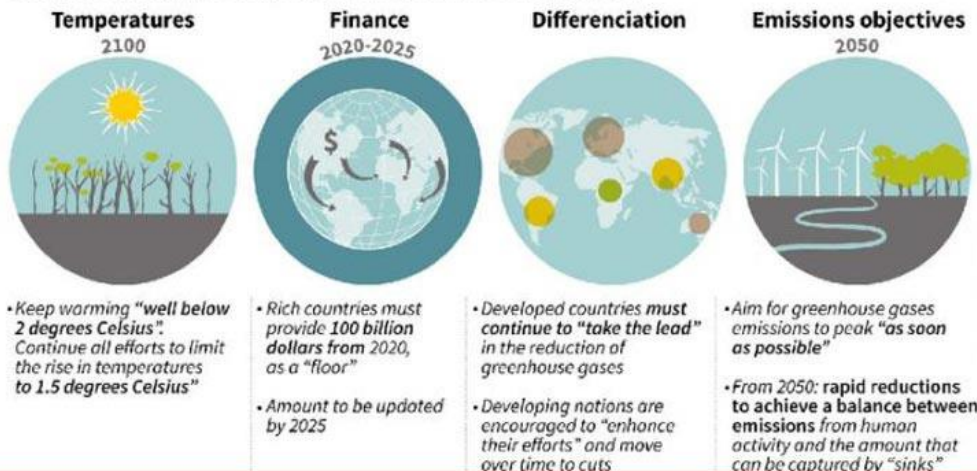
- Plants are natural carbon sequestrator in the process of photosynthesis.





## The Paris climate agreement: key points

The historic pact, approved by 195 countries, will take effect from 2020

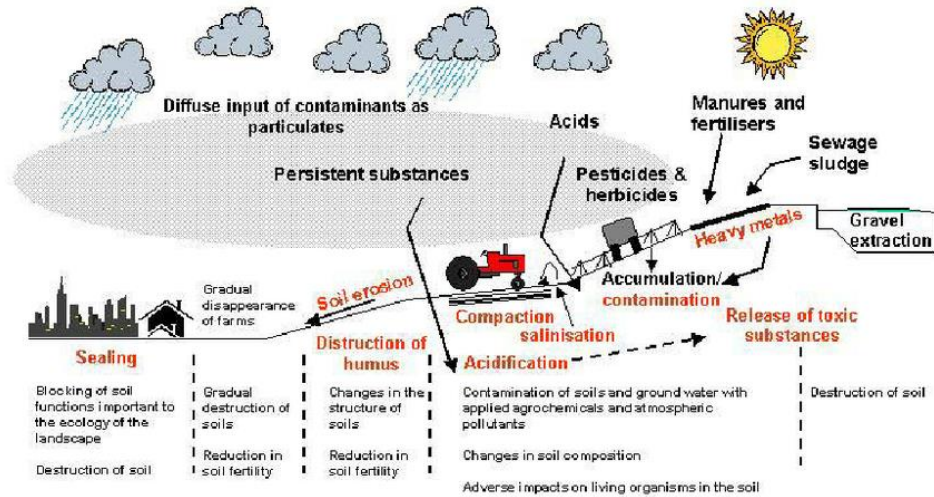


## Learning Goal #11: I can explain factors impacting soil quality

1. How might soil be impacted by human activity?

- Reduce carbon and nitrogen in the soil
- Deforestation causes destabilization of soil

# The impact of human activities on soil



12. What are some of the impacts of our forestry industry?

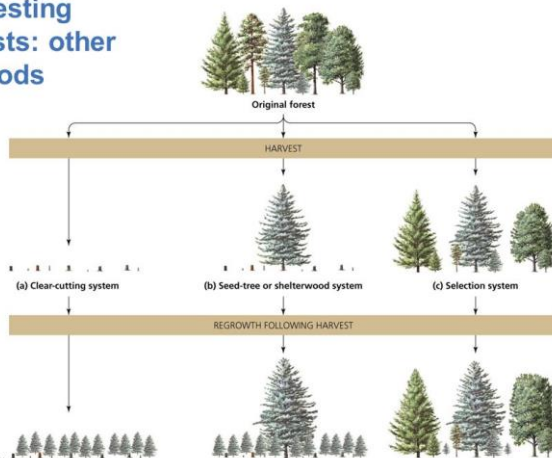
## Soil Erosion

- **Deforestation**, or the loss of forests, can have a negative effect on soil quality and lead to severe erosion.
- **Healthy** forests hold soil in place, protect the quality of fresh water supplies, absorb **carbon dioxide**, and help moderate local climate.
- In some areas, forests can regrow after cutting, but it takes **centuries for succession** to produce mature, old-growth forests. In some places, forests don't grow back at all after logging.



13. What are the benefits and negatives of the different types of harvest methods?

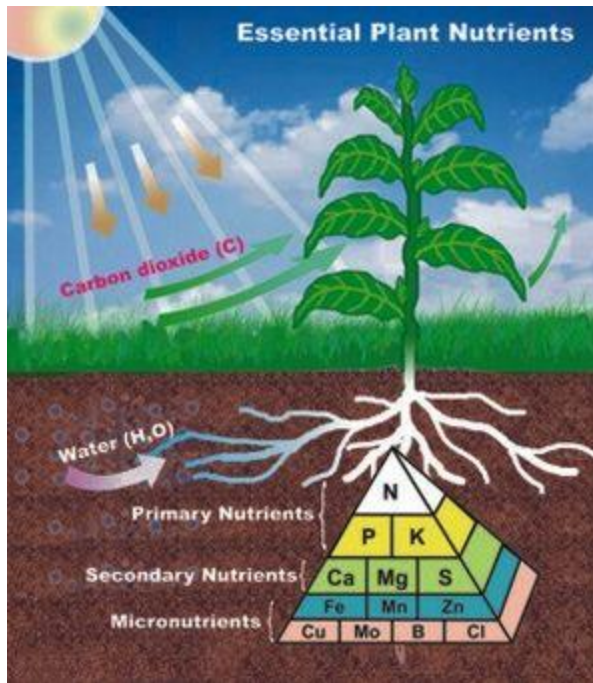
### Harvesting Forests: other methods



### We harvest timber by several methods

- **Clear-cutting** = all trees in the area are cut
  - Most cost-efficient
  - Greatest ecological impact
  - May mimic some natural disturbance (e.g., storms)
  - Leads to soil erosion
  - Resulting climax community may be different
- Most widely used harvesting method
  - But concerns have caused companies to use other harvesting methods

14. What are important nutrients needed for healthy soil?



15. What are some methods we can use to enrich our soil?

- Fertilizer added (increase nitrogen and phosphates)
- Add organic matter (compost soil)

**Learning Goal #12: I can discuss global food security issues**

1. What is our current world population? 7.6 billion people

a. How does this population impact food?

- Limits of agricultural space for food growth
- Limit of nutrient rich soil
- High quantity vs high nutrient quality
- Increase malnourishment to under developed countries
- Changing freshwater sources to promote agriculture growth

b. What are some solutions?

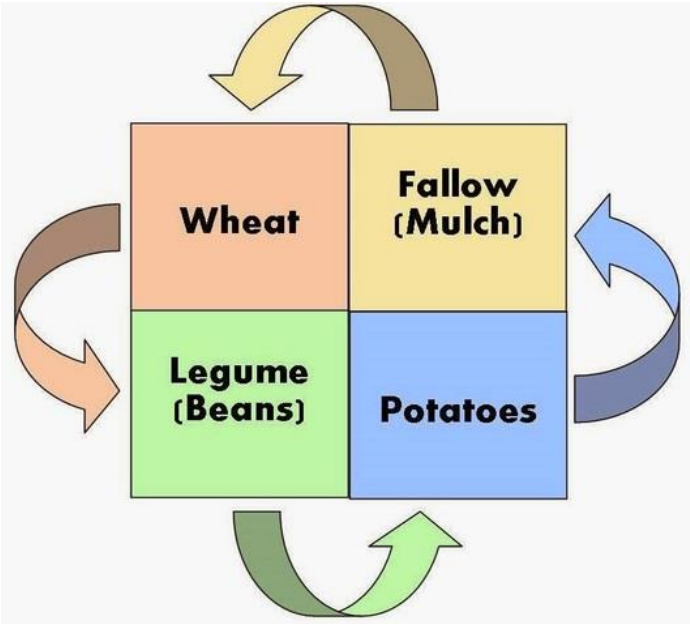
- More efficient growth of food source
- Grow on moon (create a specific environment to create high yield food sources)
- GMO's → high yield, low water, high nutrients

2. What are some issues around food choices? Why are these issues?

- Purchase of GMO's
  - Support of large companies vs local farmers
  - Pesticide use
  - Organic production
  - Farmer treatment
  - Do we know how DNA changes impact human health long term?
- Local farming

- Purchase local to reduce carbon footprint from delivery and importing
- Organic
  - Is this an appropriate designation? What does it mean? How does this impact environment and treatment of animals?
- Purchase of large or small quantities
  - Food wastage

3. What is the four crop rotation method of agriculture and how has it impacted our food?



4. What are the factors that you feel are most important to food security?



### Learning Goal #13: I can explain land management practices

1. What are the new categories of our Summerland recycling depot?
  - a. What are some of the rules of the waste reduction separations?
    - There are 3 new bins: garbage, curbside recycling, landfill recycling, yard waste
  - b. What can and can't go in curbside recycling? What can and can't go in the landfill recycling recycling?

#### Curbside recycling Rules

##### Blue Lid = Recycle

- No more blue bags! Place all recyclable materials directly into the cart, loosely.

##### Accepted materials have not changed and include:

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>○ Newspaper, inserts and flyers</li> <li>○ Magazines, catalogues or phone books</li> <li>○ Boxboard boxes (cereal, cracker and cookie boxes)</li> <li>○ Plastic bottles, jars and jugs (laundry and dish soap bottles and milk jugs)</li> <li>○ Plastic trays and clamshells such as takeout containers</li> <li>○ Plastic garden pots and seeding trays</li> <li>○ Paper egg cartons</li> <li>○ All household paper, envelopes, and shredded paper (please contain shredded paper in a plastic bag)</li> </ul> | <ul style="list-style-type: none"> <li>○ All plastic or paper takeout cups, bowls and lids</li> <li>○ Cartons for soup and milk</li> <li>○ Paper bags from pet food, flour and sugar etc.</li> <li>○ Gift cards, paper gift bags and paper gift wrap (as long as it isn't metallic or shiny)</li> <li>○ Cardboard boxes and spiral wound cans and lids for frozen juice concentrate, chips, etc.</li> <li>○ Metal cans and empty aerosol cans (this does not include spray paint cans)</li> <li>○ Plastic tubs from yogurt and margarine</li> </ul> |
|--|---|

## Landfill recycling Rules

Materials that cannot be placed in your blue cart, but be recycled for FREE at the Summerland Landfill recycling depot include:

- Glass bottles and glass jars
- Foam packaging, meat trays, foam takeout containers and foam cushion packaging used to protect electronics etc.
- Soft Plastics such as plastic bags and overwrap (plastic grocery bags for produce, dry bulk foods, frozen vegetables, garden products, outer bags and product wraps such as bread bags and plastic wrap from paper towel)
- Lightbulbs
- Smoke and CO2 alarms
- Household paint
- Tires
- Scrap metal
- Oil, oil containers and filters
- Household batteries
- Agricultural plastics (separated)
- Pesticides
- Solvents
- Fertilizers

2. How does putting food scraps in composting instead of landfill impact the earth?

- Composting uses aerobic bacteria to break down the food scraps. Aerobic bacteria releases carbon dioxide
- The landfill uses anaerobic bacteria to break down any waste that can be decomposed. These anaerobic bacteria release methane as waste. Methane holds onto more heat than carbon dioxide, so it is impacting global warming more

3. What are the rules for what can be composted and what can not be composted?



**Compost it!**

YES's	NO's
<ul style="list-style-type: none"><li>• Meat &amp; Fish</li><li>• Bones</li><li>• Cheese, Eggs &amp; Milk</li><li>• Fruit &amp; Vegetable Scraps</li><li>• Table Scraps</li><li>• Pasta, Rice &amp; Grains</li><li>• Coffee Grounds &amp; Filters</li><li>• Tea &amp; Tea Bags</li><li>• Shells from Eggs, Peanuts &amp; Nuts</li><li>• Stale Bread</li><li>• Paper Towels</li></ul>	<ul style="list-style-type: none"><li>• Oil &amp; Fats (bulk)</li><li>• Plastic, Glass &amp; Metal</li><li>• Chemicals</li><li>• Wood &amp; Aluminum Foil</li><li>• Animal Waste</li></ul>

 **The Compost Exchange**  
Compost, Mulches & Specialty Soils

web: [thecompostexchange.com](http://thecompostexchange.com) • email: [compostit@thecompostexchange.com](mailto:compostit@thecompostexchange.com)



4. What are some of the minerals that are mined in Canada?

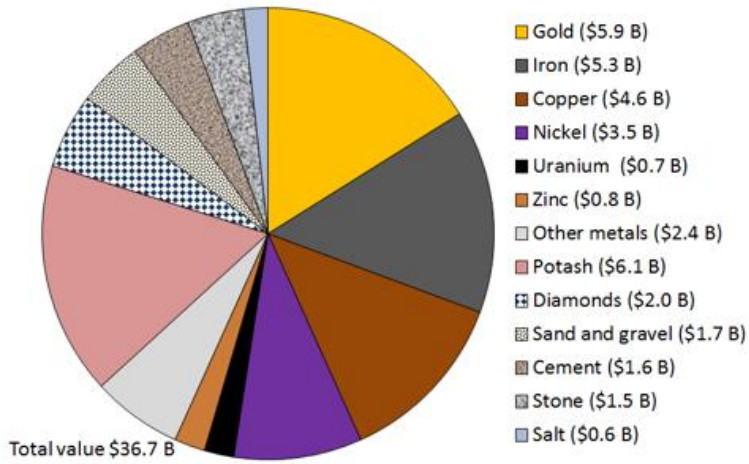


Figure 20.3 The value of various Canadian mining sectors in 2013



5. What are some of the benefits and negatives of mining styles?

Open pit mining	Underground mining
Better safety in mining	high risk mining
Simple low cost mining	Complicated expensive mining
High production rate	Low production rate
basically digging a big hole.	Basically digging tunnels
used for ore bodies close to the surface, and is basically blasting the rock, which is then taken away by trucks to be processed.	Underground tunnels are dug to get as close as possible to the ore bodies, these are then very carefully blasted,
Any materials can be mined	Required hard layers to be underlain by tunnels
Used for ores	Used for veins mining, mainly (metallic)

6. What are the pro's and con's of using natural gas

## THE PROS & CONS OF NATURAL GAS

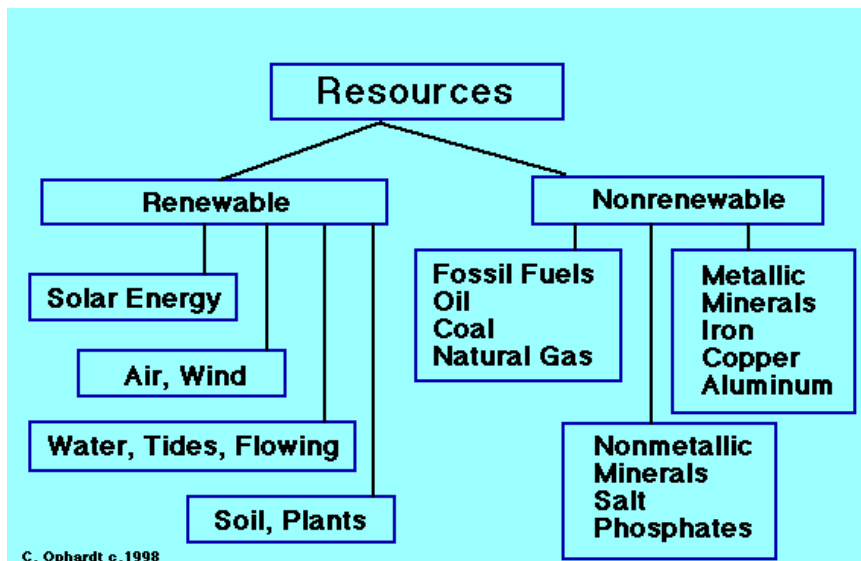
**PRO:**

- Natural gas is the cleanest burning of all the fossil fuels.
- It is an abundant source of domestic energy.
- New techniques have emerged that have increased America's potential natural gas reserves.

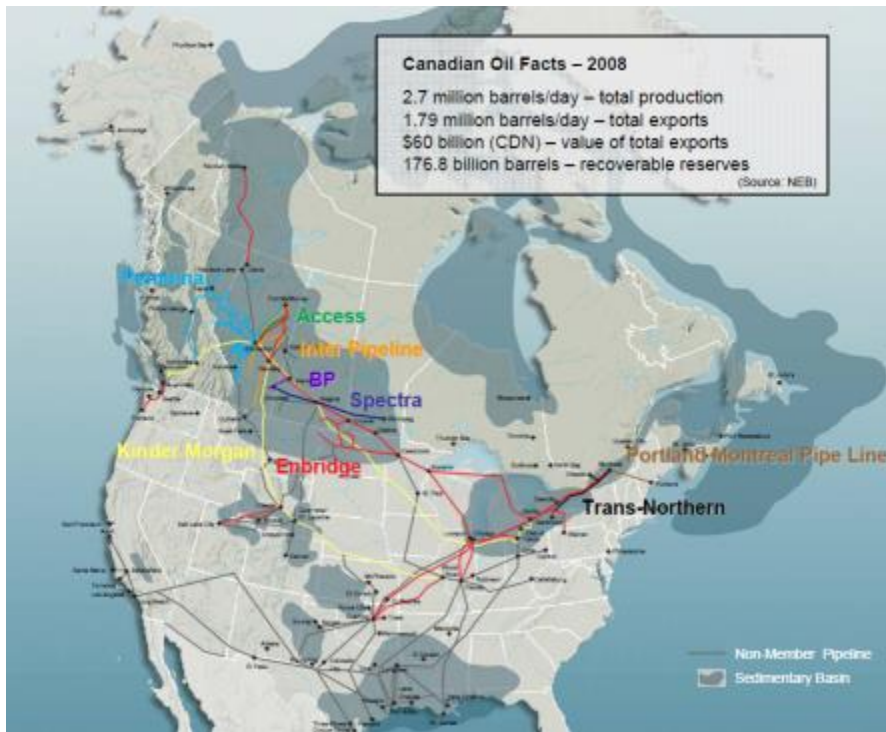
**CON:**

- Natural gas does emit carbon and nitrogen oxides, but in much smaller amounts.
- It is non-renewable.
- Environmental impacts from some types of natural gas mining are significant.
- It is more costly to process, transport and store.

7. What is the difference between renewable and non-renewable resources? Give three examples of each.



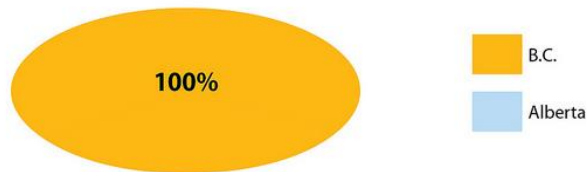
8. What are the 3 main companies involved in pipelines in Canada?



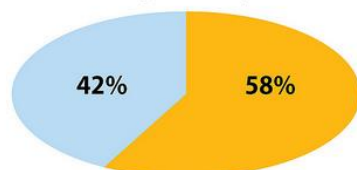
- a. What are the issues surrounding the Transmountain pipeline?
- Do we want to support extra fossil fuel use and production?
  - Is it safe for our water ways?
  - Is it safe for our soil and land?
  - How does it impact employment?
  - How does it impact First Nation communities?
  - How does it impact wildlife?
- b. What happened with the Northern Gateway pipeline?

### Environmental Risks to B.C. and Alberta

Marine environmental risk

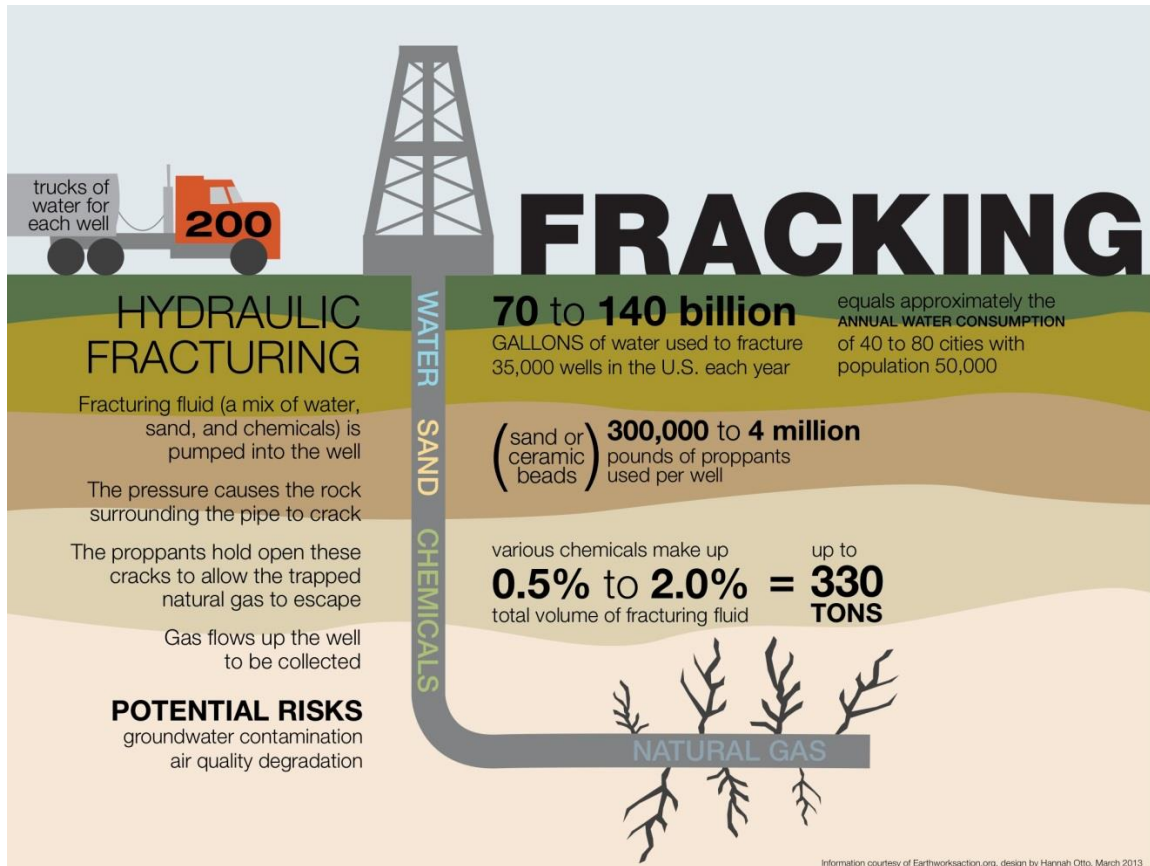


Land environmental risk: approximately 670 kilometres of the 1,170 kilometre right-of-way are in British Columbia



- c. What is the current situation in BC and Alberta with the Transmountain pipeline?
- Canadian Federal government bought the pipeline for \$4.5 billion
  - The Federal government and Albertan government want to move ahead with the project, BC government is moving ahead with legal actions about who can impact BC coast and BC land

9. What is fracking? What are the positives and negatives about this practice?

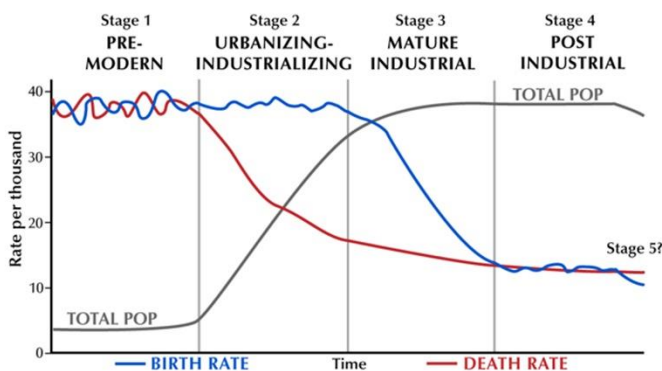


10. What are some of the First Nations practices of using the land?

- Use only what you are needing, never more than you can use
- Put back to the land anything that is not being used (bones, leaves, branches)
- When using the land, have only positive thoughts

**Learning Goal #14: I can discuss human health and environmental impacts of population growth**

1. What have been some moments in history that has impacted the human population growth?

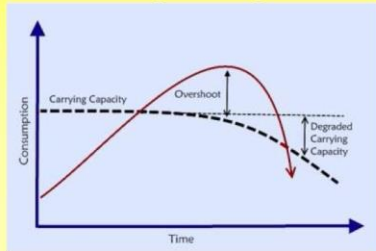


- Industrial revolution
- Sewage systems
- Modern agriculture
- Vaccines
- Medical advances

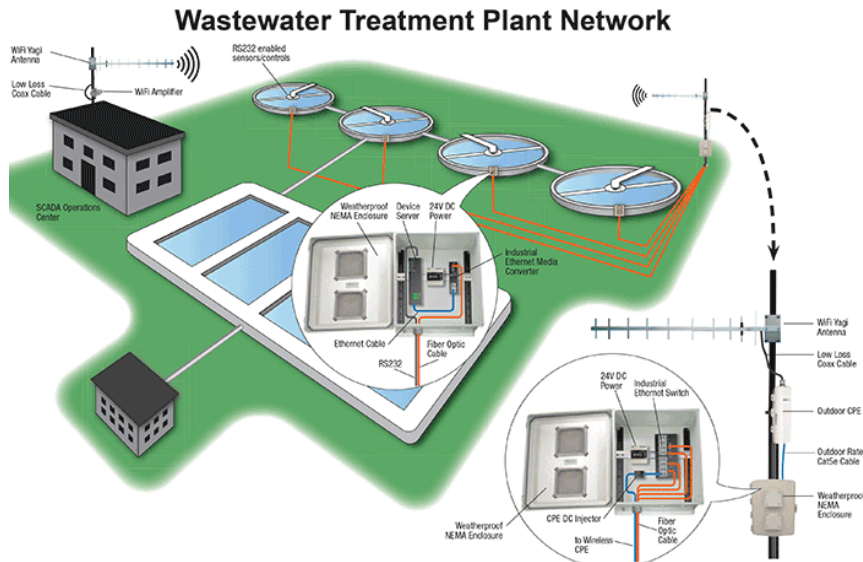
2. Do you think that the earth has reached it's carrying capacity? Why or why not?
  - a. What are limiting factors that might impact human population as we reach the carrying capacity?

### How many people can the earth support?

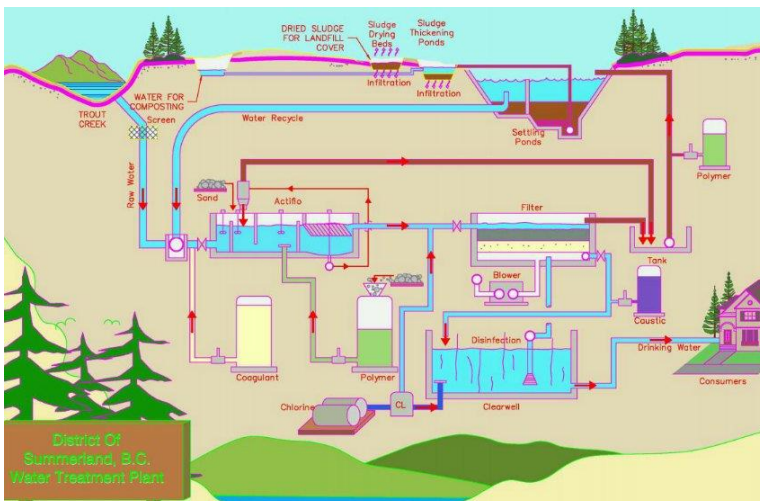
- We do not know how long we can continue increasing the earth's carrying capacity for humans without seriously degrading the life-support system that keeps us and many other species alive.



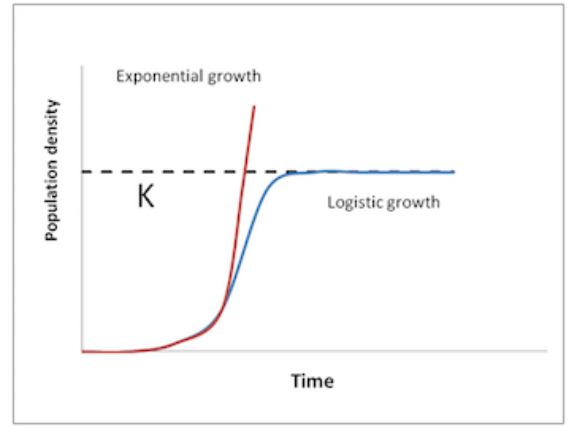
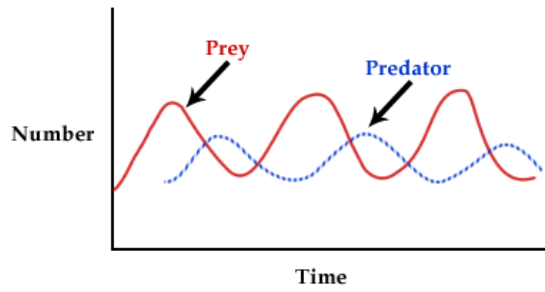
3. How does a WASTE water treatment work? Why is it necessary in Summerland?



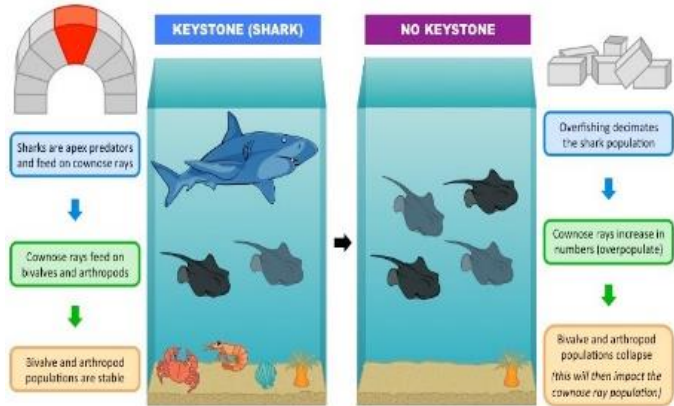
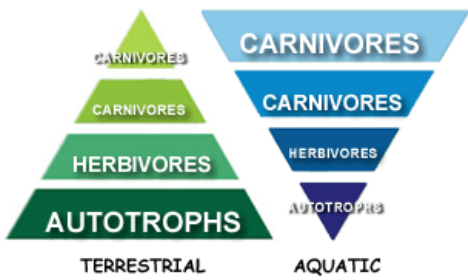
4. How does a Water Treatment Plan work? Why is it necessary in Summerland?



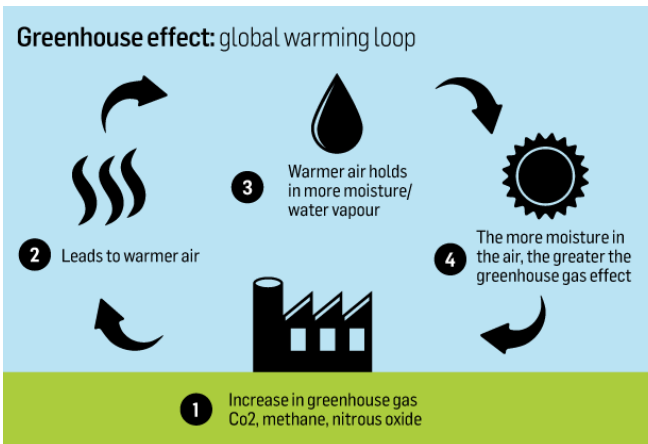
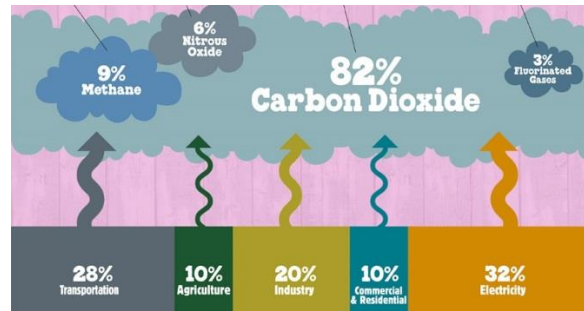
**Diagrams to Know:**



TERRESTRIAL VS. AQUATIC BIOMASS PYRAMIDS

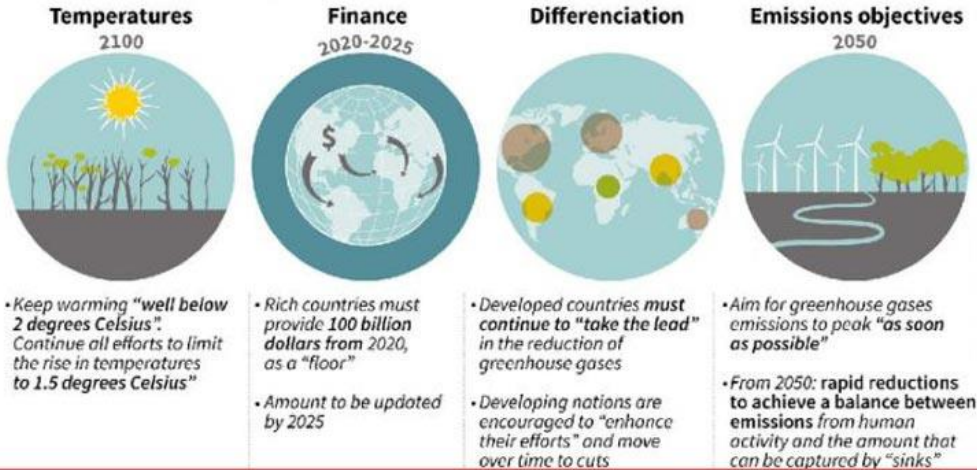


2.



# The Paris climate agreement: key points

The historic pact, approved by 195 countries, will take effect from 2020



## Diagrams to Know

### TYPES OF HARVEST

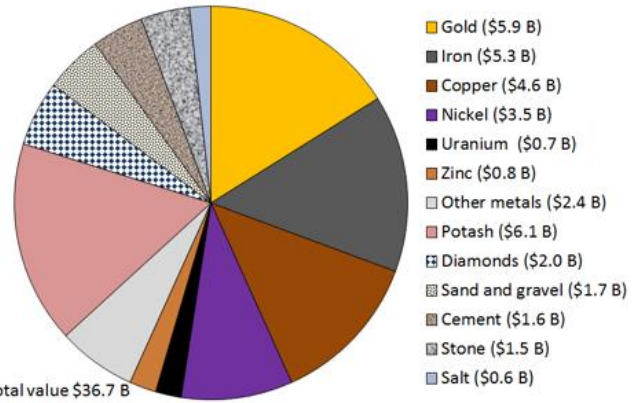
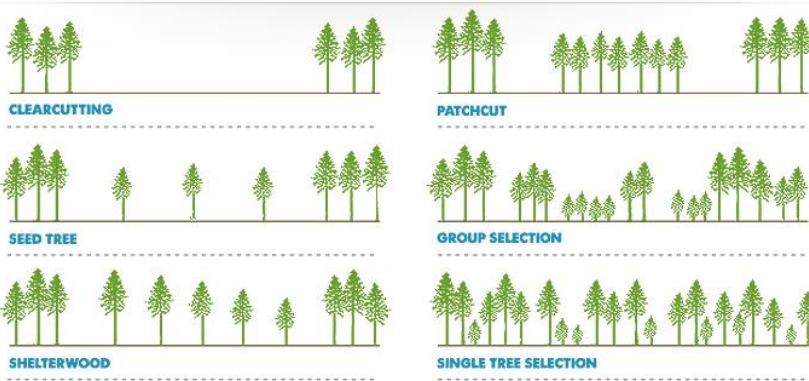
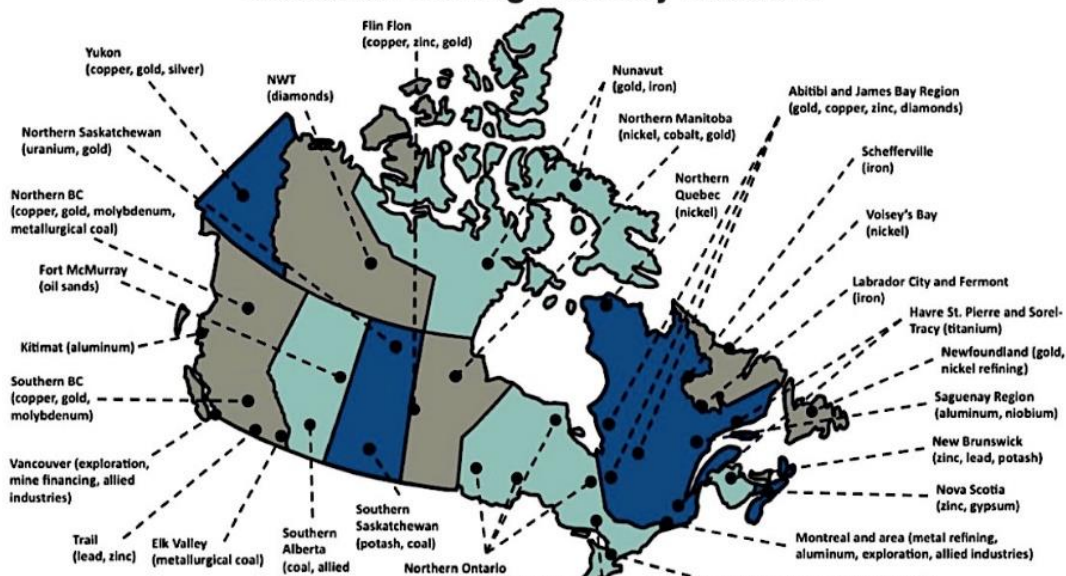
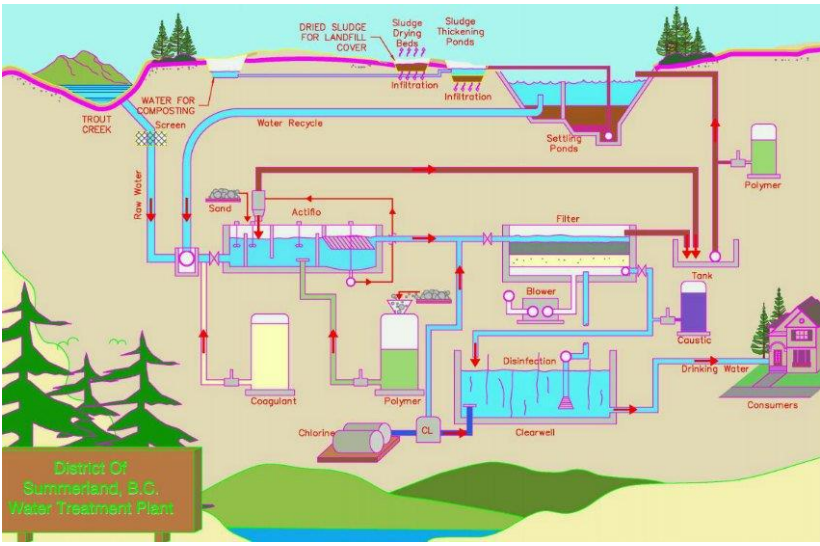
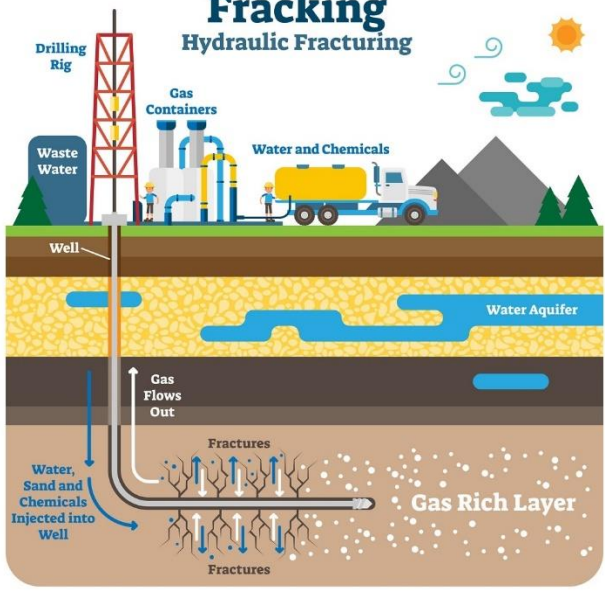


Figure 20.3 The value of various Canadian mining sectors in 2013

## Canadian mining industry clusters



# Fracking Hydraulic Fracturing



District Of  
Sumnerland, B.C.  
Water Treatment Plant