

Section 16.1 Human Population/Resources

- Earth's human population continues to grow.
- Earth's carrying capacity has changed over time due to technology.

Technology

- **Medicine Advances**
- **Agriculture**
- **Transportation**
- **Sanitation**

Section 16.1 Human Population/Resources

- Earth's human carrying capacity is unknown.

Year	Actual (billions)	Projected (billions)
1150	~0.2	-
1350	~0.3	-
1550	~0.4	-
1750	~0.6	-
1950	~2.5	~2.5
2150	~8.0	~9.5

<http://www.census.gov/popclock/>

Section 16.1 Human Population/Resources

Natural Resources

1. Nonrenewable

- **Cannot replace themselves after being used.**
 - They take a large amount of time to replenish
 - Coal and oil currently support the majority of our country's energy use.

1. Coal
2. Oil
3. Natural Gas
4. Minerals

2. Renewable

- **Do not go away when used.**
 - May become *depleted* if they are used up faster than they can replenish themselves.
 - Ex: Pollute water, deforestation

1. Wind
2. Solar
3. Water
4. Plants & animals

Section 16.1 Human Population/Resources

- **The growing human population exerts pressure on Earth's natural resources.**

- **Pollution and overuse threaten the supply of fresh water.**
- **Contaminant found in drinking water supplies include pesticides and industrial waste.**
- **U.S. produces more waste than any other country.**
 - 230 million tons of garbage each year (4.2 lbs per day, per person)



Human Effects on a Food Web



Section 16.1 Human Population/Resources

- Effective management of Earth's resources will help meet the needs of the future.
- **Careless use of resources makes them unavailable to future generations.**



Example: Easter Island

cut trees → no homes or boats / soil erosion → no fish / no animals to hunt

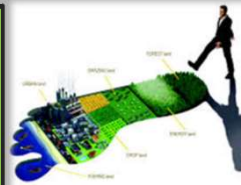
Section 16.1 Human Population/Resources

• **Ecological footprint**

– is the amount of land necessary to produce and maintain enough food and water, shelter, energy, and waste.

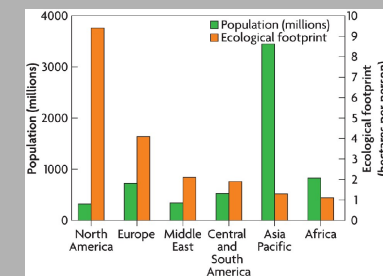
– affected by

- the amount and efficiency of resource use
- the amount and toxicity of waste produced.



Section 16.1 Human Population/Resources

- **The way we are currently using resources threatens the welfare of the population.**
- **Earth's carrying capacity depends on the land needed to support each person.**



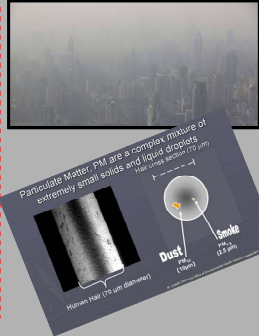
The ecological footprint of an average US citizen is an area larger than 24 football fields!!!

Section 16.2 Air Quality

Pollutants accumulate in the air, water or soil and cause **pollution**.

1. **Smog**-Formed when compounds released by the burning of fossil fuels interact with sunlight and form a "haze" of matter.

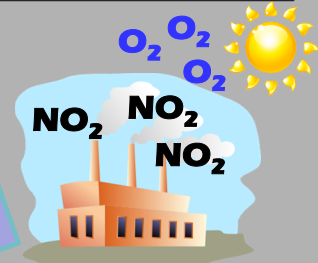
- **Particulates**- are microscopic bits of dusts, metal, and unburned fuel produced by industrial processes.
 - Cause health problems



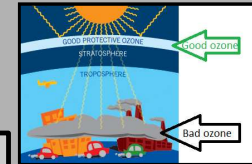
Section 16.2 Air Quality

2. Ground-level Ozone

- Component of smog
- Ozone close to the ground.
- Bad ozone layer



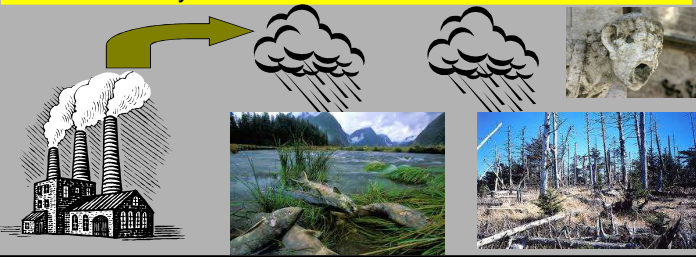
Health problem



Section 16.2 Air Quality

3. Acid Rain

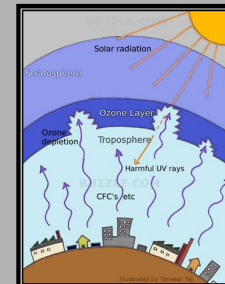
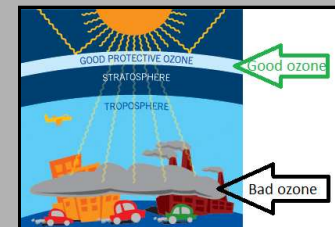
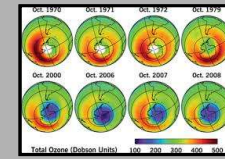
- Produced when pollutants in the water cycle cause rain pH to drop below normal levels.
 - Lowers the pH of lakes and ponds to where it may threaten habitats
 - Destroys tree bark = vulnerable to disease



Section 16.2 Air Quality

Ozone (O₃)

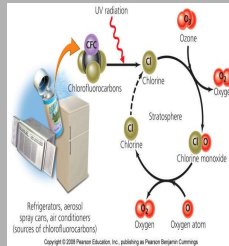
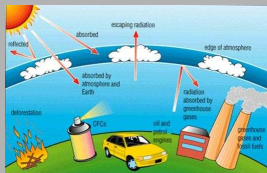
- Layer of gases that protects us from too much UV rays that be ben harmful.



Section 16.2 Air Quality

Chlorofluorocarbons (CFC's)

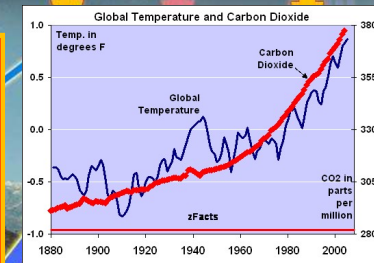
- Destroying Ozone layer
- Are the most widely used as coolants for refrigerators and air conditioners, aerosol cans.
- Has been banned since 1978 in many countries.
- However, worldwide, aerosol cans still account of 25% of CFC emissions



Section 16.2 Air Quality

Air pollution is changing Earth's biosphere.

- High levels of carbon dioxide are typical of Earth's warmer periods.



- The levels of atmospheric carbon dioxide rise and fall over time.

Section 16.2 Air Quality

The Greenhouse Effect

- The greenhouse effect slows the release of energy (HEAT) from Earth's atmosphere.

Process:

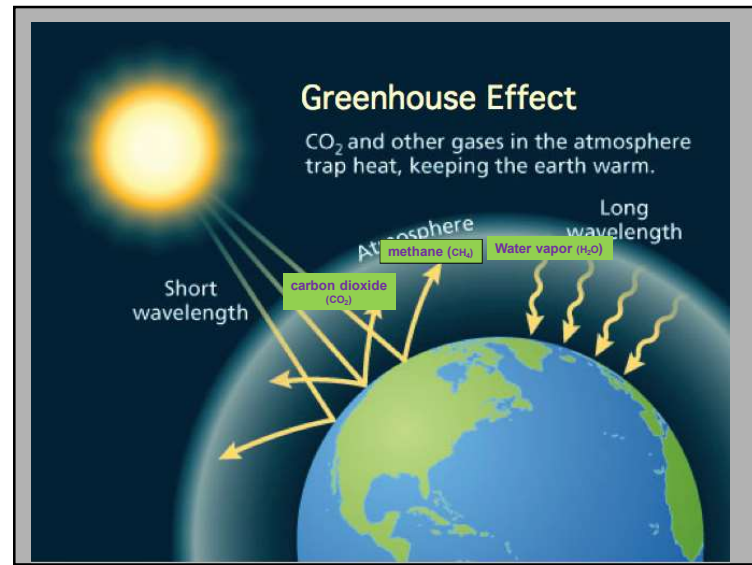
1. Sunlight penetrates the Earth's atmosphere.
2. Energy is absorbed and re-radiated as heat.
3. Greenhouse gases absorb longer wavelengths, trapping even more heat.
4. Greenhouse gas molecules re-release infrared radiation... some is released into space, some stays on Earth.



[Video](#)

Greenhouse Effect

CO₂ and other gases in the atmosphere trap heat, keeping the earth warm.



Section 16.2 Air Quality

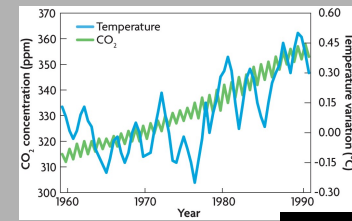
Global Warming

- The trend of increasing global temperature.

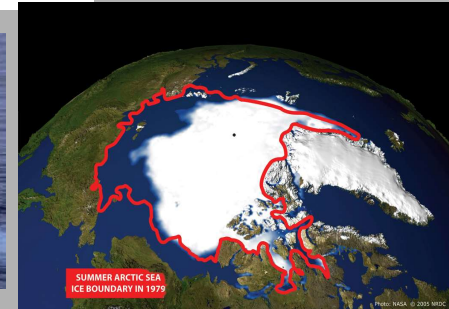
- Due to increased levels of greenhouse gases

- Global warming could cause:
 - (1) increased flooding (Polar ice caps melting)
 - (2) stronger tropical storms,
 - (3) loss of biodiversity.

Global temperatures have risen 0.6°C in the past 100 years with the most change in the last 40 years.



Polar ice caps melting at rapid pace.



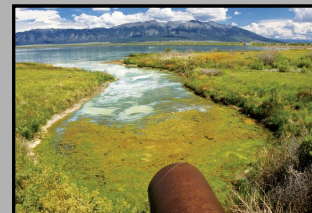
Section 16.3 Water Quality

- Water pollutants are found in rivers, lakes, and aquifers and affect ecosystems.
- Types of water pollutants
 1. chemical contaminants
 2. raw sewage.
 3. trash.
 4. fertilizer



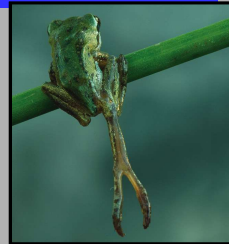
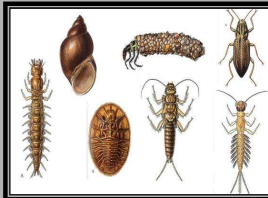
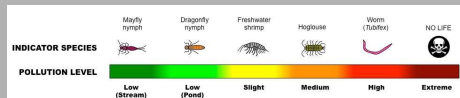
Section 16.3 Water Quality

- Eutrophication- nutrients filling in of lake over time
 - may be direct result of pollution.



Section 16.3 Water Quality

- **Indicator species**- used to determine the health of an ecosystem.
 - Ex: amphibians, macroinvertebrate

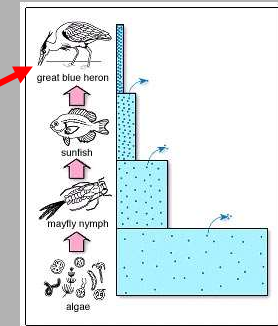


Ex. frogs- skin may be permeable to pollutants, frogs may develop deformities

Section 16.3 Water Quality

- **Biomagnification** condition that causes accumulation of toxins in the food chain.

- Top consumers, including humans, are most affected.
- Pollutants can move up the food chain. (DDT)
 - predators eat contaminated prey



[Video](#)

Section 16.4 Threats to Biodiversity

The loss of biodiversity has long-term effects.

- loss of medical and technological advances
- extinction of species
- loss of ecosystem stability



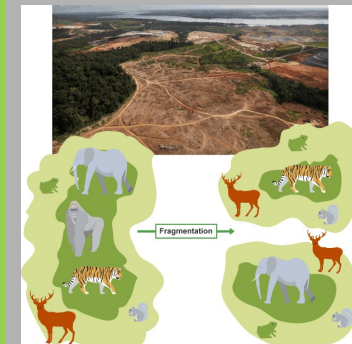
Section 16.4 Threats to Biodiversity

Loss of habitat eliminates species.

Habitat fragmentation

prevents an organism from accessing its entire home range.

- occurs when a barrier forms within the habitat (ex: roads, parks, other man-made structures)
- often caused by human development



Section 16.4 Threats to Biodiversity

- Habitat corridors are a solution to the problem.
 - corridors can be road overpasses or underpasses
 - allow species to move between different areas of habitat



Section 16.4 Threats to Biodiversity

- An **introduced species** is one that is brought to an ecosystem by humans.
 - accidental
 - purposeful

- Can disrupt stable relationships in an ecosystem.

Can become invasive



Section 16.4 Threats to Biodiversity

- Invasive species** can have an environmental and economic impact by pushing out native species.



Burmese python (Florida Everglades)



kudzu (southeastern United States)



mice (Australia)

Section 16.5 Conservation

Conservation methods can help protect and restore ecosystems.



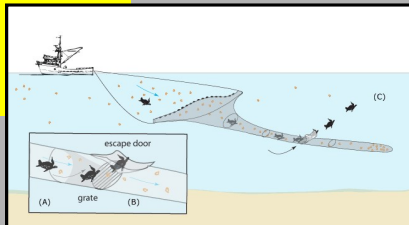
Sustainable development = a practice that manages natural resources for present and future generations.



Section 16.5 Conservation

Conservation Methods

- Example: Global fisheries have adopted several sustainable practices.
 - rotation of catches
 - fishing gear review
 - harvest reduction
 - fishing bans



Section 16.5 Conservation

Conservation practices focus on a few species but benefit entire ecosystems.

- An **umbrella species** is protected under the ESA, leading to the preservation of its habitat and all the other organisms that live in its habitat.



Section 16.5 Conservation

Protecting Earth's resources helps protect our future.

- The Environmental Protection Agency (EPA) was created in 1970.
- The EPA develops policies and regulations to protect the environment.
- Legislation helps to protect the environment and endangered species.
 - Clean Air Act
 - Clean Water Act
 - Endangered Species Act: works to protect individual species from extinction



Pangolin

Section 16.5 Conservation

- There are several ways that people can help protect the environment.

1. Control population growth
2. Develop sustainable technology and practices
3. Protect and maintain ecosystems

