



Human Impact on the Biosphere

Those Pesky Humans!

- Humans have a large impact on the environment and the organisms we share it with.
- This is due to:
 - Increasing population size = **MORE PEOPLE**
 - More people = increasing use of both renewable and non-renewable resources.

Humans Actions that impact the Biosphere:

1. **Burning Fossil Fuels (Coal, Oil, Natural Gas)**
2. **Cutting down trees (deforestation)**
3. **Using aerosol propellants and refrigerants**
4. **Water pollution**
5. **Using pesticides**
6. **Threatening Biodiversity**

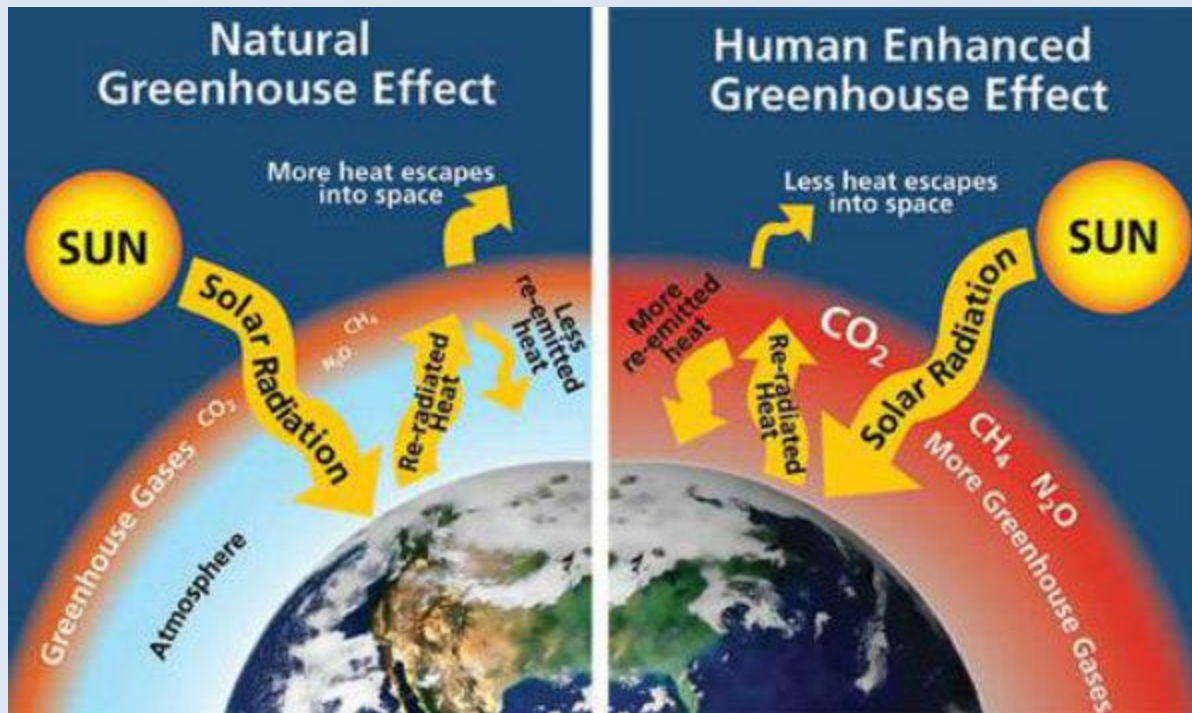
How do these actions impact the
Biosphere?

Burning Fossil Fuels

- Affects the Carbon Cycle by increasing Carbon dioxide (CO_2) into the atmosphere
- Affects the Nitrogen cycle by releasing nitric oxide (a nitrogen compound) into the atmosphere

Why do we care about atmospheric CO₂ levels?

- Carbon Dioxide is a **GREENHOUSE GAS!**
- Greenhouse gases TRAP in heat from the sun

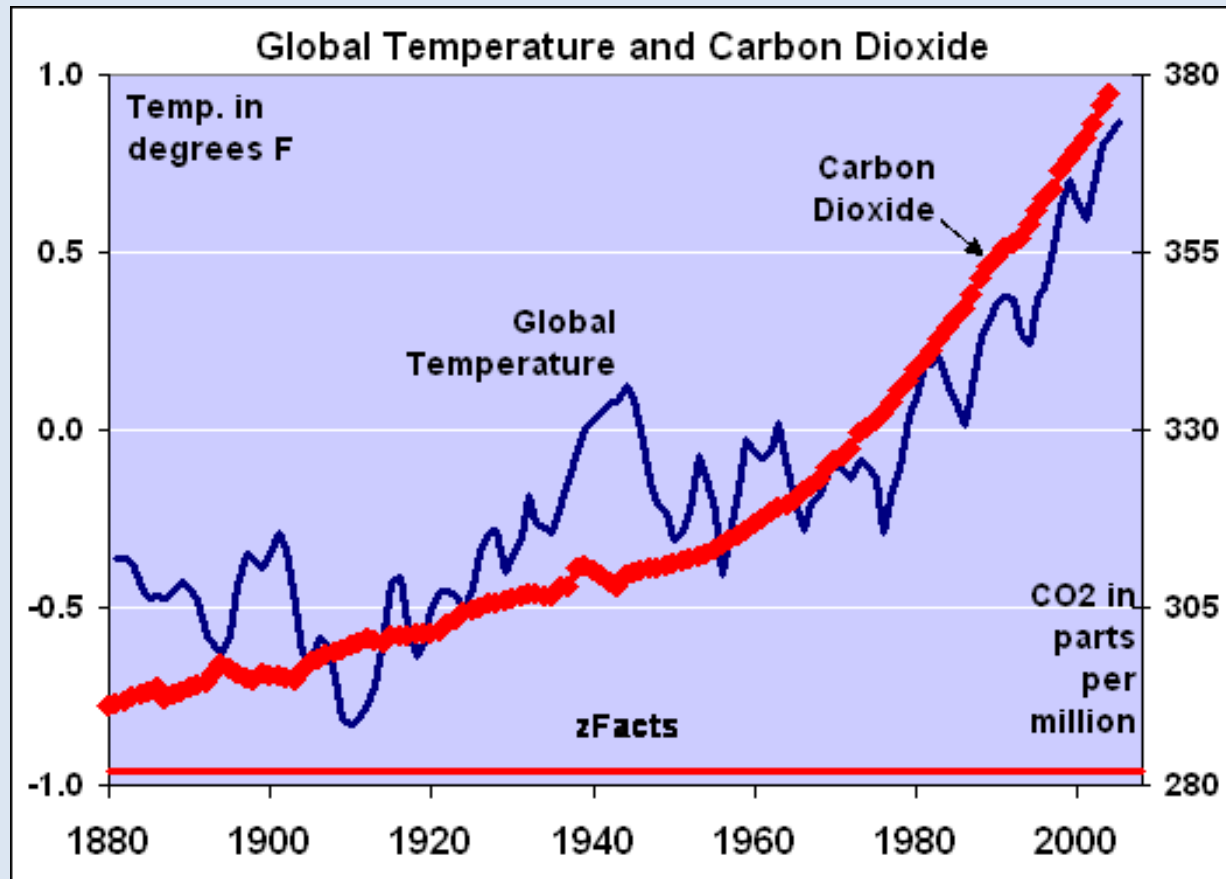


Long term effects of increased Greenhouse Gases

- Over time as more greenhouse gases are produced, more heat is trapped, and the overall global temperature will increase =
CLIMATE CHANGE

FACTS WE KNOW

Global temperatures have increased 0.5-1.0° F since the late 19th century.

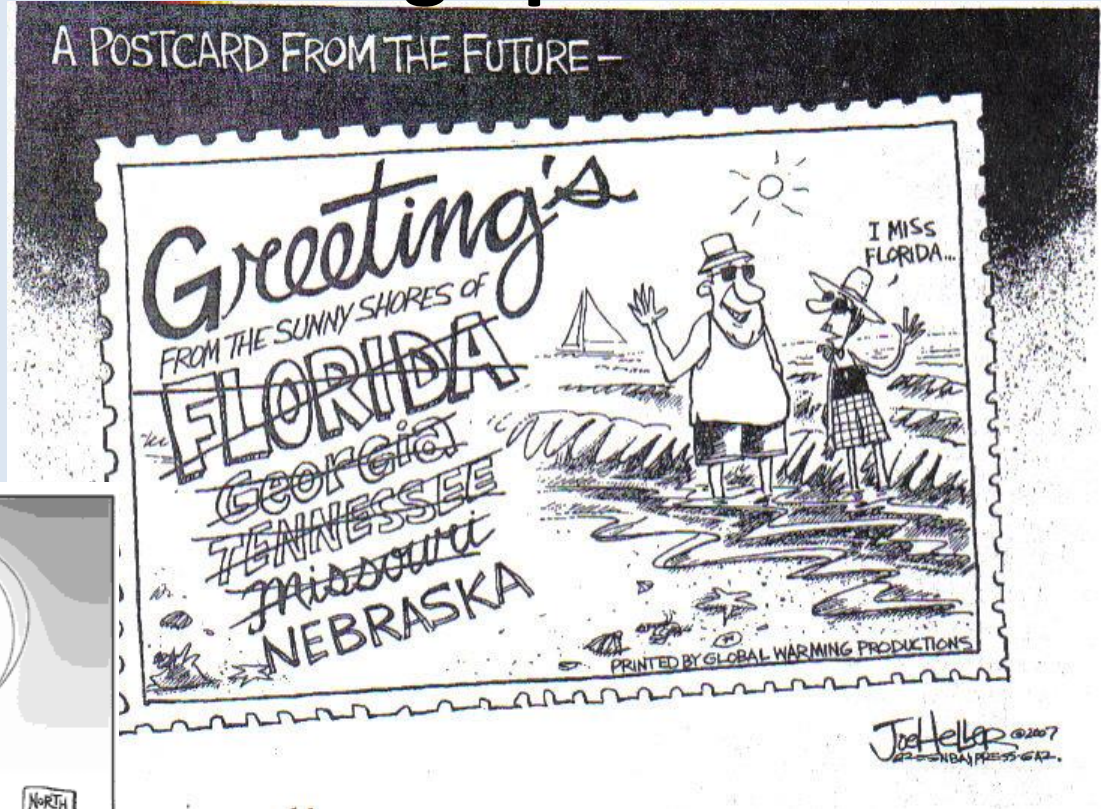


FACTS WE KNOW

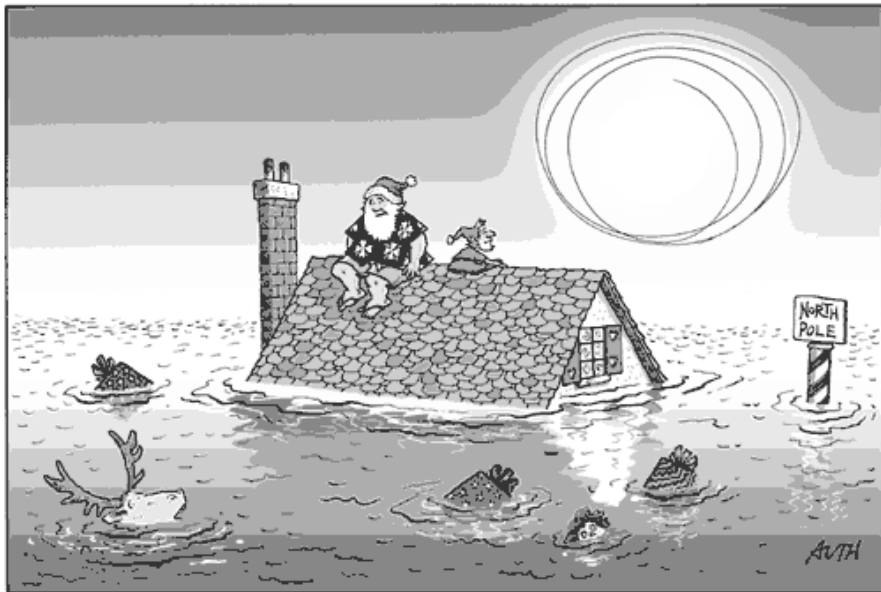
The snow cover in the Northern Hemisphere and floating ice in the Arctic Ocean have decreased.



What's so bad about warming up a little?

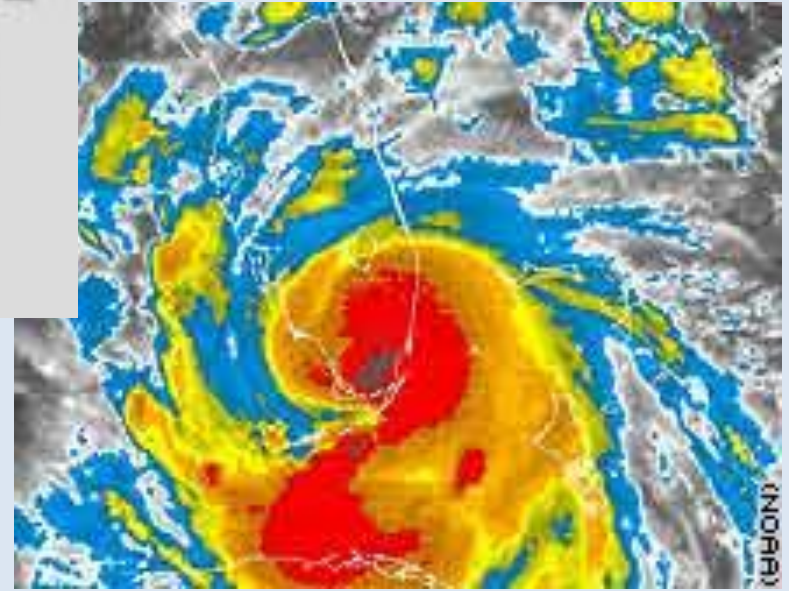
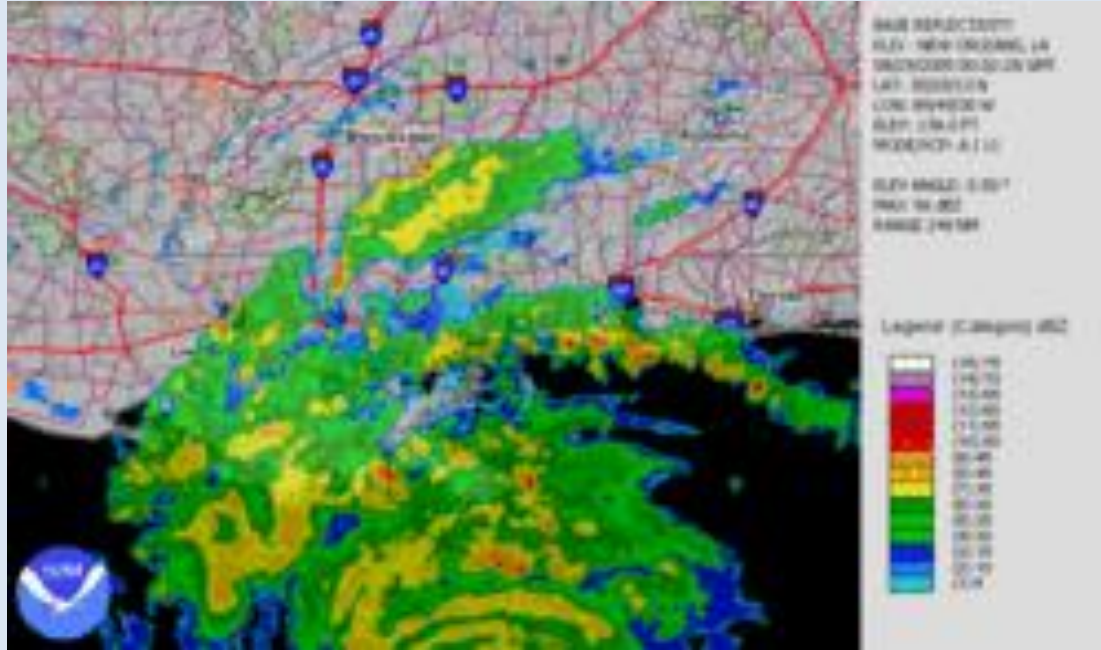


Cartoon from Brookings Register



Coastal flooding – leads to beach erosion

What's so bad about warming up a little?





More severe storms

What's so bad about warming up a little?



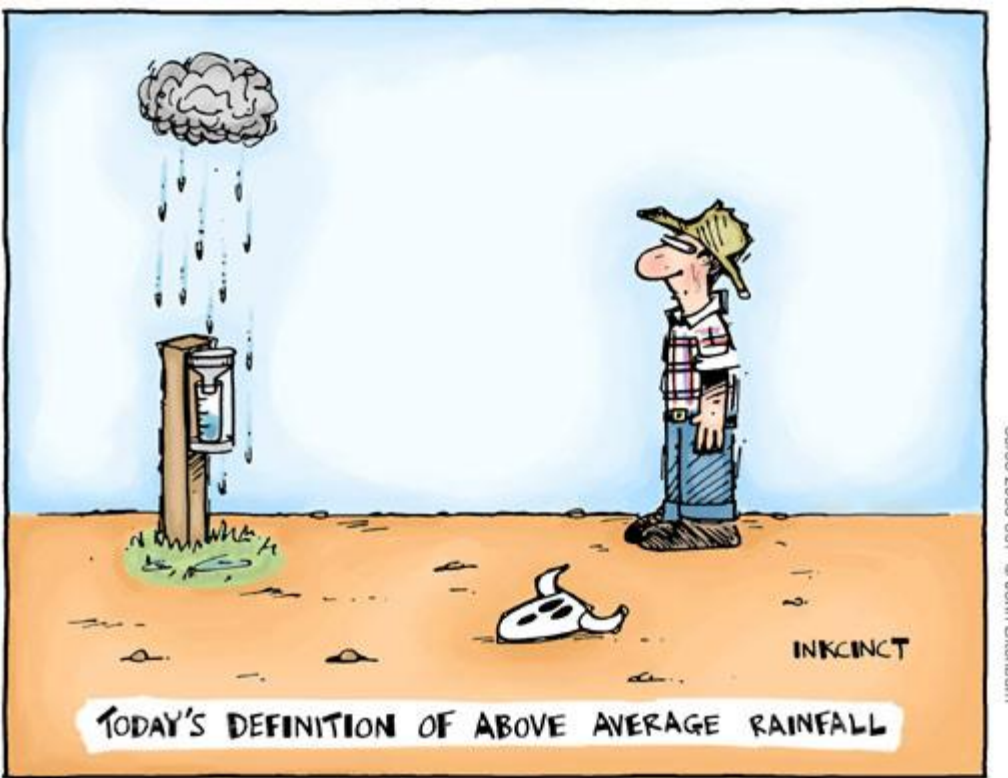
Changes in Gulf Stream



-  warm, fresh, less dense, shallow water
-  cold, salty, dense, deep water

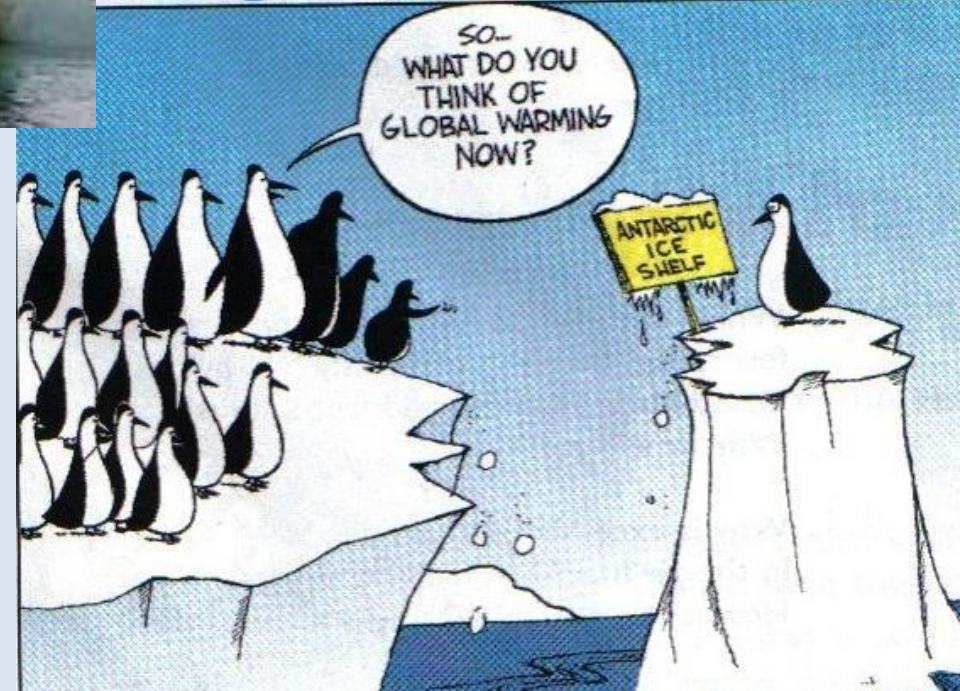
What's so bad about warming up a little?

Weather extremes



Heat waves and drought

What's so bad about warming up a little?



Changing habitats
means
loss of species

Solutions to Reduce Greenhouse Gas Emissions

- Decrease burning of fossil fuels
 - Find/use alternate energy sources

Why do we care about increased nitrogen compounds in the atmosphere?

- **These compounds combine with water vapor in the air to produce acids.**
- **The acids then migrate for miles and fall as acid rain.**

Effects of Acid Rain

A lowered pH:

- disrupts aquatic ecosystems
- makes soil less fertile
 - By suppressing nitrification
- harms plant life
- damages human property.

Nitrogen Cycle

- Nitrogen-fixing bacteria – present in the soil or plant roots
 - Change Nitrogen gases from the atmosphere into solid nitrogen compounds that plants can use in the soil
- = NITRIFICATION



Effects of Acid Rain



Effects of Acid Rain



How acid rain affects stonework.
The picture on the left was taken in 1908.
The picture on the right was taken in 1968

Solutions for Acid Rain

- Decrease burning of fossil fuels
 - Find/use alternate energy sources

Deforestation

- What do trees do?
 - Take in carbon dioxide and release oxygen
- Cutting down trees = MORE Carbon dioxide in the atmosphere
 - Increased greenhouse effect and potential for global climate change

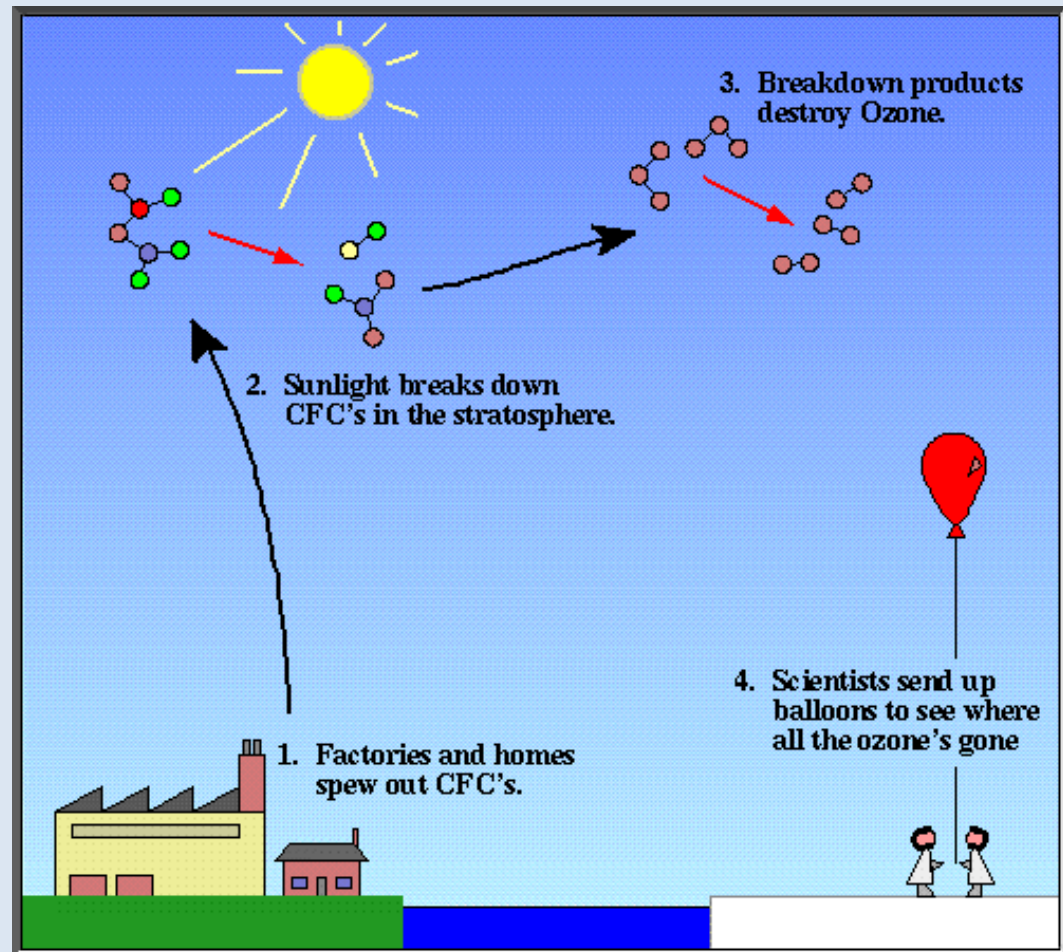


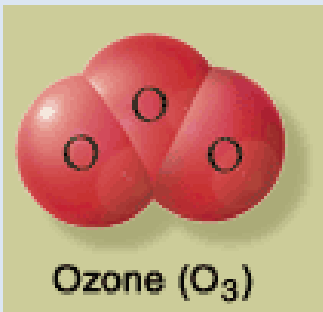
Solutions to Deforestation:

- Less deforestation
- Plant more trees

Aerosol propellants and refrigerants

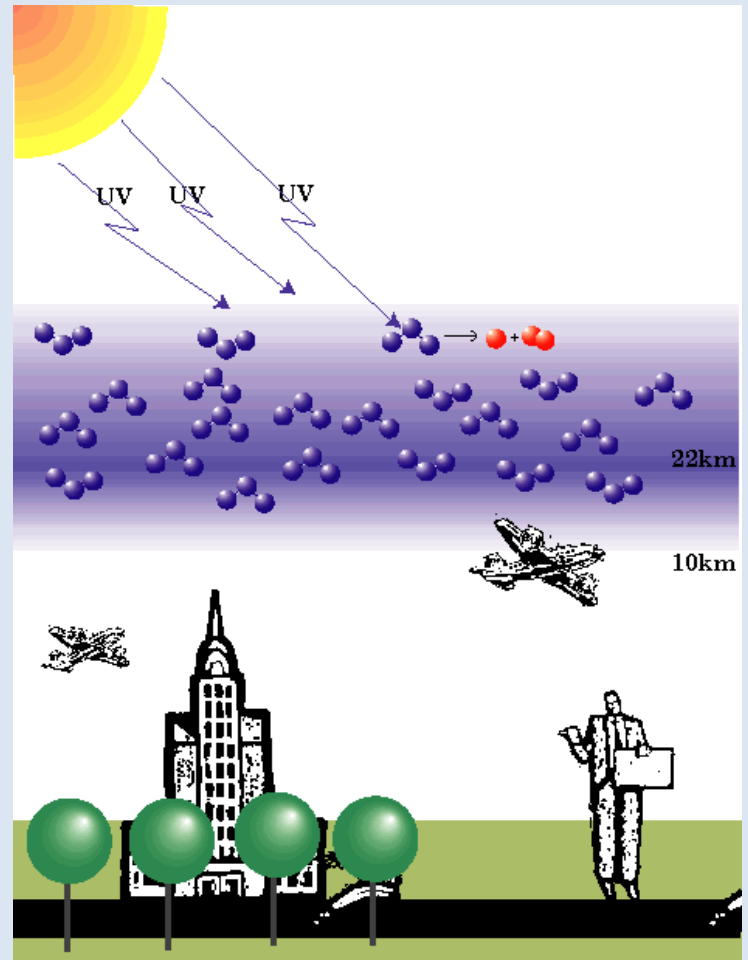
Chlorofluorocarbon molecules (CFC's) released from air conditioners, aerosol spray cans, fire extinguishers, and industry destroy ozone





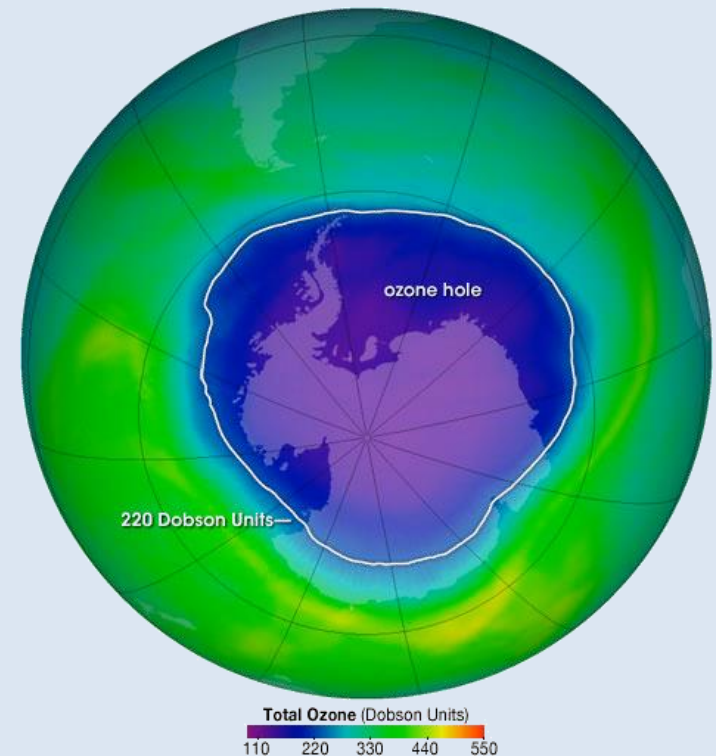
OZONE LAYER

- The ozone layer protects us from UV light.
- UV light causes cancer, eye damage, and can damage plant tissue



WHAT WE KNOW

Scientists have been monitoring the depletion of ozone in our atmosphere and have discovered a hole in the ozone layer over Antarctica.



Solution

AEROSOL spray cans
no longer contain
CFC propellants.

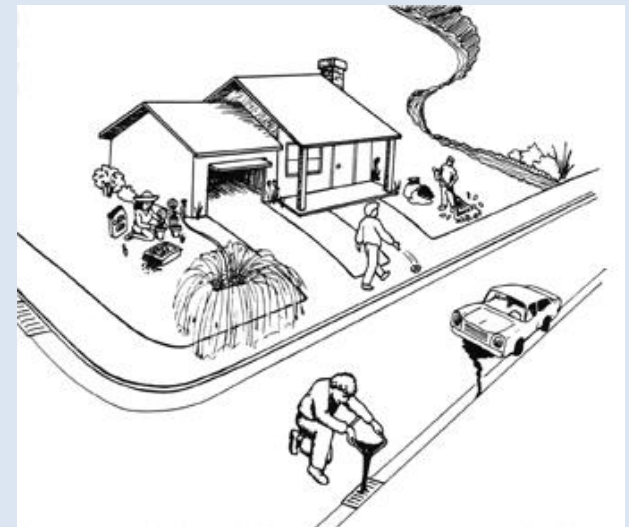


Gases in AIR CONDITIONERS
and refrigerators are collected
and recycled.

Water Pollution

Sources of water pollution:

- begin on land, such as oil from cars, sediments from naked land, and fertilizers from lawns.
- illegal chemical dumping
- acid rain
- raw sewage.



Effects of Water Pollution

- A lack of clean drinking water is a leading cause of disease (such as cholera, dysentery, typhoid).
- Water pollution also affects many ecosystems through habitat destruction.



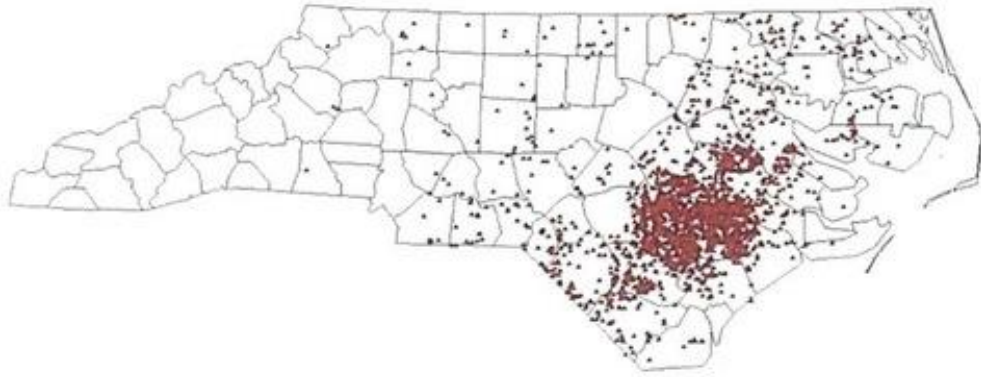
Case Study:

Waste Lagoons on North Carolina Hog Farms

- There are approximately 7 million hogs on industrial farms in NC, most in eastern NC which is a flood-prone coastal plain.
 - a. Industrial farms raise thousands of animals in a small space, producing TONS of waste. The waste is stored in lagoons, but may run-off, leak or spill into surface water with rainfall.



Industrial Hog Operations in North Carolina



• Industrial Hog Operations
□ County Borders

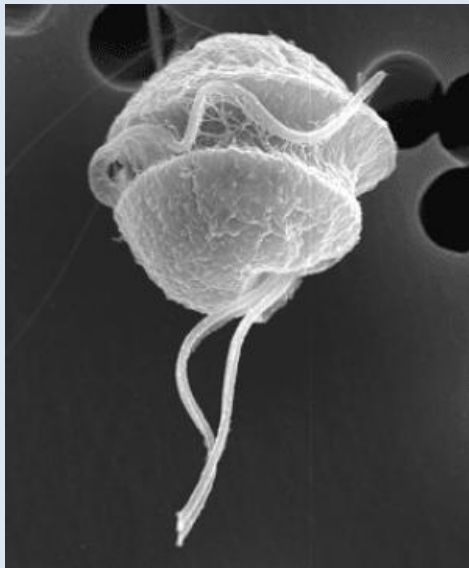


Best Solution for Hog Farms

- Plant vegetation around the hog farms and waterways to absorb the excess nutrients.

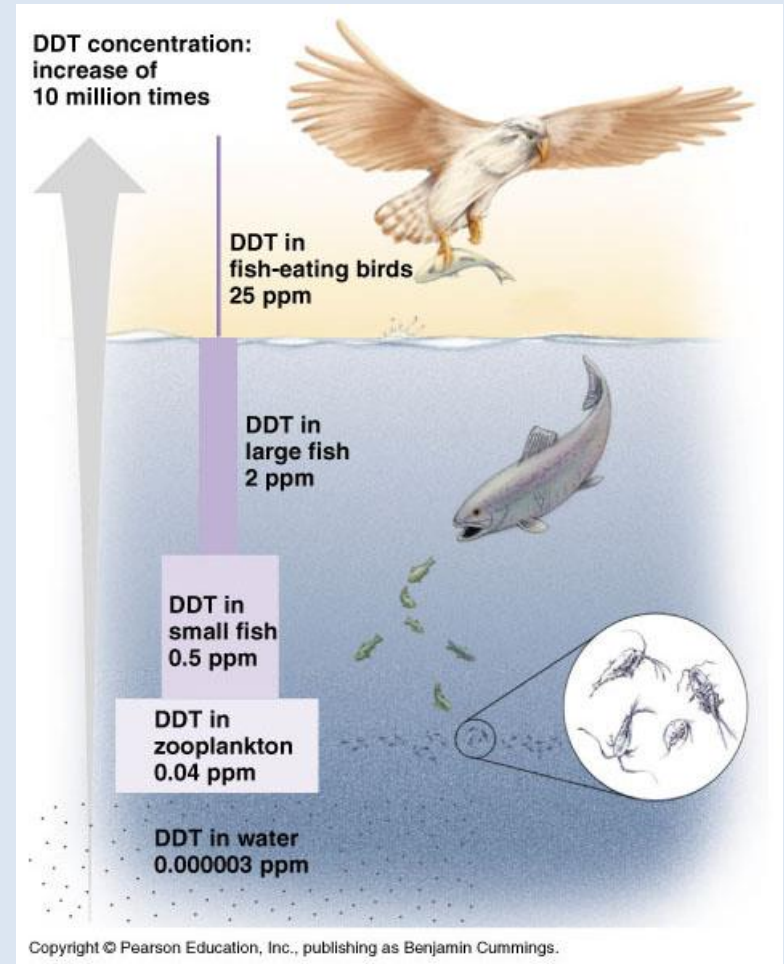
Case Study: Nitrogen run-off from the waste may contribute to outbreaks of **Pfisteria**

Pfisteria is a single-celled protist that is associated with harmful algae blooms because it produces a deadly neurotoxin. Massive fish kills have resulted, along with health problems in fishermen and others exposed.



Pesticide Use:

- Effects:
 - Biomagnification/
Bioaccumulation
 - occurs when pesticides build up in animal tissue as you move up a food chain.



Example:

DDT was the first modern insecticide

- It was cheap, stayed active for long time, and kills many different insects
- Used to control agriculture pests and disease carrying

MOSQUITOES



DDT in Borneo

- **DDT was used in Borneo to kill mosquitoes. Lizards ate the mosquitoes. Cats ate the lizards. Cats began dying.**
- **With no cats, the rat population grew.**
- **Rats began spreading disease.**

DDT in the United States

DDT causes birds to lay eggs with fragile shells so eggs would break when sat on.



American Bald Eagle was declared endangered in 1967. It has since been reclassified as “threatened”



THREATENING BIODIVERSITY

The sum of the genetically based
variety of all the organisms in the
biosphere = BIODIVERSITY

Biodiversity gives stability to the
ecosystems

Threatening Biodiversity

There are 3 basic ways that human actions threaten biodiversity:

- **Introducing non-native species = invasive species**
- **Hunting organisms to extinction**
- **Habitat destruction**

EXAMPLES OF INVASIVE SPECIES



24 rabbits turned loose for hunting in 1859 in Australia, reproduced at such a rapid rate they have taken over the continent.
NO NATURAL PREDATORS!!

It is still a major problem and rabbit diseases have been purposely introduced to try to control the population



Invasive Species

- KUDZU!!!



Hunting to Extinction

- Some species are off-limits due to low population numbers
- Set limits for animals that you are allowed to hunt

Habitat Destruction



Tropical rainforests are disappearing at a rate of about 80 acres per minute.



BIODIVERSITY THREAT



Changes in Brazilian rainforest over 30 years

12 May 200

The tropical rainforests once covered more than 14% of the earth's total land surface, but now cover less than 6%.