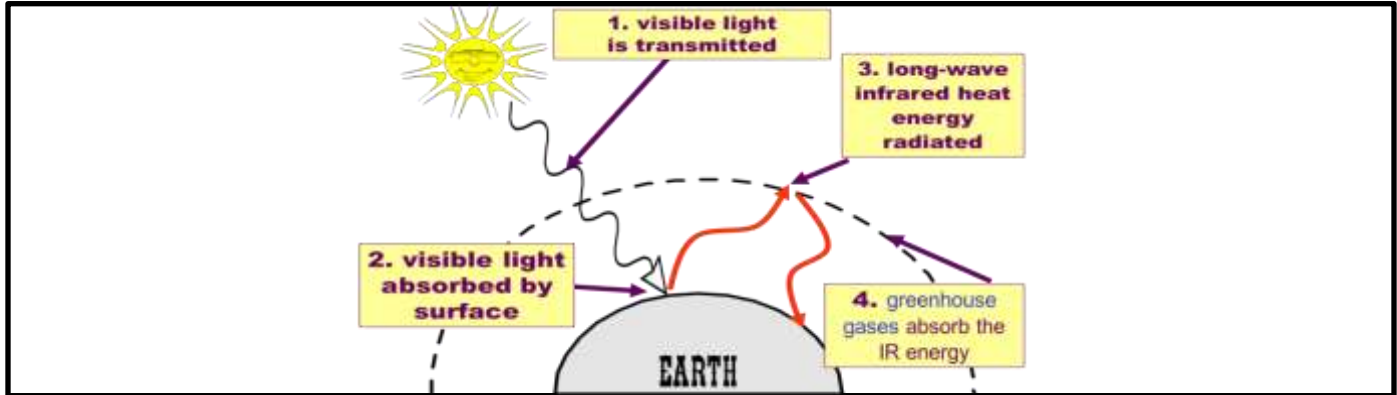


Aim: How is climate change linked to an increase in greenhouse gases?

How the Greenhouse Effect Works:



Greenhouse Gas	Global Warming Potential (GWP) as compared to CO ₂	Associated Information
water vapor (H ₂ O _v)	???	naturally occurring positive feedback mechanism with other GHGs
carbon dioxide (CO ₂)	1X	fossil fuel burning deforestation/ land-clearing
methane (CH ₄)	24X	fossil fuel burning bacteria decomposition of organic matter in wetlands / rice paddies decomposing waste in landfills
nitrous oxide (N ₂ O)	360X	burning of fossil fuels and biomass agriculture – fertilizer /livestock manure (denitrification by bacteria)
chlorofluorocarbons (CFCs)	1500-7000X	air conditioning / refrigerants aerosols foams and packing materials

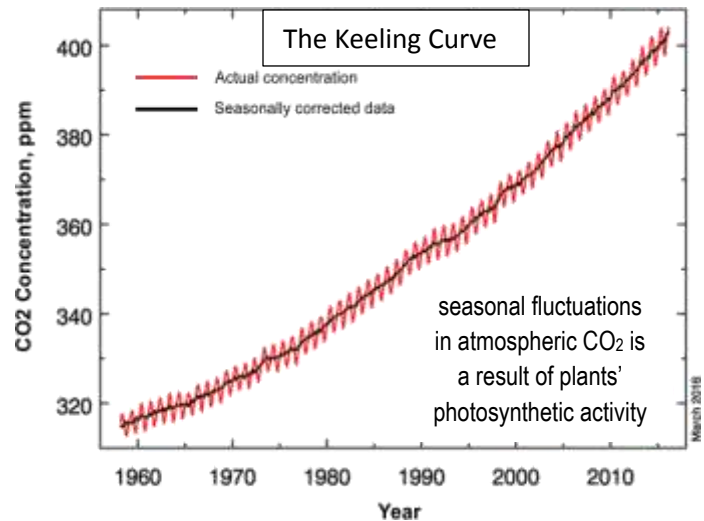
Carbon dioxide has seen the greatest increase because of anthropogenic activities

For the past 10 years, the average annual rate of increase of CO₂ is 2.07ppm.

The rate of increase of CO₂ is more than double that of the 1960s

9 out of 10 of the warmest years on record occurred in the 21st century (1998 was the exception)

****Global temperatures have risen 1.25°F during the last century****



Effects of Global Climate Change

1. rising sea levels

- thermal expansion of water in oceans due to heating
- melting ice of polar ice caps – water added to ocean basins causing an increase in sea level

2. polar ice melt and methane release

- when ice melts, organic matter is exposed to air.
- decomposition of this matter releases methane gas that enhances greenhouse effect (ex. melting of Alaska permafrost)
- melting of icecaps reduces Earth's albedo (reflective capability) – more sunlight is absorbed at surface causing increases in surface temperatures

3. changing precipitation patterns

- statistics reflect an increase in storm occurrence and intensity (tropical storms, hurricanes, typhoons)

4. increase in the spread of disease

- insects are disease vectors – insects that are typically indigenous to tropical regions will be able to survive in locations farther from the Equator and carry diseases with them
- bacteria cannot survive in polar regions – if temperatures increase, bacteria will be able to survive in areas that were once too cold to sustain microbial life

5. adverse ecosystem impacts

alterations in migration patterns, bloom times, mating seasons – effects cannot be foreseen

6. change in agriculture

- shifting temperatures and precipitation (El Niño?)
- coastal agricultural lands will decrease because of flooding

Reducing Global Climate Change

1. Reduction of one's **Carbon Footprint** - the amount of carbon dioxide and other carbon compounds emitted due to the consumption of fossil fuels by a particular person

2. **Kyoto Protocol (1997)** treaty to control/reduce greenhouse gas emissions
(U.S. / China did not ratify – many exemptions for developing nations)

2015 Paris Agreement/Accord – addressed problems related to Kyoto Protocol – especially relating to exemptions
Obama administration ratifies – Trump administration withdrew the U.S.