**Global Warming**

Enhanced Global warming is the term given to describe the recent increase of the earth's temperature as a whole. The earth's weather and climate is controlled by energy from the sun, which warms the surface of the earth as it, in turn, deflects the energy back into space. Some of this deflected energy is retained within the atmosphere of the earth by **greenhouse gases** which prevent the energy from passing into space, thereby preserving heat. It is this process that results in the earth having a temperature which supports life.

Global warming has occurred since the 1980's, and during this time, the seven warmest years in global meteorological history have been recorded. If the earth's warming trend continues into the next decade the earth may enter a period of climate change unlike any of the past.
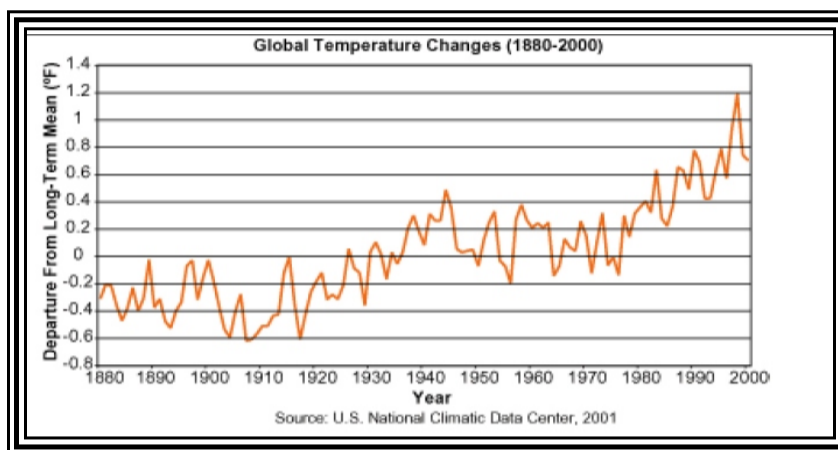


If the earth's warming trend continues into the next decade the earth may enter a period of climate change unlike any of the past. Changes in the concentration of heat-trapping gases "greenhouse gases" have played a major role, because these gases trap the heat and does not let it escape, therefore causing global warming or an increase in climate temperatures.

The three primary greenhouse gases which are responsible for this warming include:

1) carbon dioxide          2) methane          3) nitrous oxide
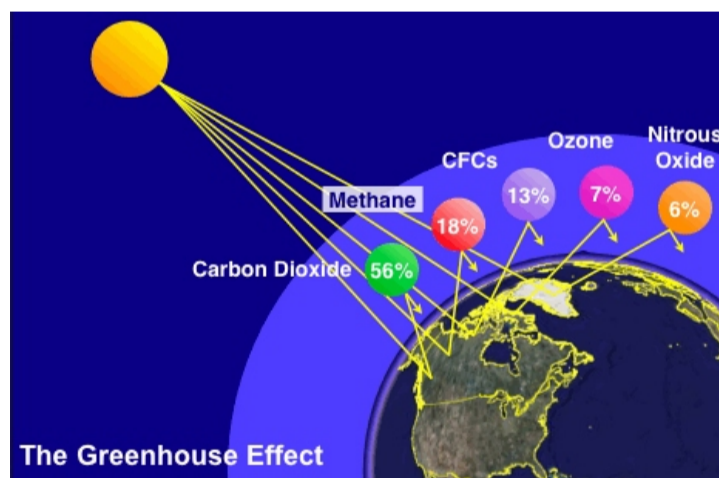


Causes of excess greenhouse gases include

:-Carbon dioxide is released into the atmosphere by the combustion of solid waste, fossil fuels, wood and wood products.

 -Methane emissions are a direct result of the production and transportation of coal, natural gas, and oil. The raising of livestock, and the decomposition of organic waste also contribute to the amount of methane emitted into the atmosphere.

-Nitrous oxide emissions are a result of agricultural and industrial activities as well as the burning of solid waste and fossil fuels.

A major issue which is causing concern is that of our own health. Throughout the world, the occurrence of particular diseases and other threats to human health depend largely on the local climate. For example:

1)extreme temperatures can directly cause the loss of life (although it has the greatest toll on very old and very young people),

2)many severe diseases are only found in warm areas,

3) warmer temperatures have been shown to increase air and water pollution.
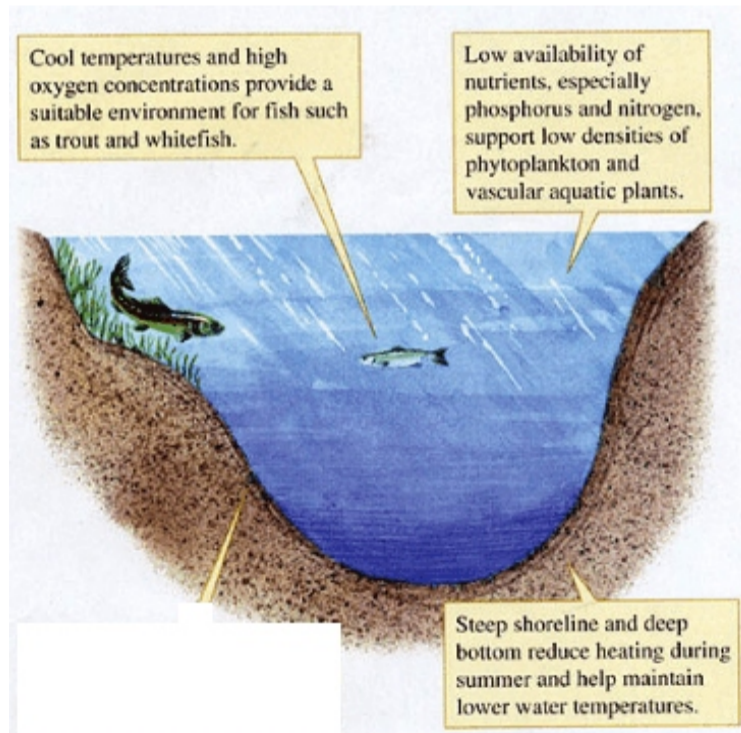In July of 1995, a heat wave killed more than 700 people in the Chicago area alone.

**Aquatic Eutrophication**

If you look at a drop of pond water under a microscope you will discover an entire world of very tiny organisms. Some are photosynthetic such as the microscopic algae, but many are heterotrophic like the animals that live on land.

One of the factors that determines how many of these microscopic organisms live in the water is the availability of nutrients.

Low levels of nitrates and phosphates reduce the number of micro-organisms. The water appears clear and sunlight can penetrate deeper supporting the production of oxygen by photosynthetic organisms.

Under these conditions, the pond or lake can support large populations of fish and other organisms that are adapted to relatively high levels of oxygen. Such a lake in which oxygen levels are relatively high is known as an **oligotrophic lake**.



Cool temperatures and high oxygen concentrations provide a suitable environment for fish such as trout and whitefish.

Low availability of nutrients, especially phosphorus and nitrogen, support low densities of phytoplankton and vascular aquatic plants.

Steep shoreline and deep bottom reduce heating during summer and help maintain lower water temperatures.

Enrichment, the fertilization of a body of water, by nitrates and phosphates mainly from agricultural lands and from untreated human or animal sewage causes the number of micro-organisms to increase to the point that the water actually appears turbid (cloudy). As a result of the bacteria, less light is able to penetrate the water and oxygen concentrations tend to be reduced. Such a lake is said to be **eutrophic**
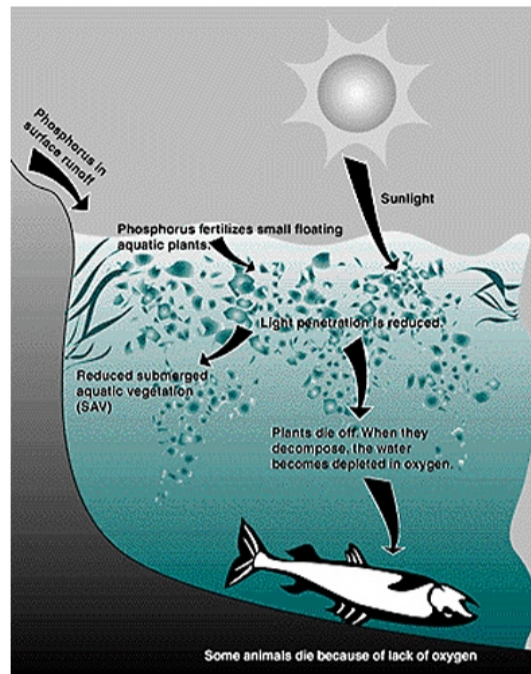


Eutrophic lakes are generally shallower and warmer than oligotrophic lakes and because there is a lower oxygen concentration in the water, they are unable to support the same type of fish populations as found in oligotrophic lakes. Fish that tend to require relatively high levels of dissolved oxygen, such as pike or trout, tend to die out and are replaced by fish species, like catfish or carp, that can survive in lower levels of oxygen.

1.     Which factor contributes most to the problem of global warming?

    (A)     burning of fossil fuels
    (B)     cutting down forests
    (C)     using public transportation
    (D)     walking to school

2.     Which is not considered a major greenhouse gas?

    (A)     methane
    (B)     carbon dioxide
    (C)     oxygen
    (D)     nitrous oxide

3.     How can you help solve the problem of global warming?

    (A)     Plant trees.
    (B)     Use wind to generate electricity.
    (C)     Insulate your home
    (D)     All of the above.

4.     If global warming continues, which is least likely to result?

    (A)     increase in the spread of disease
    (B)      plants may not survive the change in climate
    (C)     sea levels will tend to fall to much lower levels
    (D)     change in migration routes of birds

5. What is least likely to happen to the tundra if global warming continues?

(A) The tundra will tend to move further south.
(B) The tundra may suffer heat stress in summer.
(C) The tundra may undergo species change.
(D) The tundra may become unstable due to the loss of permafrost.

6. Global warming may lead to shifts in wind and rainfall patterns resulting in all of the following except

(A) increased urban smog
(B) more severe winter conditions
(C) summer droughts and heat stress
(D) extinction of many plants and animals

7. Why is recycling important?

(A) Recycling reduces the amount of energy required to manufacture goods.
(B) Recycling will reduce the production of methane in land fills.
(C) Recycling helps conserve nonrenewable resources.
(D) all of the above

8. Which factor is least likely to be associated with an oligotrophic lake?

(A) cold water temperature
(B) shallow depths
(C) high oxygen levels
(D) many fish

9. Which is NOT an advantage of cold water temperatures in an oligotrophic lake?

(A) reduces growth of bacteria
(B) increases oxygen concentration
(C) increases light penetration
(D) reduces metabolic rate

10. Which fish species might be used as an indicator of a eutrophic lake?

(A) catfish
(B) trout
(C) salmon
(D) pike

11. Which represents the major source of nutrients that results in increased eutrophication?

(A) phosphates in laundry detergents
(B) human sewage
(C) fertilizers in agriculture
(D) farm sewage

12. Which of the following cities still release untreated sewage into their environment?

(A) Montreal
(B) St. John's
(C) Halifax
(D) all of the above

13. Which pollutant is most commonly associated with our highways?

(A) salt
(B) phosphate
(C) nitrate
(D) nuclear