Raniganj Girls' College

Course Name: Environment Studies

Course Code: AEE101

Topic of the project: Different aspects of Air, Soil, Water, Noise pollution

A Project Report

Submitted by Semester-I students (Academic Year 2021-22)

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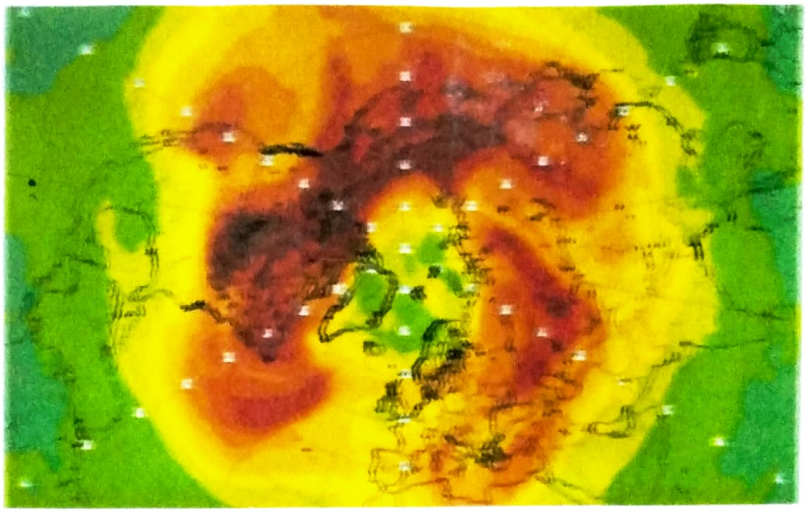

OZONE HOLE

NAME: ASMITA SINGH

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ROLL NO. 24

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SESSION: 2021-2022

CERTIFICATE

This is to certify that this project titled "Different aspects of Air, Soil, Water, Noise pollution" submitted by the students for the award of degree of B.A. Honours/ Program is a bonafide record of work carried out under my guidance and supervision.

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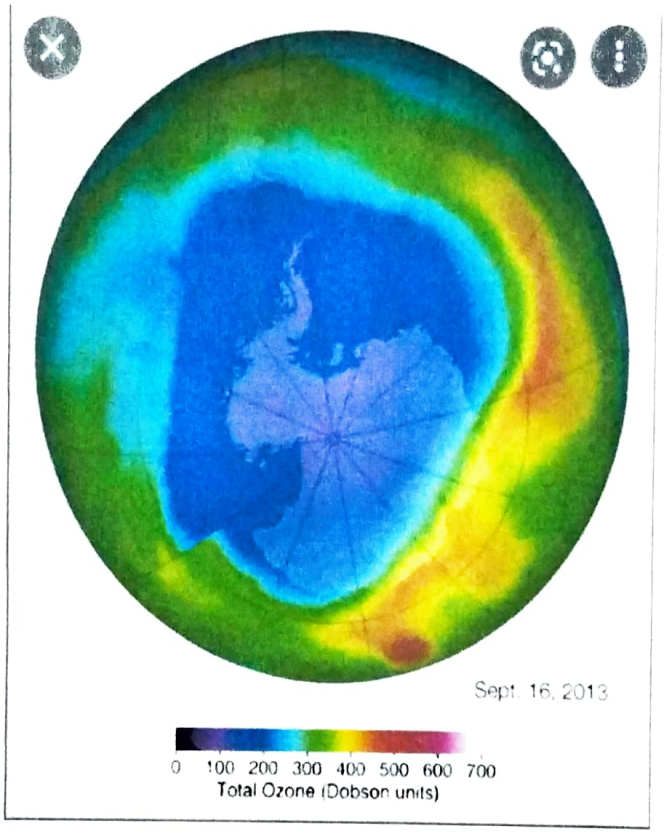
OZONE HOLE

A severe depletion of ozone in a region of the ozone layer, particularly over Antarctica and over the Arctic. The depletion is caused by the destruction of ozone by CFCs and by other compounds, such as carbon tetrafluoride (CCl_4) and carbon tetrachloride (CCl_4). The amount of ozone in ozone holes is about 55 to 60 percent of the normal concentration in the ozone layer. Although the full effect of increased ozone depletion is not yet known, the amount of ultraviolet radiation the Earth receives is greatly increased by ozone depletion, creating a heightened risk of skin cancers and likely contribution to global warming.

Basic Information About Ozone Hole :-

The Earth's ozone layer protects all life from the sun's harmful radiation, but human activities have damaged this shield. Less ozone-layer protection from ultraviolet (UV) light will, over time, damage crops and lead to higher skin cancer and cataract rates



[The Antarctic Ozone Hole]

The Earth's atmosphere is composed of several layers. The lowest layer, the troposphere, extends from the Earth's surface up to about 6 miles or 10 kilometers in altitude. Virtually all human activities occur in the troposphere.

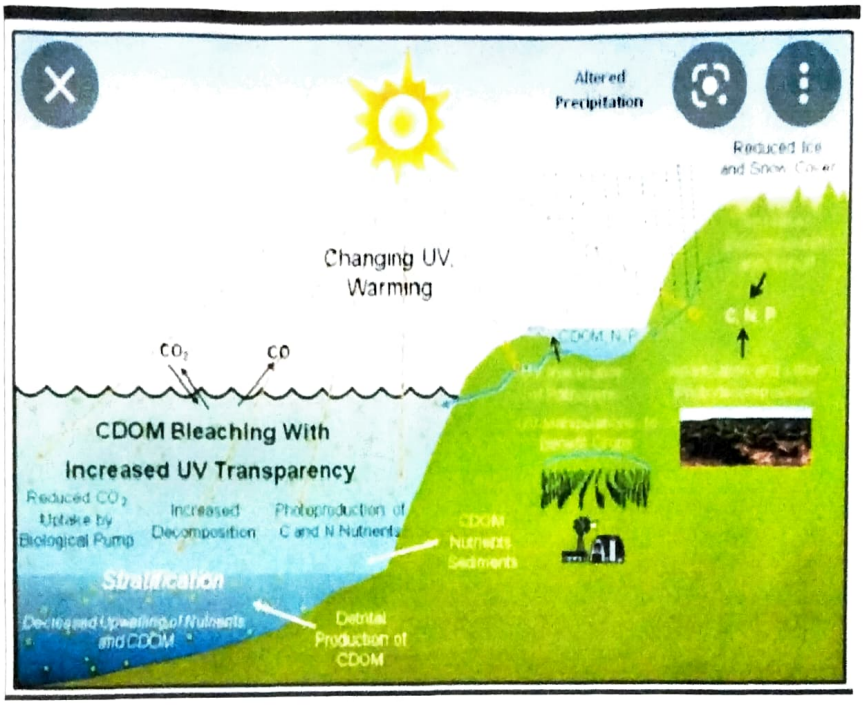
Mt. Everest, the tallest mountain on the planet, is only about 5.6 miles (9km) high. The next layer, the stratosphere, continues from 6 miles (10km) to about 31 miles (50km). Most commercial airplanes fly in the lower part of the stratosphere.

[OZONE LAYER DEPLETION]

Not all chlorine and bromine sources contribute to ozone layer depletion. For example, researchers have found that chlorine from swimming pools, industrial plants, seasalt, and volcanoes does not reach the stratosphere. In contrast, ODS are very stable and do not dissolve in rain. Thus, there are no natural processes that remove the ODS from the lower atmosphere.

One example of ozone depletion is the annual ozone "hole" over Antarctic that has occurred during the Antarctic spring since the early 1980s. This is not really a hole through the ozone layer, but rather a large area of the stratosphere with extremely low amount of ozone.

Ozone depletion is not limited to the area over the South Pole. Research has shown that ozone depletion occurs as long as two to five years.



[Ozone depletion]

In the 1970s concerns about the effects of ozone-depleting substances on the stratospheric ozone layer prompted several countries, including the United States, to ban the use of chlorofluoro-carbons as aerosol propellants. However, global production of CFCs and other ODS continued to grow rapidly as new uses were found for these chemicals in refrigeration, fire suppression, foam insulation, and other applications

Some natural processes, such as large volcanic eruptions, can have an indirect effect on ozone levels. For example. Mt. Pinatubo's 1991 eruption didnot increase stratospheric chlorine concentrations, but it did produce large amounts of tiny particles called aerosols (different from consumer products also known as aerosols). These aerosols increase chlorine's effectiveness at destroying ozone. The can destroy ozone. However, the effect from volcanoes is short-lived. Not all chlorine and bromine sources contribute to ozone layer depletion. For example, researches have found that chlorine from swimming pools, industrial plants, sea salt, and volcanoes doesnot reach the stratosphere. In contrast, ODS are very

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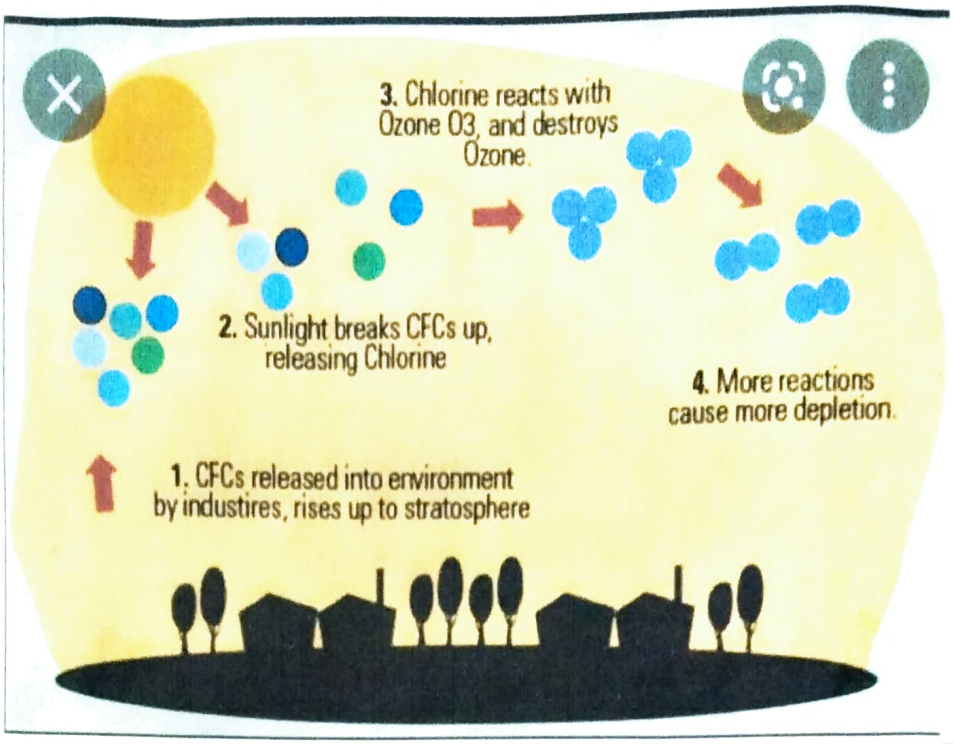
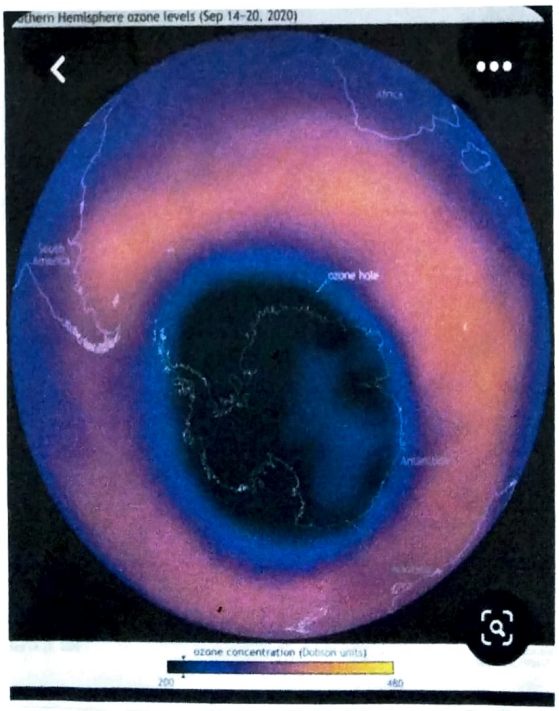
The ozone layer in the stratosphere absorbs a portion of the radiation from the sun, preventing it from reaching the planet's surface. Most importantly, it absorbs the portion of UV Lights called UVB. UVB has been linked to many harmful effects, including skin cancers, cataracts, and harm to some crops and marine life.

Scientists have established records spanning several decades that detail normal ozone levels during natural cycles. Ozone concentrations in the atmosphere vary naturally with sunspots





[2021 Antarctic Ozone Hole]

seasons, and latitude. These processes are well understood and predictable. Each natural reduction in ozone levels has been followed by a recovery. Beginning in the 1970's, however, scientific evidence showed that the ozone shield was being depleted well beyond natural processes.

Reduce ozone levels as a result of ozone depletion mean less protection from the sun's rays and more exposure to UVB radiation at the Earth's surface.

Effects on Human Health :-

Ozone layer depletion increases the amount of UVB that reaches the Earth's surface. Laboratory and epidemiological studies demonstrate that UVB causes non-melanoma skin cancer and plays a major role in human health. Because all sunlight contains some UVB, even with normal stratospheric ozone levels, it is always important to protect your skin and eyes from the sun. EPA uses the Atmospheric and Health Effect Framework model to estimate the health benefits of stronger ozone layer protection under the Montreal Protocol. Updated information on the benefits of EPA's efforts to address ozone layer depletion is available in the 2015 report,

Effects on Marine Ecosystems :-

Phytoplankton form the foundation of aquatic food webs. Phytoplankton productivity is limited to the euphotic zone, the upper layer of the water column in which there is sufficient sunlight to support net productivity. Exposure to solar UVB radiation has been shown to affect both orientation and motility in phytoplankton, can be directly affected by UVB radiation.

Indirect changes caused by UVB (such as change in plant form, how nutrients are distributed within the plant, timing of development al phases and secondary metabolism) may be equally or something more important than damaging effects of UVB. These changes can have important implication for plant competitive balance, herbivory, plant diseases, and biogeochemical cycles.

Effects on Plants :-

UVB radiation affects the physiological and developmental processes of plants. Despite mechanisms to reduce or repair these effects and an ability to adapt to increased levels of UVB, plants growth can be directly affected by UVB resulting reduced survival rates for these organisms.

Scientists have demonstrated a direct reduction in phytoplankton production due to ozone depletion-related increases in UVB.

UVB radiation has been found to cause damage to early developmental stages of fish, shrimp, crab, amphibians, and other marine animals.

Effects on Biogeochemical Cycles —

Increases in UVB radiation could affect terrestrial and aquatic biogeochemical cycles, thus altering both sources and sinks of greenhouse and chemically important trace gases (eg. carbon dioxide, carbon monoxide, carbonyl sulfide, ozone, and possibly other gases). These potential changes would contribute to biosphere-atmosphere feedbacks that mitigate or amplify the atmospheric concentrations of these gases.

Effects on Materials —

Synthetic polymers, naturally occuring, biopolymers as well as some other materials of commercial interest are adversely affected by UVB radiation.

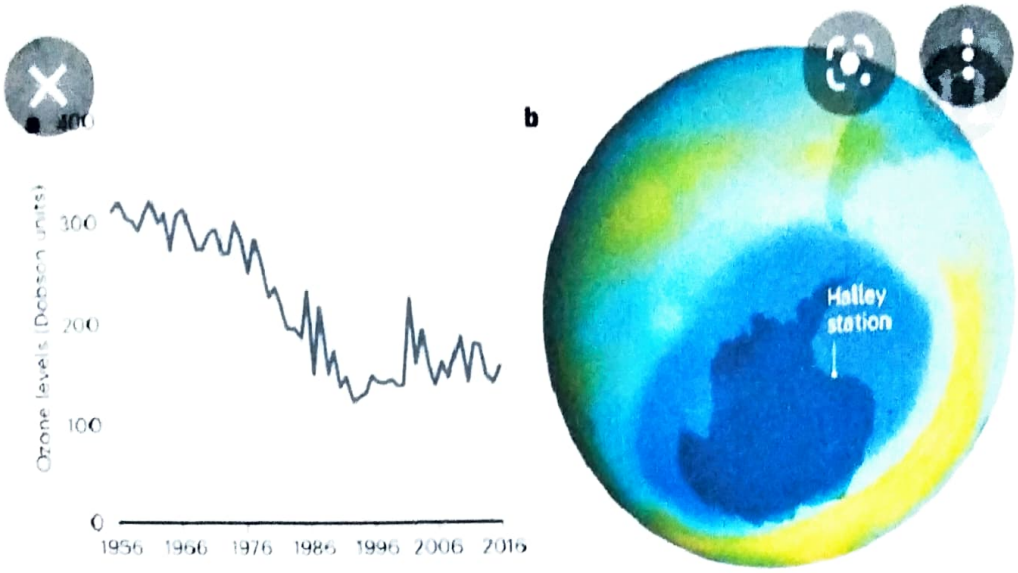
Today's materials are somewhat protected from UVB by special additives. Yet, increases in UVB levels will accelerate their breakdown, limiting the length of time for which they are useful outdoors.

[Giant hole in Ozone layer]

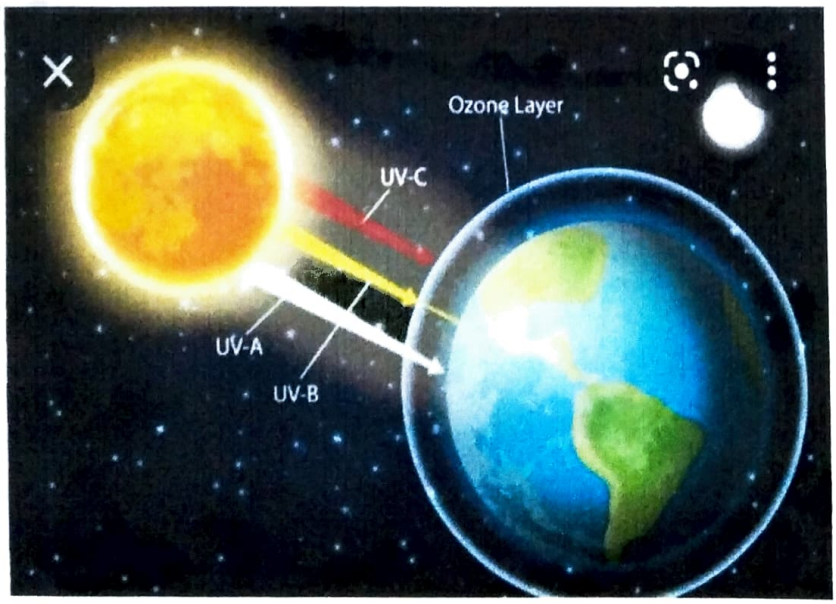
Addressing Ozone Layer Depletion :-

As part of the United States commitment to implementing the Montreal Protocol on Substances that Deplete the Ozone Layer, Congress amended the Clean Air Act to add provisions for protecting the ozone layer. As required under Title VI of the Clean Air Act, EPA is responsible for developing and implement-ing programs that protects the stratospheric ozone layer.

Since ozone is a greenhouse gas, the breakdown and anticipated recovery of the ozone layer affects Earth's climate. Scientific analyses show that the decreases in stratospheric ozone observed since the 1970s have produced a cooling effects - or, more accurately, that is has counteracted a small part of the warming that has resulted from rising concentrations of carbon dioxide and other greenhouse gases during this period. As the ozone layer slowly recovery in the coming decades, this cooling effect is expected to recede.



Ozone Layer



[UV Radiation Vector Diagram]