

Ecological Effects of Global Warming & Climate Change

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ABSTRACT: It is a well known fact that biodiversity is very important for life to sustain on Earth. Biodiversity refers to the variety of life on earth, for example the number of Species of plants, animals, micro organisms, the large variety of Genes in these species, and the various kinds of ecosystems on the planet, such as deserts, rainforests and coral reefs .Biodiversity is very important on the planet as it boosts the ecosystem productivity where each species, no matter how small, all have an important role to play and that it is in this combination that helps the ecosystem to possess the ability to prevent and recover from various disasters. It has become matter of great concern that we need to talk about global warming and climate change. There is no denying about that our environment is constantly changing; however, as our environment changes, so does the need to become increasingly aware of the problems that surrounds it.

KEYWORDS: Global Warming, Climate Change, Ecology, Ozone Layer, Environmental Crisis.

INTRODUCTION: Today we need to be aware of what types of environmental problems our planet is facing as we have massive influx of natural disasters, warming and cooling periods, different types of weather patterns and much more. One of the most important characteristics of this environmental degradation is that it affects all mankind irrespective of country, region, or race. All of us are stakeholders and this raises issues on who should do what, to combat environmental degradation. Our planet is poised at the brink of a severe Environmental Crisis. Our current environmental problems make us more vulnerable to disasters and tragedies, now and in the future. If we analyze carefully we will realize that we are in a state of planetary emergency, with environmental problems piling up. Unless we address the various issues prudently and seriously we are surely doomed for disaster. Current environmental problems require urgent attention throughout the world.

Research Methodology: The present research paper is based on the secondary

sources of data collection. Most of the study material has been taken from the articles published in reputed journals, reference books and official websites. The research is exploratory in nature. To pace the study, the researcher has also used some observational facts.

Research Objectives: This paper aims at the following objectives:

- To point out environmental concern in the perspective of climate change.
- To identify the problem of global warming and climate change.
- To highlight the ecological effects of global warming and climate change.

Environmental Concern: Today, as we have access to more resources and information, it is essential that we re-examine ethically, what we have inherited, what we are responsible for, and what we will pass onto coming generations. Our marvels of science and technology are matched, if not outweighed, by many current tragedies, including human starvation in some parts of the world, and extinction of other life forms. Earth's oceans, seas, and

fresh water areas grow increasingly polluted, and their life forms are still largely unknown or misunderstood. Our future generations may be left unaware of many of the earth's habitats, animals, plants, insects, and even micro-organisms that we know as rare all. All of us as stakeholders should take the responsibility must act before it is too late.

Environment Concern has become as the most crucial issue in today's world. It is an issue that is viewed as a challenge to the dominant, market regulated development model. Accumulation of green house gases, depleting Ozone layer, poisoned water, smog-filled atmosphere, horrifying toll of cancer and respiratory diseases, piling industrial and household wastes, depleting natural resource have and loss of bio-diversity are contributing to the environmental crisis. The root cause of all these problems is the misguided developmental priorities and myopic goals. We are building the foundations of Self Destruction by destroying forests, our source of life giving water, our natural dams, to raise monuments of human misery and deprivation.

CLIMATE CHANGE & OZONE LAYER

DEPLETION: Ozone layer is an invisible layer around the planet in stratosphere that

protects us from the sun's harmful rays. Chlorine and Bromide found in Chloro Fluoro Carbons (CFC's) are responsible for depletion of the crucial Ozone layer. These toxic gases reach the upper atmosphere, there they react with ozone and leads to ozone depletion. This has led to hole in the ozone layer, the biggest of which is above the Antarctic. The CFC's are banned in many industries and consumer products. Ozone layer is valuable because it prevents harmful UV radiation from reaching the earth that can cause diseases like skin cancer. This is one of the most important current environmental problems. Earth's atmosphere is divided into three regions, namely

- Troposphere
- Stratosphere
- Mesosphere.

The stratosphere extends from 10 to 50 Km. from the Earth's surface and is concentrated with slightly pungent smelling, light bluish ozone gas. The ozone gas is made up of molecules each containing three atoms of oxygen; its chemical formula is O_3 . The ozone layer, in the stratosphere acts as an efficient filter for harmful solar Ultraviolet B (UV-B) rays.

Since ozone is highly reactive, it can be easily broken down by man-made chlorine

and bromine compounds. These compounds are found to be responsible for ozone layer depletion. The process begins when CFCs and other ozone-depleting substances (ODS) are emitted by the refrigerators and AC's. Winds efficiently mix and evenly distribute the ODS in the troposphere. These ODS compounds do not dissolve in rain, are extremely stable, and have a long life span, after several years, they reach the stratosphere by diffusion. Strong UV light breaks apart the ODS molecules. CFCs, HCFCs, carbon tetrachloride, methyl chloroform release chlorine atoms, and halons and methyl bromide release bromine atoms. It is the chlorine and bromine atom that actually destroys ozone, not the intact ODS molecule. It is estimated that one chlorine atom can destroy from 10,000 to 100,000 ozone molecules before it is finally removed from the stratosphere.

Effects of Ozone Layer Depletion: We know it very well that depletion of ozone layer badly affects our ecosystem and it's bad effects maybe as under:

- **Effects on Air Quality:** Depletion of ozone and increased penetration of UV-B radiation result in higher photo dissociation rates of key trace gases that control the chemical reactivity of

the troposphere. This can increase both production and destruction of ozone and related oxidants such as hydrogen peroxide, which have adverse effects on human health, terrestrial plants and outdoor materials.

- **Effects on Aquatic Ecosystems:**

Higher level of exposure to radiation in tropics and subtropics may affect the distribution of phyto-planktons, which form the foundation of aquatic food webs. It can also cause damage to early development stages of fish, shrimp, crab, amphibians and other animals, the most severe effects being decreased reproductive capacity and impaired larval development.

- **Effects on Human and Animal Health:**

Increased penetration of solar UV-B radiation is likely to have high impact on human health with potential risks of eye diseases, skin cancer and infectious diseases.

- **Effects on Terrestrial Plants:**

In forests and grasslands, increased radiation is likely to change species composition thus altering the biodiversity in different ecosystems. It could also affect the plant community

indirectly resulting in changes in plant form, secondary metabolism, etc.

GLOBAL WARMING & ECOSYSTEM:

Global warming has become a matter of great concern as our planet is warming up every moment and we are definitely part of this problem. Before the Industrial Revolution happened very few gases were released into the atmosphere and all climate changes happened naturally. After the Industrial Revolution, more and more combustion of fossil fuel took place, agricultural practices were also changed in very unfriendly way to nature and deforestation increased, which led to a significant change in natural composition of gases in the atmosphere. Over the last 100 years, it was found out that the earth is getting warmer and warmer, unlike previous 8000 years when temperatures have been relatively constant. The present temperature is 0.3-0.6 °C warmer than it was 100 years ago. Carbon dioxide is one of the key greenhouse gases causing global warming. CFC's, even though they exist in very small quantities, are significant contributors to global warming. Carbon dioxide has two major human caused sources:

- Combustion of fossil fuels
- Changes in land use

The release of carbon dioxide from these two sources is contributing to the rapid rise in atmospheric concentrations since Industrial Revolution. Because estimates indicate that approximately 80 percent of all anthropogenic carbon dioxide emissions currently come from fossil fuel combustion.

Some greenhouse gases occur naturally in the atmosphere, while others result from human activities. Water vapor, carbon dioxide, methane, nitrous oxide, and ozone are included in naturally occurring greenhouse gases. Certain human activities, however, add to the levels of most of these naturally occurring gases. Burning of solid waste, fossil fuels (oil, natural gas, and coal), and wood and wood products lead to production of Carbon dioxide in the atmosphere. Methane is emitted during the production and transport of coal, natural gas, and oil. Nitrous oxide is emitted during agricultural and industrial activities, as well as during combustion of solid waste and fossil fuels. Very powerful greenhouse gases that are not naturally occurring include Hydro Fluoro Carbons (HFCs), Per Fluoro Carbons (PFCs), and Sulfur Hexafluoride (SF₆), which are generated in a variety of industrial processes. Often, estimates of GHG emissions are presented in units of millions of metric tons of carbon equivalents

(MMTCE), which weights each gas by its Global Warming Potential or GWP value.

There are numerous ways to measure the strength of different greenhouse gases in the atmosphere but perhaps the Global Warming Potential (GWP) is the most useful. GWPs measure the influence that greenhouse gases have on the natural greenhouse effect which also includes the ability of greenhouse gas molecules to absorb or trap heat and the length of time, greenhouse gas molecules remain in the atmosphere before being removed or broken down. In this way, the contribution that each GHG makes towards global warming can be assessed as each GHG differs in its ability to absorb heat in the atmosphere. HFCs and PFCs are the most heat-absorbent. Methane traps over 21 times more heat per molecule than carbon dioxide, and nitrous oxide absorbs 270 times more heat per molecule than carbon dioxide. Conventionally, the GWP of carbon dioxide, measured across all time horizons, is 1. GWP of methane is 21 while GWP of nitrous oxide is 270. Other greenhouse gases have much higher GWPs than carbon dioxide, but because their concentration in the atmosphere is much lower, carbon dioxide is still the most important greenhouse gas, contributing about 60% to the greenhouse effect.

Effects of Global Warming: The effects of global warming maybe as under:

- **Rise in Global Temperature:** Observations show that global temperatures have risen by about 0.6 °C over the 20th century, it has happened due to rise in green house gases that trap the heat and increases the planet's temperature. There is strong evidence now that most of the observed warming over the last 50 years is caused by human activities. Climate models predict that the global temperature will rise by about 6 °C by the year 2100.
- **Food Shortages and Hunger:** Rising temperature affects water resources as precipitation and evaporation patterns change around the world in turn affecting the agricultural output. Food security is likely to be threatened and some regions are likely to experience food shortages and hunger.
- **Rise in Sea Level:** Rising temperature has caused melting of glaciers and ice caps leading to significant rise in sea level. The mean sea level is expected to rise 9 - 88 cm by the year 2100, causing flooding of low lying areas and other damages.

Effects of Climate Change on Ecology:

The ecology of Earth is threatened by human activities, which lacks a commitment to humanitarian values. Ignorance, greed and lack of respect for the earth's living things are the main reasons for the destruction of nature and natural resources. This lack of respect extends even to earth's human descendants. The future generations will inherit a vastly degraded planet if world peace does not become a reality and destruction of the natural environment continues at the present rate. Earth was rich in resources and bountiful and our ancestors valued it. Today we may observe some effects of climate change on ecosystem as under:

- Ecosystems will generally shift northward or upward in altitude, but in some cases they will run out of space – as 1⁰ C change in temperature correspond to a 100 Km change in latitude, hence, average shift in habitat conditions by the year 2100 will be on the order of 140 to 580 Km.
- Climate change is affecting species already threatened by multiple threats across the globe. Colonization has lead to habitat fragmentation; logging, agriculture and mining etc. are further

contributing to destruction of terrestrial habitats.

- Individual species may not be able to adapt. Species most threatened by climate change have small ranges, low population densities, restricted habitat requirements and patchy distribution.
- Droughts and wildfires may increase. An increased risk of wildfires due to warming and drying out of vegetation is likely to occur.
- Sustained climate change may change the competitive balance among species and might lead to forests destruction.
- Coral reef mortality may increase and erosion may be accelerated. Increase level of carbon dioxide adversely impacts the coral building process (calcification).
- It may lead to rise in sea level, engulfing low-lying areas causing disappearance of many islands, and extinctions of endemic island species.
- Invasive species may be aided by climate change. Exotic species can out-compete native wildlife for space, food, water and other resources, and may also prey on native wildlife.

CONCLUSION: There is a great need for change in our daily lives. As people are more busy with issues like voting, governmental issues, the desire to stick to routine, many people don't consider that what they do will affect future generations. If our planet's health continued to move on in the harmful way it is moving then there will be no future to consider. Though we cannot physically stop our ozone layer from thinning but still there are so many things we can do to happen this at low rate. By raising awareness in our local community and within our families about these issues, we can help contribute to a more environmentally conscious and friendly place to live. There is an immediate need for overall Sustainable development. We need to adopt measures that can meet the needs of the present, without compromising the ability of future generations to meet their own needs. All of this can be possible if not only the government takes the responsibility to heal and preserve the health of the planet but all the beings on the planet should take the responsibility as stakeholders. We need to utilize the resources wisely as we have not inherited this Earth from our forefathers but we have borrowed it from our future generations.

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