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IMPACT OF GREENHOUSE GASES ON ENVIRONMENT

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ABSTRACT

Global temperatures appear to be being negatively impacted by the buildup of so-called "greenhouse gases" in the atmosphere, with carbon dioxide being the most prominent of them. Current assumptions about physical and biological consequences, potential societal costs, and estimated abatement costs are summarised in this paper. For a "worst case" scenario to be economically viable, it would be impossible to assess every conceivable non-linear synergistic impact. It seems probable that the consequences are within the "affordable" range, at least in the industrialised nations of the world, under the "most favourable" (but not necessarily "likely") scenario of slow-paced climate change. Even if there is some doubt about the certainty of something happening, this remains true. In the "third world," where the idea of cost is dubious at best, quantitative evaluation presents a formidable obstacle.

Keywords: *Greenhouse, Gases, Atmosphere, Environment.*

Introduction

India, which is located in South Asia, is a country that is rather large. The country has a population that is greater than 1.2 billion people, making it the second most populated country in the total world population. With latitudes ranging from 6 degrees 44 minutes north to 35 degrees 30 minutes north and longitudes ranging from 68 degrees 7 minutes east to 97 degrees 25 minutes east, the nation of India may be found to the north of the equator. It is connected to the Arabian Sea, the Bay of Bengal, and the Indian Ocean by its coastline, which is 7517 km long and is shared with all three bodies of water. Pakistan, China, Nepal, Bhutan, Burma, and Bangladesh are all nations that are located inside its geographical borders. Bangladesh is also found within its borders. There is a wide range of temperatures that may be experienced in India as a result of the country's size. These temperatures range from the ice cold winters that are experienced in the Himalayas to the scorching heat that is experienced in the Thar Desert. These two regions have a very major effect on influencing the weather in India, which results in the country experiencing temperatures that are greater than what would be predicted given its latitude. While the Himalayas are important for preventing cold winds from entering the region, the Thar desert is the source of the summer monsoon winds that are responsible for creating the majority of India's monsoon season. Both of these factors contribute to the warming of the Indian climate. The majority of the regions, on the other hand, are generally considered to have a climate that is classed as tropical.

The following are some of the most prominent types of climate zones that may be found in India:

- During the Season of Cold Weather (December-February)
- Season of Extremely Hot Weather (March-May)
- This is the wet season. (June-September)
- It is the season of the South-west Monsoon that is retreating. (October-November)

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Literature Review

Kweku, D. W., Bismark, O., Maxwell, A., Desmond, K. A., Danso, K. B., Oti-Mensah, E. A., ... & Adormaa, B. B. (2018). The greenhouse effect is one of the most important elements that contribute to the retention of the Earth's temperature at a warm level. This is due to the fact that it prevents a portion of the heat from the planet that would otherwise escape from the atmosphere and travel into space. This article provides the conclusions of the research that was conducted on greenhouse gases and the impact that they have on the phenomenon of global warming. If the greenhouse effect did not exist, the average global temperature of the Earth would be far lower, and it would be impossible for life to survive on Earth in the form that we are accustomed to seeing. The term "greenhouse gas" refers to a group of gases that include water vapour, carbon dioxide, methane, and nitrous oxide (N2O), among others. Within the atmosphere, carbon dioxide (CO2) and other greenhouse gases provide the function of a blanket, preventing infrared energy from escaping into space and safeguarding it. The release of greenhouse gases is therefore prevented as a result of this action. When it comes to the continual heating of the Earth's atmosphere and surface, which is the outcome of global warming, it is plainly clear that greenhouse gases are the culprits accountable for this temperature increase.

Ramanathan, V., & Feng, Y. (2009). Rainfall rates, glacier and sea ice retreat, and ocean levels are only a few of the many phenomena that are significantly affected by the surface and atmospheric warming induced by greenhouse gases (GHGs). A major greenhouse forcing term, the increase in tropospheric ozone due to air pollution (including NOx, CO, and other contaminants), was not recognised until around thirty years ago. Also, a solid link between chemistry and climate was formed when chlorofluorocarbons (CFCs) were found on stratospheric ozone and their effects on the temperature were known. In contrast, air pollution is a very small but equally serious problem all over the world. It was thought that air pollution was a problem exclusive to urban or relatively small areas until around ten years ago. New evidence, however, suggests that fast long-range travel is responsible for the transcontinental spread of air pollution. Aerosols, or particles smaller than one millimetre in size, are formed when this event occurs, and they are referred to as "trans-oceanic and trans-continental plumes" of atmospheric brown clouds (ABCs). Because of their ability to absorb and reflect sunlight, ABCs may drastically reduce the quantity of light that a surface reflects. Aerosols can further amplify the dimming effect by increasing the number of cloud droplets that can be nucleated, leading to increased cloud reflection of solar radiation. The dimming effect not only cools the surface, but it also decreases surface moisture evaporation, which slows the hydrological cycle. The opposite is true when it comes to black carbon and some organic molecules absorbing solar radiation; this raises atmospheric temperatures and tends to hasten the warming of the atmosphere caused by greenhouse gases.

Kumar, A., Singh, P., Raizada, P., & Hussain, C. M. (2022). Since the 2019 coronavirus (COVID-19) pandemic began, there have been major disruptions to global energy production, human health, and environmental protection. An economic slowdown caused by the stringent measures implemented to contain the COVID-19 pandemic reduced emissions of greenhouse gases (GHG), with a particular impact on atmospheric carbon dioxide levels. Given this background, this study aims to evaluate the available scientific literature in order to prove that the COVID-19 pandemic has significantly affected emissions of greenhouse gases. Another method the study offered an extra illustration of the variance in greenhouse gas emissions was by comparing data that focused on pre-pandemic, during-pandemic, and post-pandemic (predictions) scenarios. Furthermore, the assessment of COVID-19's impact on global energy consumption, carbon dioxide buildup, and the economy has also been performed. Also included is a possible recovery plan for the framework, which serves as a basis for environmentally and energy-friendly growth. The review concludes with an illuminating analysis of the challenges and potential solutions to achieve sustainable development goals. The present study is conducted with the hope that it will help scholars evaluate the consequences on the global environment and energy.

Sources of Greenhouse Gases

Some of the most prevalent greenhouse gases found in the atmosphere of the Earth include:

- Water vapor (H20),
- Carbon dioxide (CO2),
- Methane (CH4),
- Nitrous oxide (N20),
- Ozone (O3),
- Chlorofluorocarbons (CFCs).

The amounts of greenhouse gases in the atmosphere are determined by the balance between sources and sinks. Sources include the gas emissions from natural and human systems, while sinks refer to the process of removing the gas from the atmosphere by converting it to another chemical component. Both natural and human-caused processes can be considered sources. The "airborne fraction" (AF) of an emission is the residual amount of that emission in the atmosphere after a specific duration of time has elapsed. In particular, the annual AF is defined as the ratio of a given year's total emissions to that year's rising air temperature. The yearly percentage change (AF) for carbon dioxide has been rising at a pace of 0.25 ± 0.21% each year throughout the last fifty years, from 1956 to 2006 [5].

The following gases, with their respective percentage contributions to the Earth's greenhouse effect: water vapour, 36-70% carbon dioxide, 9-26% methane, 4-9% ozone, and 3-7% hydrocarbons. It is technically impossible to assign a specific percentage to any gas since their absorption and emission bands overlap. This is why the previously mentioned ranges are provided. Of all the non-aging factors that contribute to the Earth's greenhouse effect, clouds have the greatest impact. Because clouds both absorb and release infrared radiation, they affect the atmospheric radioactivity levels.

Because of their high specific greenhouse potential, site-and management-related N20 emissions8 are just as important as CO2 and CH4 emissions when studying the net greenhouse effect of agricultural systems. Model approaches have been developed for the aim of farm-level emission inventories. Despite using slightly reduced model methods, these model approaches consider all relevant outputs2, 9. Accounting for both biological and technological carbon fluxes—that is, all of the carbon dioxide emissions from fossil fuels—is essential for obtaining a full view of the net greenhouse effect of agricultural systems.

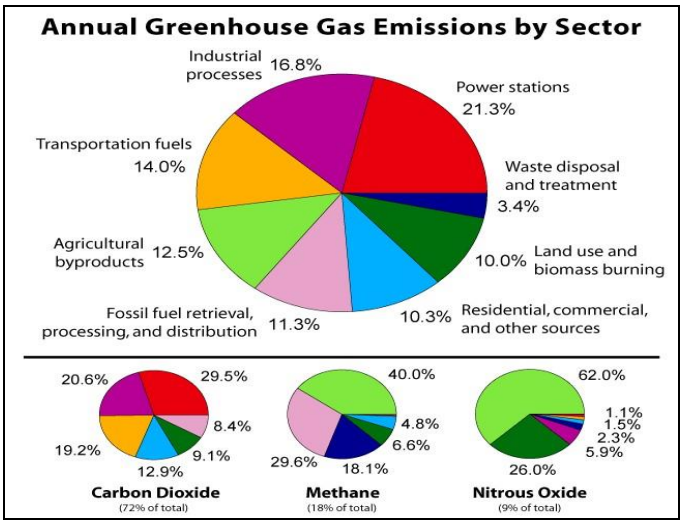

Fig. 1: Emission of Greenhouse Gases

The release of methane, also known as CH4 emissions, occurs during the production and transportation of fossil fuels including coal, natural gas, and oil. Furthermore, organic waste decomposition in agricultural settings, MSW, landfills, and the livestock sector all contribute to methane emissions. We estimated the metabolic methane emissions from cow upkeep by considering the species, performance, and feeding of the animals. The amount of methane emitted was determined by using conversion factors, which were based on the gross energy of the feedstock. The excreta output (amount, chemical components, and degradability) was chosen as the foundation for calculating the methane formation potential in order to measure the methane release from organic fertiliser while it is being kept . Next, we calculated the output of methane in proportion to the storage capacity of the system.

Emission of nitrogen dioxide: Emissions of nitrogen dioxide were determined from all agricultural and industrial activities, fossil fuel combustion, and solid waste incineration. It was formerly believed, although simplistically, that 1.25 percent of the nitrogen that soils get via organic and mineral fertilisation, N2 fixation, and N deposition is released into the atmosphere as N20-N. The N20-N emission factor, which was obtained from a plethora of measurements taken at the experimental farm, was 2.53% of the

total nitrogen input, on the other hand. With the use of emission factors, we were able to put a number on the indirect N20 emissions caused by reaching, gaseous NH3, and NOx losses.

Carbon dioxide is abbreviated as CO2. Carbon dioxide is released into the atmosphere when solid waste, trees, and products derived from wood are burned, along with fossil fuels, solid waste, and certain chemical processes like cement manufacturing. Carbon dioxide is "sequestered" when plants absorb it; this process is part of the biological carbon cycle. A significant amount of carbon dioxide is removed from the atmosphere through this mechanism.

The Greenhouse Effect

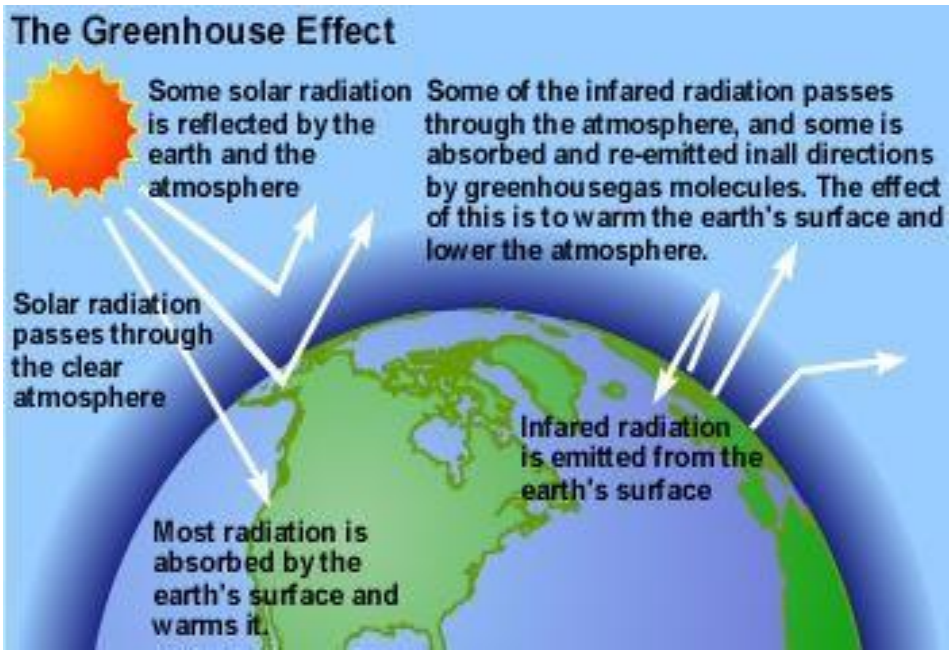

Fig. 2: The Greenhouse Effect

A description of Transmission of electromagnetic waves allows for the release of a sort of energy called radiation.

- What we call "solar radiation" is actually the energy that the sun pumps out into space.
- Global warming is caused by solar radiation, and after the Earth is warmed, it continues to release heat. However, this phenomena is not called "heat" in scientific terms; rather, it is energy. These days, the term "infrared radiation" is more appropriate.
- An atmospheric "blanket" composed of gas molecules encases Earth's atmosphere.
- Heat is produced when solar energy travels through Earth's atmosphere and reaches the surface, where it is absorbed by the planet.
- These features define the process we call the "GREENHOUSE EFFECT":
- The process begins with the Earth's surface heating up, which releases infrared radiation (IR). Greenhouse gases then absorb this IR, which energises the gases and causes them to release more IR. Some of this IR then makes its way back to the Earth's surface, further warming it.

Impact on Environment of Greenhouse Effect

- **Global Warming**

A change in Earth's climate is necessary to restore a balance between the amount of radiation entering the planet and the amount that is leaving it, since a rise in greenhouse gas concentration reduces infrared radiation emissions. A global warming of the Earth's surface and lower atmosphere will be a part of this climatic change since warming up is the simplest way for the climate to release the extra energy . Reason being, the environment is changing due to human activities like warming up. On the flip side, even a little rise in temperature can cause a cascade of other changes, such shifts in wind patterns

and cloud cover. Some of these changes may have the effect of amplifying the warming (called positive feedbacks) while others may have the opposite effect (called negative feedbacks). The "Intergovernmental Panel on Climate Change" (IPCC) has projected, in its third assessment report, that global average surface temperatures would rise by 1.4 to 5.8 degrees Celsius by 2100, based on complex climate models. This forecast factors in the influence of aerosols, which have a cooling effect, and the seas, which dilute the effects of climate change due to their high thermal capacity. Nevertheless, this estimate is fraught with a number of unknowns. Greenhouse gas emission rates in the future, the strength of climate feedbacks, and the extent of the ocean delay are all instances of such unknowns.

- **Sea Level Rise**

In the case that global warming takes place, the sea level will rise due to two separate processes. To start, when temperatures rise, the main reason sea levels rise is because seawater expands due to heat. "Melting glaciers and ice sheets from Greenland and Antarctica would" be the second major contributor to the world's water supply. An expected increase of 0.09 to 0.88 metres in global sea level from 1990 to 2100 is being considered.

- **Potential Impact on Human Life**
  - More than half of the world's population lives within 100 km of the ocean, which has a significant impact on the economy. The vast majority of this people resides in metropolitan regions that are also important seaports. By way of illustration, an increase in sea level that is quantifiable will have a significant influence on the economy of low-lying coastal areas and islands .
  - For instance, the pace of beach erosion along coasts will increase, and rising sea level will cause fresh groundwater to be displaced for a considerable distance interior.
  - The impact on agriculture: Experiments have demonstrated that plants are able to grow larger and more quickly when exposed to increased concentrations of carbon dioxide.
  - However, the effect of global warming may have an influence on the general circulation of the atmosphere, which may result in a change in the pattern of precipitation that occurs around the globe as well as a change in the amount of moisture that is present in the soil on different continents.
  - Due to the fact that it is not known how climate will be affected on a regional or local scale by global warming, the consequences that are likely to occur on the biosphere are still subject to uncertainty.
  - The destruction of coastal wetland areas has the potential to have a negative impact on aquatic ecosystems, particularly with regard to the populations of fish and shellfish.
  - It is possible that a rise in salinity in estuaries will lead to a decrease in the number of freshwater species, but it may lead to an increase in the number "of marine species. Nevertheless, the complete influence on marine species is unknown at this time".
  - It is anticipated that there will be an increase in the amount of precipitation that occurs on a global scale. On the other hand, it is unknown how the patterns of rainfall in different regions may evolve. It's possible that certain areas receive more rainfall than others, while others receive less.
  - Additionally, it is likely that greater temperatures would result in an increase in evaporation. A great number of water management systems will most likely experience new strains as a result of these developments.

Reduction and Control Measures of Greenhouse Gases

Worldwide nature of the problem makes reducing greenhouse gas emissions a top priority for all countries. No one country or group of countries can solve the problem on its own. For the purpose of keeping the world's climate under check, this is why collaboration between nations and regions is being sought for and demanded more and more. In an effort to tackle the global issue of climate change, the UN Framework Convention on Climate Change (UNFCCC) was recently launched. The current conflict is affected by this new information. A number of nations from different parts of the world came together in an international accord to lower the dangerous amounts of greenhouse gases in the atmosphere, which are a result of human activity.

- **Clean Development Mechanism**

Clean development mechanisms aim to promote sustainable development by generating power and sequestering carbon dioxide through the extensive use of renewable energy technology. Utilising a variety of renewable energy sources is quickly turning into a reality, and not just because of their ability to decrease emissions of greenhouse gases, but also because it ensures energy security. Within the framework of the UNFCCC, the Kyoto Protocol emphasises the importance of the clean development mechanism as a key component. Capital development mechanism (CDM) proposals have led to poor countries investing more heavily in renewable energy research and development. In 2009, developing nations produced 53% of the world's electricity output from renewable sources. One of the original ideas behind the Clean Development Mechanism (CDM) was to set a sustainable target for the reduction of emissions from energy production and consumption. On the other side, it was thought that developed countries would foot the bill for emission reduction methods, with poor nations getting their share through sponsorship of renewable energy projects. Even after over a decade, there has been no sign of a solid implementation outcome, and the global acceleration of renewable power exploitation is outpacing the level of realistic and anticipated progress.

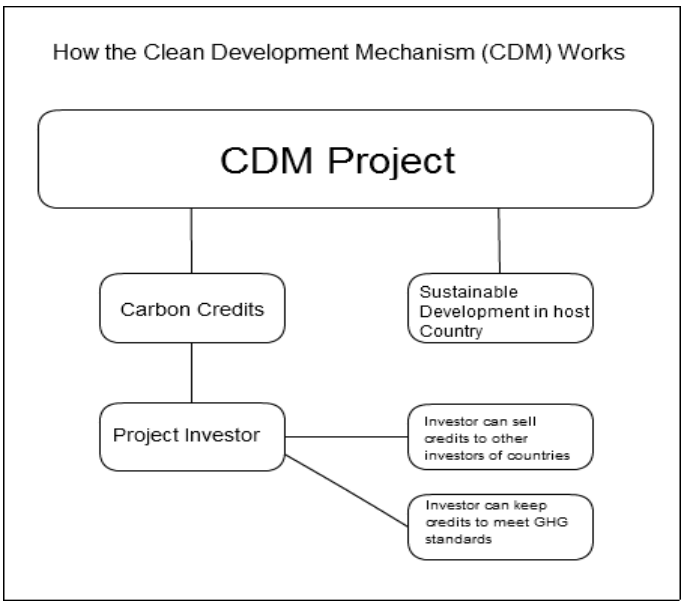

Fig. 3: Clean Developmental Mechanism

- **Green Energy Portfolio Standard**

What we call "green energy" is energy that is conventionally generated but uses less harmful substances to the environment. Renewable energy is also called green energy on occasion. The utilisation of renewable energy sources has developed into a crucial component in the fight against climate change and for the promotion of sustainable development. To generate and use power in the most environmentally friendly way possible, a number of countries have launched and supported green energy projects. Legislation enacted with the goal of increasing the production and use of energy from cleaner sources with the lowest potential emission propensity is known as a green energy portfolio standard (GEPS).

Electric power production companies in countries that are actively promoting the green energy portfolio standard are required to meet a set proportion of the country's electricity demand using renewable energy. This is being done with the intention of reducing emissions within the country. As per the guidelines set out by the IPCC, countries are obligated to share data on their emissions from various energy-related sources. Proponents of GEPS have listed several benefits, such as innovation, less pollution, and lower renewable energy prices per unit due to competition. While safeguarding fossil fuels is important, a sustainable expansion of green energy may have far-reaching positive effects on the environment for years to come.

- **Financing Low Carbon Energy**

Emissions of carbon dioxide (CO2) "from the combustion of petroleum products" cause large quantities of greenhouse gases to be emitted into the environment. Because this is such an important part of progress, development cannot proceed without reliable access to contemporary energy sources. Financing low-carbon energy sources is one strategy that might be used to reduce emissions of greenhouse gases. This is in reaction to the growing consensus on the need to lessen our impact on the environment caused by our energy use. There are a number of funding opportunities for energy projects, but in countries where oil is the main source of income and energy production, low carbon project finance is crucial. Powering an economy with energy technologies that produce less pollution might help make human environmental sustainability more resilient. One way to achieve the low-carbon economy that has been planned is to tap into the untapped renewable energy resources. Particularly in rural regions, where the population is more diverse, there is a great chance to enhance and extend energy infrastructure through the optimisation of renewable sources. This long-term plan has the potential to alleviate energy poverty in developing nations by making use of decentralised renewable energy infrastructure. The carbon tax known as an emissions trading system (ETS) has already helped regulate and monitor emissions in a number of countries.

- Ways to lessen the impact of climate change:
- The preservation of energy
- Fuel prices going up
- The creation of novel energy generation methods
- Preserving and replanting forests
- Methane recovery from waste
- Banning of CFC production
- International conferences
- National Standards of pollutants
- Anti-pollution measures

Conclusion

Both the production of electricity and the consumption of energy are associated with emissions that have the potential to influence greenhouse gas emissions, which are the principal contributor to the approaching phenomena of global warming. The findings of this study reveal that these emissions are related with activities that include the creation of electricity and the consumption of energy. As a matter of fact, the emissions of greenhouse gases that are generated by human activities, such as the production of energy, are far larger than the emissions of greenhouse gases that are caused by other human activities. In summary, the research called for the requirement of taking a purposeful approach to the reduction of greenhouse gas emissions in order to safeguard the integrity of the global environmental difference for the goal of fostering sustainable development and biodiversity interaction. Lastly, but certainly not least, it recognised the requirement of boosting the consumption of renewable energy sources in order to aid in the management of concerns pertaining to energy control, energy security, and health-related issues.

Glass or plastic are the most common materials used in the construction of greenhouses, however any material that enables sunlight to pass through it can be used or created. The soil and the things contained within it are warmed by the sun, which in turn causes the air within the greenhouse to become warmer. This is the key factor that is contributing to the greenhouse effect of warming. As a result of the fact that it is contained within the greenhouse, the air continues to heat up, which is in contrast to the climatic conditions that are present outside .

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