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GLOBAL WARMING CAUSE AND IMPACT ON CLIMATE CHANGE

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Abstract

This paper aims to demonstrate the profound impact of global warming on Earth. Environmentalists, engineers, and researchers express deep concerns over climate changes driven by increasing concentrations of atmospheric greenhouse gases from human activities. The result of the study reveals that global warming, exacerbated by fossil fuel burning and emissions of carbon dioxide and methane, has significantly raised Earth's surface temperatures and global sea levels in recent decades, alarming researchers worldwide. These changes threaten ecological balance and contributeto species extinction through ocean acidification. To effectively mitigate global warming and climate change, drastic reductions in greenhouse gas emissions are imperative. Utilizing renewable energy sources is identified as one of the most effective approaches. Achieving this goal requires strong public leadership, global cooperation, and individual action. Scientists and engineers must innovate to enhance energy efficiency and promote non-fossil fuel alternatives, reducing dependence on fossil fuels and stabilizing the impacts of global warming and climate change. Moreover, conclusion of the study revealed that the urgent global need addresses the profound challenges of global warming and climate change. Emphasizing the critical role of reducing greenhouse gas emissions and transitioning to renewable energy sources, it calls for interdisciplinary cooperation, innovative technologies, and robust policy frameworks. Enhanced public awareness, sustainable practices, and adaptation measures are crucial to safeguarding the planet's future through concerted international efforts.

Keywords: *Global Warming, Greenhouse Gases, Climate Change, Ecological Balance.*

1. INTRODUCTION

Global warming is a significant climate phenomenon marked by a sustained increase in Earth's average temperatures, profoundly impacting weather patterns and ecosystems. This rise is primarily attributed to the buildup of greenhouse gases (GHGs) such as Carbon Dioxide (CO2), Methane (CH4), Nitrous Oxide (NO2), Sulphur Dioxide (SO2), and water vapor (H2O) in the atmosphere, largely stemming from human activities like fossil fuel combustion and deforestation. The Intergovernmental Panel on Climate Change (IPCC), established in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP), plays a pivotal role in assessing the risks of human-induced climate change. Their reports

have globally heightened awareness and catalyzed governmental actions.

The Paris Agreement, a landmark international treaty adopted in 2015 under the UN Framework Convention on Climate Change (UNFCCC), unites 195 nations in the fight against climate change. Its primary objective is to limit global temperature rise to well below 2 degrees Celsius above pre-industrial levels, striving for 1.5 degrees Celsius. Countries like India, through their Intended Nationally Determined Contributions (INDCs), have committed to reducing emissions intensity, expanding forest cover, and increasing non-fossil fuel-based energy sources.

Recent global climate conferences, such as COP28 in Dubai, underscore the urgent need for collective global efforts to address climate change. Current emission trends could lead to a temperature rise of 1.5 to 5.3 degrees Celsius by 2100, posing potentially catastrophic consequences for both humanity and the environment. Effective solutions demand sustained international cooperation, technological innovations, and robust policy measures to mitigate emissions and secure a sustainable future for generations to come.

2. REVIEW OF RELATED LITERATURE

Shazad (2015) conducted a study on "*Global Warming: Causes, Effects and Solutions".* The study revealed that global warming is a significant hazard, impacting humans, animals, and plants. Melting polar ice caps will lead to floods, causing widespread destruction, while rising sea levels threaten agriculture and fishing. Timely corrective steps are essential, including the use of renewable energy sources and halting deforestation. Innovative solutions are necessary to address and eliminate this danger permanently.

Michael & Cracken (2001) "*Global Warming: A Science Overview".* Study showed that everyone become well informed about the science of climate change, about potential impacts, and about potential for decreasing emissions. Moving toward collective action will require that the political system focus on finding methods that tend to balance and reconcile these diverse, yet simultaneously legitimate, concerns about how best to proceed.

Kashif. et al. (2022) a review of the *"global climate change impacts, adaptation, and sustainable mitigation measures"*. According to the finding's government participation is necessary for the country's long-term development through firm accountability of resources and regulations implemented in the past to generate cutting-edge climate policy. Hence, mitigating the effects of climate change must be of the utmost importance, and hence, this global threat requires global commitment to address its horrible implications to ensure global sustenance.

Sudha & Banpatte (2021) Case study of "*Global Warming Review. He revealed that burning of these fuels produces gases like carbon dioxide, nitrous oxide and methane which lead to global warming"*. Deforestation exacerbates global warming, disrupting ecosystems and ecological balance. Despite widespread ignorance about its severity, global warming poses significant environmental risks. Embracing renewable energy sources such as solar, wind, hydro, geothermal, and biomass is crucial. The rising levels of greenhouse gases have substantially increased Earth's temperature, causing severe impacts.

Milfont, (2010) "*Global warming, climate change and human psychology"*. Finding of the study revelead that the rate and consequences of global warming and climate change can be lowered by global and local reductions of greenhouse gas emissions. Climate problem and issue we are facing will have a negative effect in our life.

Vatansever, et al. (2012). Conducted a study on "*Alternative Resources for Renewable Energy: Piezoelectric and Photovoltaic Smart Structures it is considered as one of the biggest threats to life on earth"*. It is fact that one of the factors which cause global warming is high carbon emissions. Rising population and the increasing technology consumerism contribute to the enhanced usage of energy from coal, oil, electricity etc.

Raj & Singh. (2012). Study of Impacts of "*Global Warming on Climate Change: Rise in Sea Level and Disaster Frequency".* Study showed that it is obvious that the current rate of carbon dioxide release in the atmosphere there would not only be the rise in the global temperature, but it will also cause rise in sea, level and rise the frequency of disasters. Emissions from human activities are increasing the frequency of extreme weather events. In particular, there are likely to be many more heat waves, droughts and changes in rainfall patterns.

Rayhan, et al. (2023) conducted a study on "*climate change and global warming: studying impacts, causes, mitigation, and adaptation preprint*". This paper delves into climate change's complexities, covering impacts, causes, and mitigation strategies. It emphasizes global cooperation, focusing on greenhouse gases, deforestation, and industry. Solutions include renewable energy, carbon capture, reforestation, and sustainable urban planning to address environmental and societal challenges.

Poudyal (2016) conducted research on *"cause and effect of Global Warming".* Researcher fond that Global warming cause hit everyone we're all in a heap of trouble and the sooner we admit this fact. We should put serious effort to overcome the problems due to it. We must try our best to solve the problem and struggle as much as possible to restore our earth for sake of future generation.

Drallos, (2008) conducted research on "Is global warming caused by human activity" in this study the researcher revealed that current global warming is not the result of natural causes but is, instead it is the result of anthropogenic activity.

Venkataramanan et al. (2011) revealed that global warming increases infectious diseases, heatwave deaths, and extreme weather. Rising sea levels from thermal expansion and melting glaciers cause floods. Burning fossil fuels elevates atmospheric CO2, driving the greenhouse effect and climate change. This leads to more disease, death, and injury from heatwaves, floods, storms, and droughts. Reducing fossil fuel demand through wiser energy use can help mitigate global warming.

Khandve et. al., (2011). The study on "*climate change and global warming".* The researcher found that various factors such as atmospheric circulation shifts, sea life changes, and geological processes like plate tectonics and volcanism, alongside human activities, are altering glaciers, vegetation, and sea levels. Increased greenhouse gases and natural variations like solar activity and aerosols are intensifying global warming and influencing natural events.

Davarcioglu (2017). Conducted a study on the "*Case of Global Warming and Climate Change".* The study underscores that human activities have significantly increased greenhouse gas levels, impacting climate change. Turkey faces heightened vulnerability to climate variations, including more frequent heat waves, increased rainfall, and intensified extreme weather events. Urgent international action is essential, focusing on enhancing energy efficiency and transitioning to non-fossil fuel sources to mitigate these effects.

Khawas (2004) Conducted a research on *"Global warming and climate change: Implications for human security in India"*. Scientific studies confirm that Earth's climate undergoes continual change. Climatologists note that global temperature rise is accelerating, leading to melting glaciers, rising sea levels, and deforestation-induced flooding. These changes threaten vital resources and have severe environmental and human security consequences.

Bhattacharjee (2010). Conducted research on "*Global Warming Impact on the Earth".* The study findings indicate that global warming affects Earth's magnetic field, gravity, ice melting, weather shifts, sea levels, and promotes disease outbreaks. Modern lifestyles, industries, transport, and electronic devices contribute significantly to environmental temperature rise and climate change.

Mahasneh (2021). Conducted a study on "*Climate Change and Global Warming*". The researcher concluded that increased industrial activity in major countries and rising vehicle numbers and movement are primary causes of greenhouse gas emissions and air pollution, contributing to global warming and climate change.

Matawal & Maton (2013). Conducted a study on "*Climate Change and Global Warming: Signs, Impact and Solutions"*. The researcher revealed that global temperatures are currently at their highest in two thousand years due to ongoing global warming. Human activities are major contributors, threatening ecosystems and climate stability.

3. SIGNIFICANCE OF THE STUDY

The aims of this study to explore the impact of global warming on climate change. By emphasizing the critical role of human activities in greenhouse gas emissions and the resulting rapid changes in global temperatures, the study highlights the urgent need to address this pressing issue. Understanding these complex dynamics is essential for devising effective mitigation and adaptation strategies. The findings offer invaluable insights for policymakers, environmentalists, and

the public, facilitating informed decision-making and the implementation of sustainable practices. Moreover, the study stresses the importance of timely and innovative solutions to combat global warming and its detrimental impacts, ultimately aiming to protect and preserve the planet for future generations. This comprehensive approach is vital for fostering global cooperation and promoting resilience against the challenges posed by climate change.

4. OBJECTIVE

- To study the cause and impact of global warming on climate change.

5. RESEARCH QUESTION

- What are the causes and impact of global warming on climate change?

6. METHODOLOGY

The research utilized secondary sources of data, including government reports, research papers, articles, books, newspapers, and magazines, to analyze the causes and impacts of global warming on climate change. By synthesizing existing literature, the study aimed to provide a comprehensive overview of how human activities contribute to greenhouse gas emissions and global temperature rise. The review-based approach focused on identifying key factors driving climate change and examining its ecological and socio-economic consequences. The findings are intended to inform policymakers, researchers, and the public, guiding the development of effective mitigation and adaptation strategies.

6.1. Causes of Global Warming

Global warming is primarily driven by the increase in greenhouse gases (GHGs) in Earth's atmosphere due to various human activities. These gases trap heat from the sun, preventing it from escaping back into space, and causing global temperatures to rise. The main causes include the burning of fossil fuels for energy and transportation, deforestation, which reduces CO2 absorption, and agricultural practices that release methane and nitrous oxide. Industrial processes also contribute to GHG emissions. These activities collectively enhance the greenhouse effect, leading to climate change and its associated impacts.

- **Fossil Fuels:** The massive use of fossil fuels is obviously the first source of global warming, as burning coal, oil and gas produces carbon dioxide - the most important greenhouse gas in the atmosphere as well as nitrous oxide.
- **Deforestation:** The exploitation of forests has a major role in climate change. Trees help regulate the climate by absorbing CO2 from the atmosphere. When they are cut down, this positive effect is lost and the carbon stored in the trees is released into the atmosphere.
- **Intensive Farming:** Another cause of global warming is intensive farming, not only with the ever-increasing livestock, but also with plant protection products and fertilizers. In fact, cattle and sheep produce large amounts of methane when digesting their food, while fertilizers produce nitrous oxide emissions.
- **Overconsumption:** overconsumption also plays a major role in climate change. In fact, it is responsible for the overexploitation of natural resources and emissions from international freight transport, which both contributes to global warming.
- **Mining:** Modern life is highly dependent on the mining and metallurgical industry. Metals and minerals are the raw materials used in the construction, transportation and manufacturing of goods. From extraction to delivery, this market accounts for 5% of all greenhouse gas emissions.
- **Waste Disposal**: Waste management method like landfills and incineration emit greenhouse and toxic gases including methane that are released into the atmosphere, soil and waterways, contributing to the increase of the greenhouse effect.
- **Industry**: Many industrial processes, such as cement production liquid natural gas production and coal mining, emit a variety of greenhouse gases.
- **Industrial Processes:** Industrial processes emit GHGs through chemical reactions and fossil fuel use. Cement, steel, and chemical production release significant CO2, and energy-intensive manufacturing further increases emissions by burning fossil fuels, contributing to global warming.
- **Land Use Changes:** Changes in land use, such as urbanization and agricultural expansion, disrupt natural carbon sinks like forests and wetlands. These changes can release stored carbon and reduce the land's ability to absorb

CO_2, contributing to higher atmospheric GHG levels.

Moreover, global warming is predominantly driven by increased greenhouse gases (GHGs) in Earth's atmosphere, primarily due to human activities. The major contributors include the burning of fossil fuels for energy and transportation, deforestation, intensive farming practices, overconsumption, mining, waste disposal, and various industrial processes. These activities collectively enhance the greenhouse effect, trapping heat and causing global temperatures to rise. Deforestation and land use changes further exacerbate the problem by reducing natural CO_2 absorption. To mitigate the impacts of global warming and climate change, it is crucial to adopt sustainable practices, reduce GHG emissions, and protect natural carbon sinks. Addressing these causes requires global cooperation, innovative solutions, and a commitment to sustainable development to ensure a healthier planet for future generations.

6.2. Impact of Climate Changes and Global Warming

Climate change and global warming significantly impact the environment and human society. Rising global temperatures lead to more frequent and severe weather events, such as hurricanes, droughts, and heatwaves. Melting polar ice caps and glaciers contribute to sea-level rise, threatening coastal communities and ecosystems. Changes in precipitation patterns disrupt agriculture, leading to food and water shortages. Biodiversity loss accelerates as species struggle to adapt to changing habitats. Human health is also affected, with increased risks of heat-related illnesses and the spread of diseases. Moreover, economic consequences arise from damage to infrastructure and increased costs for disaster response. Addressing these impacts requires urgent and coordinated global efforts to reduce greenhouse gas emissions, transition to renewable energy sources, and implement adaptive strategies to build resilience against climate change. Collective action is essential to mitigate the long-term consequences and protect future generations.

- **Cyclonic Storms:** Both the intensity and frequency of tropical storms have increases in the past decade. They are caused by evaporation of water from oceans. Coriolis Effect cause the storms to spin, and a hurricane is declared when this spinning mass of storms attain a wind speed greater than 119km/h. An ice storm is a particular weather event in which precipitation fall as ice due to atmospheric conditions.
- **Loss of biodiversity:** Global warming poses a severe threat to biodiversity by disrupting habitats of millions of species. IPCC warns a 1.5°C rise may endanger 20-30% of species; exceeding 2°C could imperil most ecosystems. Deforestation exacerbates this, reducing biodiversity and risking species extinction irreversibly.
- **Rising sea level:** The role of the ocean in global warming is multifaceted. Increased carbon dioxide levels cause ocean acidification. Global warming further impacts oceans with rising sea levels from melting polar ice, increased water temperature, salinity changes, and heightened exposure to ultraviolet rays, all affecting marine life.
- **Shrinking of Ice Sheet:** Data from NASA's Gravity Recovery and Climate Experiment show Antarctica lost about 127 billion tons of ice per year between 1993 and 2016, while Greenland lost an average of 286 billion tons of ice per year during the same time period. The rate of antarctica ice mass loss has tripled in the last decade.
- **Decreased Snow Covers:** Satellite observations reveal that the amount of spring snow cover in the Northern Hemisphere has decreased over the past five decades and that the snow is melting earlier.
- **On Humans:** Climate change is disrupting the global economy, health, and geopolitics, leading to resource scarcity, conflicts, sea level rise, floods, and potential migration of 250 million climate refugees by 2050.
- **On the weather:** For decades now, meteorologists and climatologists around the world have been watching the effects of global warming on the weather phenomena. And the impact is huge: more droughts and heat waves, more precipitations, more natural disasters like floods, hurricanes, storms and wildfires, frost-free season, etc.

6.3. Global Warming Preventions

Preventing global warming requires a multifaceted approach. Key strategies include reducing greenhouse gas emissions by transitioning to renewable energy sources like solar and wind, enhancing energy efficiency in buildings and transportation, and promoting sustainable agricultural practices. Reforestation and preventing deforestation are crucial for increasing CO2 absorption. Implementing stricter regulations on industrial emissions and encouraging low-carbon technologies also play vital roles. Global cooperation and individual actions, such as reducing waste and conserving energy, are essential to mitigate the impacts of global warming.

- **Renewable energies:** The first way to prevent climate change is to move away from fossil fuels. Promote the uses of Renewable energies like solar, wind, biomass and geothermal etc.
- **Energy & water efficiency:** Producing clean energy is essential, but reducing our consumption of energy and water by using more efficient devices (e.g. LED light bulbs, innovative shower system) is less costly and equally important.
- **Sustainable transportation:** Promoting public transportation, carpooling electric and hydrogen mobility, can definitely help reduce CO2 emissions and thus fight global warming.
- **Sustainable Infrastructure:** In order to reduce the CO2 emissions from buildings - caused by heating, air conditioning, hot water or lighting - it is necessary both to build new low energy buildings, and to renovate the existing constructions.
- **Sustainable agriculture & forest management**: Encouraging better use of natural resources, stopping massive deforestation as well as making agriculture greener and more efficient should also be a priority.

7. REVIEW BASED DISCUSSION ON GLOBAL WARMING AND ITS CAUSE AND EFFECT ON CLIMATE CHANGE

The reviewed studies collectively underscore the urgency and complexity of addressing global warming and its associated impacts. Global warming poses significant hazards to ecosystems, human societies, and biodiversity worldwide. Key findings highlight that melting polar ice caps and rising sea levels threaten coastal communities, agriculture, and fisheries, exacerbating the risk of floods and extreme weather events. Moreover, the emission of greenhouse gases from human activities such as burning fossil fuels and deforestation contributes significantly to global warming, amplifying its adverse effects on the environment.

Effective solutions to mitigate global warming require interdisciplinary efforts, innovative technologies, and stringent policy measures. Transitioning towards renewable energy sources like solar, wind, and hydroelectric power is crucial for reducing carbon emissions and curbing further temperature rise. Additionally, halting deforestation and implementing sustainable land use practices are imperative to preserving ecosystems and maintaining ecological balance.

The studies emphasize the need for informed public awareness and robust governmental action on both local and global scales. Governments play a pivotal role in enacting policies that promote sustainability, incentivize green technologies, and foster international cooperation to combat climate change. Addressing global warming is not only a scientific and environmental imperative but also a moral obligation to safeguard future generations and ensure global sustenance.

Moreover, the comprehensive review of literature on global warming and climate change underscores the urgent need for collective global action to mitigate and adapt to these escalating environmental challenges. Studies consistently highlight those human activities, particularly the emission of greenhouse gases from fossil fuel combustion and deforestation, are the primary drivers of global warming. The implications of global warming are far-reaching, affecting ecosystems, biodiversity, human health, and socio-economic stability. From threats to food security and water resources to the disruption of ecological balance and the exacerbation of natural disasters, the consequences of inaction are dire. Addressing these challenges necessitates immediate and concerted efforts to transition to renewable energy sources, enhance energy efficiency, and adopt sustainable practices in urban planning and land use.

Furthermore, While the challenges posed by global warming are daunting, concerted efforts across all sectors of society offer hope for mitigating its impacts. By advancing technological innovations, enhancing public awareness, and implementing effective climate policies, humanity can strive towards a sustainable future that preserves the planet's natural resources and protects its inhabitants from the ravages of climate change. International collaboration and stringent policy frameworks to curb greenhouse gas emissions are crucial, along with urgent adaptation measures to address impacts already affecting vulnerable regions. Unified global action is essential to safeguard the future of our planet for generations to come.

8. CONCLUSION

The study explores into the demanding issue of global warming and its profound impact on climate change worldwide. Greenhouse gas emissions and human activities that are primary drivers of global warming, leading to significant increases in Earth's surface temperatures and sea levels in recent decades. Climate change, a critical issue of the 21st century, poses direct threats to the global economy and civilizations, altering long-term weather patterns and affecting regions or entire countries over extended periods. The rise in temperatures, both atmospheric and oceanic, is mainly due to greenhouse gases like CO2, CH4, NO2, SO2, and H2O from activities such as fossil fuel burning and deforestation. These changes disrupt global weather patterns, known collectively as climate change, with adverse impacts on weather systems worldwide. Urgent global action is needed to mitigate these challenges, focusing on reducing pollutant emissions, adopting new technologies, and prioritizing renewable energy sources. The study underscores the critical need for international cooperation to address the profound impacts of global warming and climate change on ecosystems, societies, and biodiversity. Enhancing public awareness, implementing sustainable practices, and adapting to mitigate escalating threats are crucial steps toward ensuring a resilient and sustainable future for generations to come.

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