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Research Article

Title: A Descriptive Research on Global Climate Change: Causes, Consequences and Countermeasures

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ABSTRACT

This paper examines the multifaceted issue of global climate change, exploring its causes, impacts, and potential mitigation strategies. It summarises the latest research and data to call attention to the severity of the crisis, to underscore the interconnections of environmental systems, and to argue that holistic action is required. The findings underscore that immediate and sustained efforts are essential to mitigate the effects of climate change and transition toward a sustainable future.

Keywords: multifaceted, interconnections, sustainable future

1. INTRODUCTION

One of the current major environmental problems is the changing global climate. Increases in global temperature resulting from human-induced warming of the planet, in large part due to human-emitted greenhouse gases, put ecosystems, human health, and economic stability at risk. The objective of this paper is to provide a comprehensive overview of the factors, outcomes, and strategies necessary to address this pressing issue.

2. CLIMATE CHANGE CAUSES

2. 1 Atmospheric greenhouse gases Emissions of greenhouse gases (GHGs) in the atmosphere are the primary source of climate change. Burning fossil fuels, deforestation, and agricultural practices are the main sources of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), the three most significant greenhouse gases.According to the Global Carbon Project (2021), CO_2 emissions in 2020 hit a record high of 36.4 billion metric tonnes.

2. 2 Land Use ChangesDeforestation and land use conversion for agriculture are major sources of climate change. The Food and Agriculture Organisation (FAO) has reported that land use changes are responsible for around 10-12% of the global GHGs. These transformations decrease the ability of ecosystems to take up CO_2, which is counteracting the greenhouse effect.

2. 3 Industrial processes Industrial activities emit significant quantities of GHGs. Cement production, chemical production, and waste treatment all contribute a large proportion of global emissions. Innovations in industrial operations are essential to minimise the load.

3. IMPACTS OF CLIMATE CHANGE

3. 1 Environmental Impacts Climate change leads to increased temperatures, changing precipitation patterns, and more extreme weather events.The IPCC (2021) estimates that since the late 19th century, global surface temperatures have increased by around 1.1°C, which has caused ice caps to melt and sea levels to rise. Changes in these systems lead to disruption of ecosystems and loss of biodiversity.

3. 2 Economic Impacts Economic implications of climate change are significant. Damage from extreme weather events, increased healthcare costs, and decreased agricultural productivity threaten global economies. A study by the

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National Oceanic and Atmospheric Administration (NOAA) estimated that U.S. weather disasters caused $1 billion or more in damages in over 20 events in 2020 alone.

3. 3 Social effects Vulnerable groups, especially in poor countries, bear a heavier burden of climate change, such as food insecurity, evacuation, and risk to health. Climate change exacerbates existing inequalities, creating a humanitarian crisis that necessitates urgent action.

4. MITIGATION STRATEGIES

4. 1 Transition to Renewable Energy

Reducing GHG emissions requires a transition away from fossil fuels and towards renewable energy sources like hydropower, solar, and wind. The International Renewable Energy Agency (IRENA) predicts that emissions around the world could be cut as much as 70% by 2050, transitioning to renewables.

4. 2 Energy Efficiency Improving energy emissions may be considerably decreased by increasing construction, transportation, and industrial efficiency. To realise climate goals, policies are needed to promote energy-saving measures and energy-efficient technology.

4. Carbon sequestration for climate change mitigation can be achieved through enhancement of natural carbon sinks such as wetlands and forests and through developing carbon capture and storage (CCS) technology. In order to restore ecosystems and sequester carbon, afforestation and reforestation initiatives are essential.

5. INTERNATIONAL COOPERATION

There is a need to take coordinated action on a global scale to measure and react to the challenge of climate change. An objective of agreements such as the Paris Agreement is the mobilisation of countries to reduce emissions and develop climate resilience. Effective implementation of these statements is crucial for success.

Here are some key statistics related to climate change:

The global average temperature of the earth has risen by about 1.1°C (2.0°F), on average, with increases due to both increases in carbon dioxide emissions and other anthropogenic activities since late 19th century (IPCC, 2021).

b) Greenhouse Gas Emissions CO2 Emissions: In 2021, global carbon dioxide emissions reached approximately 36.4 billion metric tonnes (Global Carbon Project, 2021). Sources of Emissions: Fossil fuel combustion contributes ~75% of all greenhouse gas emissions.

c) Sea Level Rise: Rising Sea Levels: Since 1900, sea levels have increased by around 20 centimetres (8 inches), and if present trends continue, forecasts indicate that sea levels might rise by up to 1 meter (3.3 feet) by 2100 (IPCC, 2021).

The occurrence of extreme meteorological events (e.g., hurricanes, floods, heat waves) has risen. The NOAA reported over 20 weather and climate disasters causing damages of $1 billion or more in the U.S. in 2020.

e) Ocean Acidification pH Levels: Throughout the history of the Industrial Revolution, the pH of the ocean has decreased to about 0.1 units (corresponding to a 30% increase in acidity) (NOAA).

Glaciers around the world have been estimated to have contributed to sea level rise by about 0.9 mm/yr on average over the past two decades because of their mass loss.

g] Biodiversity Loss Species Extinction: World Wildlife Fund (WWF) estimates that vertebrates have lost 68% of their populations between 1970 and 2016, as a result of habitat loss and climate change.

h) Economic Costs Projected Economic Impact: Climate change may cost the global economy roughly $23 trillion by 2050 unless measures are taken (Swiss Re).

According to the International Renewable Energy Agency (IRENA), the percentage of power generated worldwide from renewable sources increased from 26% in 2019 to around 29% in 2020.

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j) Public Perception Global Concern: A 2021 survey reported that 61% of adults globally perceive climate change as a high-risk factor, differing by location (Pew Research Centre).

5. CONCLUSION

Global climate change presents an unprecedented challenge that demands immediate and sustained action. Its causes and effects are important for designing suitable mitigation measures. By transitioning to renewable energy, improving energy efficiency, and enhancing international cooperation, we can work toward a sustainable future and mitigate the worst effects of climate change.

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