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An alarming issue of Global Warming, Global Climate change

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Abstract

Global warming is the rise in the temperature of the Earth. As the Earth gets warmer, disasters such as droughts, hurricanes, and floods are becoming more common. Most scientists and activists express deep concern about the changes in the planet's overall climate. The average temperature above the Earth's surface has risen by just below 1 degree or 1.3 degree fahrenheit over the past 100 years.

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INTRODUCTION

Causes of Global Warming

Greenhouse gases are the primary cause of global warming. These gases include carbon dioxide, nitrous oxides, methane and certain carbon dioxide compounds. Compounds containing chlorine and bromine. The accumulation of these gases in the atmosphere disrupts radioactive equilibrium, leading to the heating of Earth's surface and lower atmosphere.

Natural Causes

- **Solar activity:** -

It is a natural cause of global warming. It involves fluctuations in solar radiation and events like sunspots. A weaker sun is believed to have caused the "Little Ice Age" in the 17th century. During that period average global temperature was about 1°C cooler than today. The 11-year sunspot cycle includes phases of varying solar activity. These variations can shift Earth's magnetic field and affect cosmic rays, ionise small particles that form clouds, cooling the Earth. Low thick clouds reflect solar energy into space. Changes in solar irradiance may correlate with temperature changes. The exact role of solar radiation in global warming is debated.

- **Natural deforestation**

It releases carbon dioxide through forest fires, and decay contributes to global warming by increasing CO₂ levels. Part of the natural carbon cycle, but human activities worsen its impact. Forests act as carbon sinks. So, their loss accelerates climate change.

- **Permafrost melting**

It releases methane, a potent greenhouse gas. Accelerating global warming. Thawing permafrost also releases carbon dioxide, further contributing to climate change.

- **Eruptions of volcanoes.**

Release ash and gases, including carbon dioxide, into the atmosphere contributing to global warming, volcanic CO₂ adds to greenhouse gases, though human activities emit far more CO₂ than volcanoes.

Manmade Causes

- **Burning of Fossil fuels.**

Fossil fuels (oil, coal, natural gas) are hydrocarbons from dead organisms. Their combustion releases carbon dioxide, the major driver of global warming. In the U.S., 790% of greenhouse gas emissions come from fossil fuel burning.

- **Manmade deforestation**

Clearing forests for agricultural construction and burning plant matter releases stored carbon, significantly increasing atmospheric CO₂. Tropical deforestation accounts for 20% of global greenhouse gas emissions.

- **Uses of fertiliser**

During fertilizer production and application, greenhouse gases like carbon dioxide, methane and nitrous oxide (N₂O) are released into the air and soil. N₂O has become the third most important greenhouse gas, with fertilizer use being a major contributor to global warming in agriculture.

- **Mining**

Coal mining accounts for 8% of all methane emission oil and coal production allow methane to escape into the atmosphere, especially when the surrounding area is disturbed.

- **Greenhouse gases.**

Gases that absorb and emit radiation within the thermal infrared spectrum, causing the greenhouse effect. Without GHGs, Earth's average surface temperature would be 33°C (59°F) cooler than it currently is.

- **Chlorofluorocarbons.**

Industrial chemicals that damage the ozone layer. Their production is now primarily restricted by international agreements.

- **Carbon dioxide**

A naturally small but very significant component. Human activities (like fossil fuel burning and land use changes) have dramatically increased atmospheric CO₂ concentration by about 25%.

- **Water vapour**

The most abundant GHG. It plays a crucial role in climate, as warming air holds more water vapour, leading to more cloud formation and precipitation.

- **Nitrous oxides.**

A potent GHG primarily produced by soil cultivation, fossil fuel combustion, industrial processes and biomass burning.

- **Methane**

A simple, odourless, colourless gas produced naturally and through human activities like agriculture, waste and fossil fuel production. It is the second most important GHG.

Effects of Global Warming

Physical impact

- **Extreme weather Events**

Heat waves, droughts, blizzards and rainstorms are expected to become more frequent and intense.

- **Ice Melt**

Decline in arctic sea ice and thawing permafrost (which can release large amounts of stored carbon into the atmosphere).

- **Sea levels and ocean Acidification**

Rising sea levels (due to thermal expansion and ice melt) and the absorption of CO₂ leading to increased ocean acidity, which harms marine life. Rising sea levels (up to 82 cm by 2100) are caused by melting ice and thermal expansion. The ocean absorbs CO₂, leading to acidification, which harms coral reefs and marine life.

Biological impact

- **Plants**

Climate change threatens many plant species by exceeding their temperature tolerance and limiting growth and photosynthesis.

- **Animal**

It drives species migration, changes behaviours (like feeding and mating), and causes deaths, such as the cattle in northern Kenya due to drought.

Social impact

Impacts on natural systems translate into severe challenges for human society, affecting:

- Agriculture (droughts, floods, heat stress)
- Health (infectious diseases, heat-related risks)
- Security (displacement, loss of livelihood, and water /food scarcity)

Alternative Sources of Energy.

Energy and climate solution.

• Nuclear Energy

Rising fossil fuel costs and climate concerns have increased interest in nuclear power, despite safety concerns raised by the Fukushima disaster.

Energy efficiency and conservation

• Efficiency.

using less energy for the same output (eg, using LED lights)

• Conservation

Reducing the amount of energy used (eg, turning off lights, driving less)

- Both are important for sustainability and fuel independence.

Negative Emissions and sink

- Methods to permanently remove CO₂ from the atmosphere.

Carbon sinks

*Natural or artificial reservoir that absorbs and stores CO₂ (ex. forest, geological formation)

Reforestation

- planting forests to help restore those depleted by deforestation. Forests are critical natural carbon sinks, absorbing massive amounts of greenhouse gas.

Carbon capture and storage (CCS)

A technology that captures CO₂ from large sources (like power plants) and stores it safely underground. It is a crucial technology for reducing emissions, even though a CCS-equipped coal plant may use up to 40% more energy.

Control Measures

- Reduce Greenhouse Gas Emissions: Limit the use of fossil fuels (coal, petrol, diesel). Shift to cleaner fuels and low-carbon technologies.
- Use Renewable Energy Sources: Promote solar, wind, hydro, and biogas energy. Install solar panels in homes, schools, and industries.
- Energy Conservation & Efficiency: Use energy-efficient appliances (LED bulbs, star-rated devices). Reduce unnecessary electricity consumption.
- Afforestation & Forest Protection: Plant more trees and stop deforestation. Protect existing forests and wildlife.
- Sustainable Transportation: Use public transport, carpooling, cycling, and electric vehicles. Reduce private vehicle usage.

- Waste Management: Follow Reduce, Reuse, and Recycle (3R) principle. Avoid burning waste and plastics.
- Sustainable Agriculture: Reduce chemical fertilisers and pesticides. Promote organic farming and efficient irrigation.
- Climate-Friendly Industrial Practices: Use cleaner production methods. Control industrial emissions with proper regulations.
- Public Awareness & Education: Spread awareness about climate change impacts. Encourage eco-friendly lifestyles.
- Strong Government Policies & Global Cooperation: Implement strict environmental laws.

Follow international agreements like the Paris Climate Agreement.

CONCLUSION

The scientific community confirms that human-driven greenhouse gas buildup is causing rapid global warming, which outpaces organisms' ability to adapt. Effects include melting ice caps, sea-level rise, extreme weather, and water scarcity. Urgent measures are required to adopt renewable energy, deforestation, and pursue innovative solutions.

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