

GLOBAL WARMING: CAUSES, IMPACTS AND SOLUTIONS

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Global warming is an urgent issue of increasing concern to scientists, policy makers and the public. Global warming refers to the long-term increase in the average temperature of the Earth's climate system, caused primarily by the accumulation of greenhouse gases (GHGs) in the atmosphere. This phenomenon is exacerbated by human activities such as fossil fuel burning, deforestation and industrial processes that release large amounts of carbon dioxide (CO₂), methane (CH₄) and other heat-trapping gases.

Causes of global warming

The main cause of global warming is the increasing concentration of greenhouse gases in the atmosphere. The greenhouse effect refers to the way greenhouse gases prevent heat from escaping into space. The most important contributors to this effect are as follows:

Burning fossil fuels: burning coal, oil and natural gas for energy production and transportation is the world's largest source of CO₂ emissions. As industrialization increases, especially in developing countries, energy demand increases and greenhouse gas emissions rise.

Deforestation: forests play an important role in absorbing atmospheric CO₂. However, widespread deforestation, especially in tropical regions, is reducing the planet's capacity to reduce CO₂. In addition, when trees are cut down or burned, the carbon stored in them is released into the atmosphere.

Agricultural practices: Methane, another powerful greenhouse gas, is produced in large quantities by livestock and rice farming. Nitrous oxide (N₂O), especially from fertilizer use, also contributes to global warming.

Industrial activities: some industrial processes, such as cement production and chemical manufacturing, emit significant amounts of CO₂ and other greenhouse

gases. Increases in global production and consumption have significantly increased these emissions.

Effects of global warming

The impacts of global warming are multifaceted and far-reaching, affecting not only the environment but also human societies around the world. Some of the most important impacts include:

Rising global temperatures: the average global temperature has increased by about 1.2°C since the late 19th century. This warming trend is expected to continue and is projected to rise by more than 2°C by the end of the century if current emission rates continue.

Melting glaciers: Glaciers in the polar regions of the world are melting at an unprecedented rate, contributing to rising sea levels. This not only threatens coastal areas with increased flooding, but also leads to the loss of critical habitats for species such as polar bears and seals.

Extreme weather: global warming is leading to an increase in the frequency and intensity of extreme weather events. Heat waves, droughts, hurricanes and heavy rainfall are becoming more common, destroying ecosystems, agriculture and human settlements.

Ocean acidification: When CO₂ is absorbed by the ocean, it reacts with seawater to produce carbonic acid, lowering the pH of the water. This acidification has a particularly negative impact on marine organisms with calcium carbonate shells and skeletons, such as corals and shellfish.

Impact on biodiversity: Many plant and animal species are struggling to adapt to the rapidly changing climate. Species that cannot move to cooler regions or adapt quickly enough are in danger of extinction. This loss of biodiversity can disrupt entire ecosystems and lead to further environmental degradation.

Human health risks: Rising temperatures and extreme weather events pose direct risks to human health. For example, heat waves can cause heat stroke and cardiovascular disorders, especially in vulnerable groups such as the elderly. In addition, changing climate patterns are altering the spread of vector-borne diseases

such as malaria and dengue fever.

Reducing global warming

Addressing global warming requires both mitigation (reducing or avoiding greenhouse gas emissions) and adaptation (adapting to the inevitable impacts of climate change). Key strategies for mitigating global warming include:

Conversion to renewable energy: Replacing fossil fuels with renewable energy sources such as solar, wind and hydropower is one of the most effective ways to reduce greenhouse gas emissions. These energy sources produce energy with little or no emissions and are increasingly cost competitive.

Energy efficiency: improving energy efficiency in industry, transportation and housing can significantly reduce energy consumption and therefore emissions. Technologies such as energy-efficient appliances, LED lighting and electric vehicles are examples of solutions that reduce carbon emissions.

Carbon capture and storage (CCS): CCS technology captures CO₂ emitted from industrial processes and stores it underground to prevent its release into the atmosphere. Although still under development, this technology can play an important role in achieving net zero emissions.

Afforestation and reforestation: afforestation and reforestation can reduce atmospheric CO₂. Forests can act as natural carbon sinks and offset emissions from human activities by increasing forest cover.

International agreements and policies: Global cooperation is essential to tackle climate change: The 2015 Paris Agreement is an important international agreement that brings countries together to limit the global temperature rise to below 2°C. It encourages countries to set ambitious emission reduction targets and strengthen resilience to climate change.

Conclusion

Global warming is a formidable challenge that demands urgent and concerted action from governments, industries, and individuals alike. The scientific evidence is clear: human activities are driving climate change, and without immediate intervention, the consequences could be devastating for both the natural world and

human civilization. However, through technological innovation, policy changes, and collective global efforts, it is possible to mitigate the effects of global warming and build a sustainable future for generations to come.

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