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Global Warming: A Threat To Our Planet And Future Generation

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Abstract

Global warming has emerged as one of the most significant environmental threats of the 21st century. It refers to the long-term increase in Earth's average surface temperature due to the excessive accumulation of greenhouse gases (GHGs) such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). These gases trap heat in the atmosphere, causing the planet to warm unnaturally. Human activities—particularly industrialization, deforestation, burning of fossil fuels, and intensive agriculture—have drastically accelerated this warming process. As a result, the world is witnessing alarming consequences such as rising sea levels, melting glaciers, extreme weather events, loss of biodiversity, and disruption of ecosystems.

This thesis explores the causes, consequences, and potential solutions to global warming. It investigates the roles of different sectors and countries in contributing to the problem and examines global efforts to combat climate change, including the Paris Agreement and other policy frameworks. Additionally, it presents sustainable strategies such as transitioning to renewable energy, enhancing energy efficiency, and promoting climate education. The paper emphasizes that the time for action is now. If global warming continues unchecked, the damage to our environment and future generations may become irreversible. Therefore, collective global action, awareness, and innovation are essential to mitigate its impacts and ensure a livable planet.

Keywords

Global warming, climate change, greenhouse gases, fossil fuels, carbon emissions, renewable energy, deforestation, sustainability, Paris Agreement, climate policy

Introduction

Global warming, a subset of the broader issue of climate change, refers to the progressive increase in the Earth's average surface temperature due to elevated levels of greenhouse gases. It is a phenomenon that poses a profound threat to ecosystems, weather patterns, and human societies across the globe. Since the Industrial Revolution, human activities—especially the burning of fossil fuels and deforestation—have significantly contributed to the atmospheric concentration of carbon dioxide and other greenhouse gases, disrupting Earth's natural climate balance.

Greenhouse gases and radiative forcing

The Earth's radiative balance is regulated by greenhouse gases that trap outgoing longwave radiation. Since the Industrial Revolution, atmospheric CO_2 concentrations have risen dramatically—from roughly 280 ppm pre-industrial to values exceeding 420 ppm in the 2020s—largely due to fossil fuel combustion and land-use change. Methane and nitrous oxide have also increased from pre-industrial baselines and contribute substantially to radiative forcing. The IPCC's Sixth Assessment Synthesis confirms that human influence is unequivocal and is the dominant cause of observed warming since the mid-20th century.

Observed warming and recent trends

Instrumental records and independent analyses show that the last decade contains the warmest years on record. Global mean surface temperature has increased by approximately 1.0–1.3°C above pre-industrial levels (depending on the baseline and dataset), with the most recent years (2023–2024) among the warmest observed. The warming is not uniform: land areas warm faster than oceans, polar amplification is pronounced in the Arctic, and regional patterns of change influence precipitation and extreme events. Satellite and in-situ observations also show ocean warming, ice sheet mass loss, and sea-level rise—all consistent with anthropogenic forcing.

Emissions trajectories and remaining carbon budgets

Scientific assessments provide remaining carbon budgets compatible with limiting warming to specific targets (e.g., 1.5°C or 2°C). Current global greenhouse gas emissions remain at record levels; recent UNEP analyses conclude that current national pledges and policies would still lead to warming well above 1.5°C by 2100 without rapid, sustained emission reductions. The "emissions gap" between current policy trajectories and those needed to meet Paris Agreement goals highlights the urgency of near-term action.

Temperature extremes and heat exposure

Higher mean temperatures increase the probability and intensity of extreme heat events. Heatwaves cause direct mortality and morbidity, reduce labour productivity, and exacerbate droughts. Projections indicate that children born in recent years will face substantially higher lifetime exposure to extreme heat and associated hazards under current policy trajectories compared with earlier birth cohorts. This lifetime exposure raises deep concerns about intergenerational equity and health.

Hydrological changes, droughts, and floods

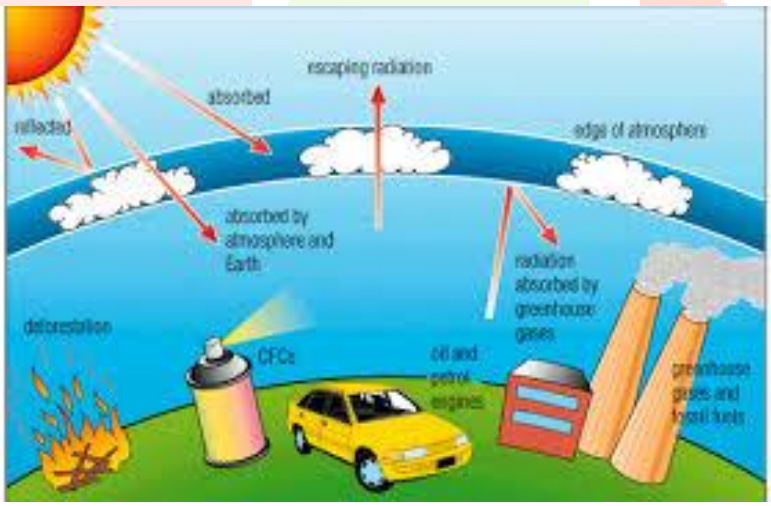
Global warming alters precipitation patterns: some regions face increased heavy precipitation and flood risk while others experience prolonged drought and aridity. These shifts affect freshwater availability, agricultural yields, and the frequency of disasters that displace populations and disrupt services (education, health, food distribution). The compound effects—e.g., heat plus drought—can trigger cascading ecological and societal crises.

Sea-level rise and coastal impacts

Thermal expansion of seawater, melting glaciers, and ice sheet loss contribute to sea-level rise. Coastal communities face greater flooding, erosion, saltwater intrusion into aquifers, and loss of infrastructure and livelihoods. Sea-level rise is long-lived: committed increases will persist for centuries, meaning future generations inherit elevated baseline risks even if emissions are curtailed.

Ocean warming, acidification, and biodiversity loss

Oceans absorb much of the excess heat and a significant fraction of CO_2 emissions, reducing atmospheric warming but disrupting marine ecosystems. Ocean warming and acidification threaten coral reefs, fisheries, and marine food webs—resources upon which hundreds of millions depend. Declines in primary productivity and shifts in species distributions have both ecological and socioeconomic implications for coastal communities and global food systems.



Food security and nutrition

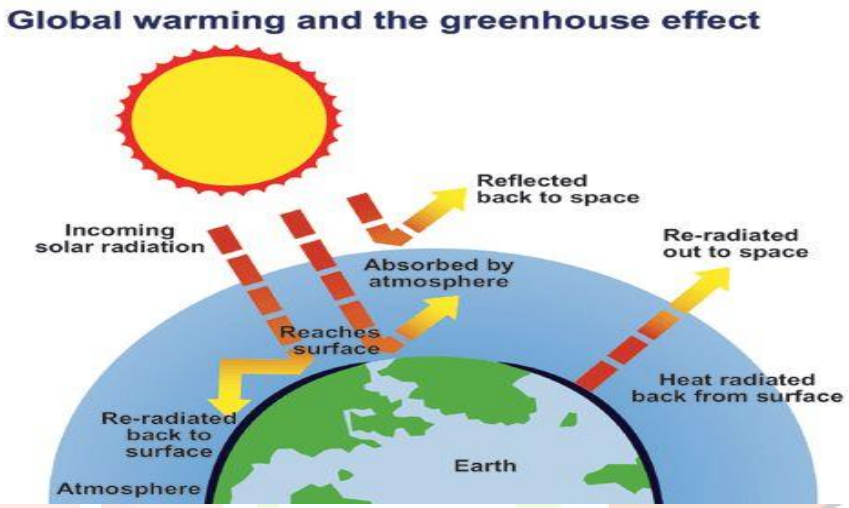
Changes in temperature, rainfall, and the frequency of extreme events affect crop yields, pest and disease dynamics, and livestock productivity. Lower yields and increased volatility in food supply threaten nutritional outcomes, particularly for children in low-income settings who already face stunting and micronutrient deficiencies. Future generations may inherit more fragile food systems unless adaptive and mitigation measures are implemented promptly.

Water security and sanitation

Hydrological shifts influence freshwater quantity and quality. Regions dependent on glacier melt or seasonal monsoons are particularly vulnerable. Compromised water systems magnify risks of waterborne diseases and reduce hygiene and sanitation standards—factors that disproportionately affect children and pregnant women.

Health impacts and child wellbeing

Climate change alters exposure to heat, air pollution, vector-borne diseases (e.g., malaria, dengue), and mental health stressors (e.g., displacement, loss). The Lancet Countdown and related health assessments document rising climate-related health burdens and call for mainstreaming child-focused policies. Children are uniquely vulnerable because of physiological sensitivity, developmental needs, and dependence on caregivers; exposures during early life have lifelong consequences for health and cognitive development.



Economic and displacement impacts

Extreme events and gradual climate trends damage infrastructure, reduce labour productivity, and create displacement and migration pressures. These economic shocks undermine long-term development prospects and can entrench intergenerational poverty, thereby magnifying vulnerability for future cohorts. Policy responses must therefore integrate social protection and climate resilience to avoid locking future generations into cycles of deprivation.

Global inequalities and intergenerational justice

Global warming presents stark ethical challenges: the countries and populations that contributed least to historical emissions often suffer the greatest harms. Likewise, current actions (or inaction) determine the baseline risks that future generations inherit. The concept of intergenerational justice demands that present-day decisions avoid imposing disproportionate burdens on those who will follow. Equity considerations require differentiated responsibilities, capacity-building, finance for adaptation and loss & damage, and inclusive international cooperation to ensure that mitigation and adaptation pathways are fair. The UNEP Emissions Gap and IPCC assessments both emphasize the need for equitable pathways to limit warming and to protect vulnerable populations.

Rapid decarbonization of energy systems

Decarbonizing electricity and energy end-uses—through renewables, energy efficiency, electrification, and phasing out unabated coal—remains central to limiting warming. The IPCC outlines mitigation pathways consistent with 1.5°C and 2°C targets that require rapid emissions reductions over the next decade and net-zero CO_2 emissions in the mid-to-late 21st century under most scenarios. Policy instruments (carbon pricing, regulatory standards), investments in clean technologies, and enabling infrastructure are critical enablers.

Land use, agriculture, and nature-based solutions

Reducing emissions from deforestation and agriculture, restoring degraded lands, and expanding nature-based solutions (e.g., reforestation, peatland restoration) contribute to mitigation while offering co-benefits for biodiversity and livelihoods. However, nature-based solutions are not substitutes for deep cuts in fossil fuel emissions and must be implemented in ways that respect land rights and food security.

Low-carbon technologies and innovation

Emerging technologies—green hydrogen, long-duration energy storage, advanced materials, and carbon dioxide removal (CDR) options—offer additional mitigation potential. While innovation can lower costs and expand options, reliance on unproven large-scale CDR to meet targets is risky; policy should prioritize proven emission reductions while supporting responsible research and scaled demonstration of novel approaches.

Building resilience in infrastructure and services

Adaptation investments—climate-resilient infrastructure, early warning systems, resilient agriculture, and resilient health and education systems—reduce vulnerability to current and future impacts. Prioritizing investments that protect children (e.g., heat-resilient school buildings, water and sanitation upgrades, disaster-proof early childhood services) helps avoid long-term developmental harms.

Social protection and governance

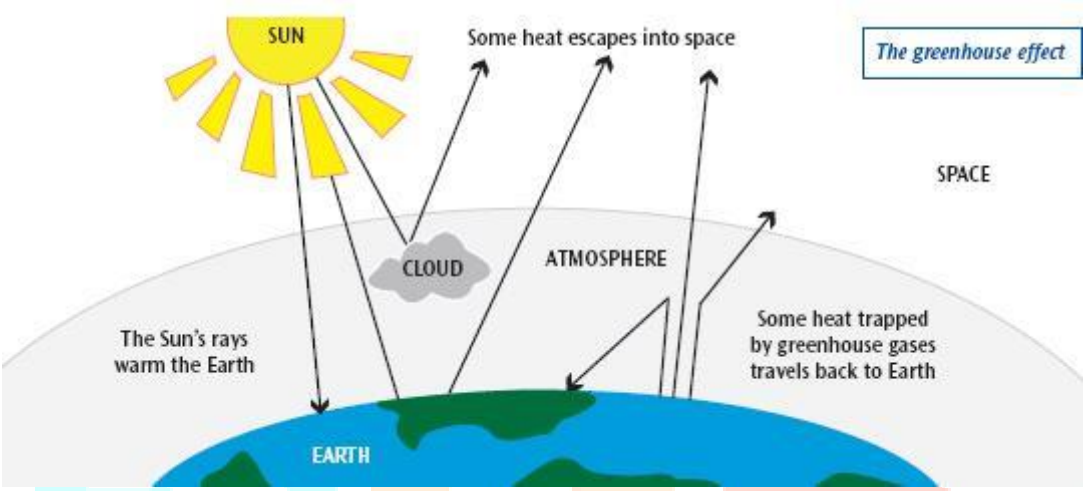
Adaptive social protection (cash transfers, insurance, food assistance) can buffer households from climate shocks and prevent long-term losses in human capital. Effective governance, inclusive planning, and community engagement are essential to ensure adaptation measures are contextually appropriate and equitably distributed.

Education, awareness, and the role of youth

Education shapes climate understanding, agency, and long-term behaviour. Climate literacy in school curricula, community awareness programs, and youth engagement in policy processes empower younger generations to contribute to mitigation and adaptation. Moreover, intergenerational dialogue and participatory approaches enhance the legitimacy of climate policies and ensure that the needs and rights of children are considered in decision-making. The Lancet Countdown and health-focused analyses call for integrating child-centred climate policies into health and education strategies.

Multilateral frameworks and the Paris Agreement

The Paris Agreement provides the global architecture for national climate action, but its success depends on ambition, implementation, and transparency. Nationally Determined Contributions (NDCs) must be strengthened in line with science and equity, while multilateral finance and technology transfer must support low-income countries' mitigation and adaptation needs. International fora (UNFCCC COP meetings) play a critical role in raising ambition, mobilizing finance, and negotiating loss & damage mechanisms.



Climate finance, loss & damage, and capacity building

Mobilizing finance for mitigation and adaptation—public and private—is essential. Developed countries have obligations under the UNFCCC to provide finance and capacity building; yet current flows fall short of estimated needs. Mechanisms to address loss & damage, including climate risk insurance and international funds, are increasingly recognized as necessary to assist vulnerable countries and communities. Ensuring transparent, efficient, and equitable finance channels is crucial to protect current and future generations.

Policy recommendations

Based on the evidence reviewed, the following priority actions are recommended to protect future generations from the worst impacts of global warming:

Rapid near-term emission reductions: Aim for deep cuts in global greenhouse gas emissions by 2030 consistent with limiting warming to 1.5–2.0°C; translate pledges into binding, transparent policies.

Scale equitable adaptation: Invest in climate-resilient infrastructure, health, water, and education systems—prioritizing children and marginalized communities.

Increase climate finance: Developed countries should meet and exceed climate finance commitments, scale up loss & damage mechanisms, and ensure funds reach communities most at risk.

Integrate education and youth engagement: Embed climate literacy across curricula, support youth participation in policymaking, and create intergenerational platforms for dialogue.

Promote innovation responsibly: Support research and deployment of low-carbon technologies and nature-based solutions, while avoiding overreliance on unproven removal technologies.

Uphold intergenerational justice: Adopt legal and policy mechanisms that consider future generations (e.g., future representatives in planning), ensuring that costs and benefits of climate action are fairly distributed.security, and economic stability. The poor and vulnerable communities are disproportionately affected, deepening global inequalities.

This thesis seeks to analyze global warming in a comprehensive manner—its causes, consequences, and the strategies needed to mitigate its effects. By examining scientific data, global policy responses, and grassroots initiatives, it aims to highlight the importance of sustainable living and the urgency of unified global efforts to combat this crisis. The fight against global warming is not just environmental—it is social, economic, and ethical.

Conclusion

Global warming represents one of the most complex and pressing challenges humanity has ever faced. As this thesis has outlined, the root causes of global warming lie in the excessive emission of greenhouse gases caused by industrialization, deforestation, and an overreliance on fossil fuels. These emissions are drastically altering Earth's natural climate systems, leading to a cascade of devastating environmental consequences, including rising sea levels, extreme weather events, and loss of biodiversity. The social and economic impacts are equally profound, with implications for food security, public health, and global stability.

The issue of global warming is no longer a distant concern—it is a present and escalating crisis. Communities across the globe, from low-lying island nations to megacities, are already bearing the brunt of climate-related disasters. Marginalized populations, especially in developing countries, are disproportionately affected despite contributing the least to the problem. This environmental injustice underscores the need for equitable global cooperation and responsibility.Efforts such as the Paris Agreement demonstrate that international consensus and Action are possible. However, much more needs to be done. Climate commitments must be backed by genuine policy shifts, financial investments, and enforcement. Countries must prioritize renewable energy, enforce stricter emission regulations, and encourage sustainable consumption patterns. At the same time, individuals must recognize their role in combating climate change through everyday decisions—reducing waste, conserving energy, and supporting eco-friendly policies.

Moreover, public education and awareness are critical. Climate change literacy can empower communities to adapt to its effects and advocate for meaningful change. It can also inspire younger generations to innovate solutions and become future leaders in sustainability.

Technology and innovation offer a ray of hope. Breakthroughs in carbon capture, green transportation, and renewable energy systems show that a cleaner future is possible. However, such advancements must be made accessible globally to ensure a just transition for all economies.

Global warming is not just an environmental issue—it is a moral and existential one. The path forward requires a shared vision of sustainability, compassion, and responsibility

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