

Causes, Consequences, And Sustainable Solutions To Climate Change Today

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Abstract: The article analyzes the main factors of global climate change observed since the 20th century, its impact on nature and human activity, as well as the possibilities of solving this problem in the areas of sustainable development. The main cause of climate change is the sharp increase in greenhouse gas emissions into the atmosphere as a result of human activity.

Keywords: Climate change, greenhouse effect, global warming, carbon dioxide, sustainable development, climate justice.

INTRODUCTION:

Climate change is one of the most serious environmental, economic, and social problems facing the modern world. The term "climate change" refers to climate change caused primarily by human activity. The rise in the Earth's average temperature and its negative impact on natural ecosystems and societies are clear. According to the 2021 report of the Intergovernmental Panel on Climate Change (IPCC), the Earth's temperature has increased by 1.1°C compared to the pre-industrial era, largely due to a sharp increase in greenhouse gases in the atmosphere. The purpose of this article is to analyze the complexity of this global threat, its causes and consequences, and current strategies for combating it.

Climate change is caused by two types of factors: natural and anthropogenic (human-related).

Anthropogenic factors: Anthropogenic factors are the primary cause of climate change. Today, the burning of fossil fuels such as coal, oil, and natural gas releases greenhouse gases into the atmosphere, including carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). CO₂ accounts for 76% of the total greenhouse effect. **Deforestation:** Forests serve as natural carbon sinks. Their destruction not only increases CO₂ emissions into the atmosphere but also reduces the

atmosphere's ability to absorb it.

Agriculture: Methane emissions from livestock, nitrogen oxides from manure and fertilizers. **Industry and transport:** Industrial processes and internal combustion engines are the main sources of air pollution.

Natural factors include changes in solar radiation, volcanic eruptions (which can lead to short-term temperature drops), and seasonal changes in the Earth's rotation around its axis (Milankovitch cycles).

However, scientific research proves that the main cause of climate change over the past 50 years is anthropogenic factors.

The negative impacts of climate change affect all sectors.

Drying lands and pastures: water supplies are at risk, especially in water-stressed areas.

Melting polar and mountain glaciers: As a result, sea levels rise, and coastal cities and lands are submerged.

The frequency of extreme weather events is increasing: heatwaves, droughts, heavy rains, and storms are becoming more frequent. **Threats to biodiversity:** habitat loss for many species is increasing, putting them at risk of extinction.

Decreased agricultural productivity: changes in temperature and water availability negatively impact arable land.

Health threats: heat stress, the spread of infectious diseases, and respiratory illnesses caused by air pollution.

- Growing socioeconomic inequality: developing countries suffer the most due to their limited ability to adapt to climate change (the "climate justice" problem).
- Environmental migration: people who have lost their homes are forced to move to other regions.

Measures to combat climate change include the following.

Sustainable solutions include two main areas: addressing the cause (mitigation) and adapting to the consequences (adaptation).

- Transition to renewable energy sources: implementing the use of solar, wind, hydroelectric, and geothermal energy.
- Improving energy efficiency: reducing energy consumption in buildings, transport, and industry.
- Promoting forest conservation and afforestation.
- Promoting green technologies: electric vehicles, carbon capture and storage (CCS).
- Implementation of environmentally friendly agricultural practices.
- Creation of water storage systems and increased water use efficiency.
- Cultivation of heat-resistant crop varieties.
- Growing socioeconomic inequality: Developing countries suffer the most due to their limited ability to adapt to climate change (the "climate justice" problem).
- Environmental migration: people who have lost their homes are forced to move to other regions.

CLIMATE CHANGE RESPONSIBILITIES

Sustainable solutions involve two main approaches: addressing the cause (mitigation) and adapting to the consequences (adaptation).

1. Mitigation

- Transition to renewable energy sources: implementation of solar, wind, hydro, and geothermal energy.
- Increasing energy efficiency: reducing energy consumption in buildings, transport, and industry.
- Development of forest conservation and afforestation.
- Development of green technologies: electric vehicles, carbon capture and storage (CCS) technologies.

- Implementation of environmentally friendly agricultural practices.

2. Adaptation

- Creation of water storage systems and increased water use efficiency.
- Cultivation of heat-resistant crop varieties.
- Construction of coastal protection structures.
- Implementation of early warning systems for hazardous weather events.

International Cooperation

Climate change is a global problem, and its solution is impossible without international cooperation.

- Paris Agreement (2015): a landmark international agreement aimed at limiting global warming to well below 2°C, and, if possible, to 1.5°C.
- United Nations Framework Convention on Climate Change (UNFCCC): An organization that monitors countries' progress in implementing measures to combat climate change.

CONCLUSION

Climate change is the most complex and urgent problem facing humanity. Its negative consequences are already evident, and future generations will find it much more difficult to overcome these severe consequences. However, the situation is not yet out of control.

Technological progress, the transition to renewable energy sources, international cooperation, and the awareness of every individual can prevent the most serious consequences of climate change. Only united and responsible action by all countries can ensure a solution to this problem. Protecting our future is the most important task of today.

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