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GLOBAL ECOLOGICAL PROBLEMS AND ECONOMIC AND SOCIAL CONSEQUENCES OF CLIMATE CHANGE IN THE CONDITIONS OF GREEN ECONOMY

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ABSTRACT

This article examines the key environmental challenges arising during the transition to a green economy, with particular emphasis on global climate change, environmental pollution, and the inefficient use of natural resources. Since the second half of the twentieth century, intensified human economic activity has led to a sharp increase in greenhouse gas emissions, transforming climate change into a global environmental, economic, and social challenge. The study analyzes the impacts of climate change on ecological stability, economic growth, and social welfare, highlighting its consequences for the agricultural sector, energy systems, and insurance markets. In addition, the article reviews international frameworks and policy initiatives, including the United Nations Sustainable Development Goals (SDGs 2030), the Paris Agreement, and the Sendai Framework for Disaster

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Risk Reduction. The findings demonstrate that the implementation of renewable energy sources, green technologies, and coordinated international cooperation plays a crucial role in mitigating climate risks and ensuring sustainable development for future generations.

Keywords: Green economy, environmental challenges, climate change, greenhouse gas emissions, sustainable development, renewable energy, environmental security, climate policy, biodiversity, economic stability.

INTRODUCTION

One of the major challenges in the transition to a green economy is the intensification of environmental problems caused by pollution and the inefficient use of natural resources. Environmental problems may arise as a result of changes in the structure and functioning of the natural environment, as well as due to anthropogenic activities or natural disasters.

Environmental issues are classified into different levels depending on the degree of their impact on the natural environment. The severity of an environmental problem is determined by its intensity, the spatial scale of changes, and specific characteristics inherent to each ecological challenge.

Since the 1960s and 1970s, the negative impact of human activities on the environment has gained global significance. During the twentieth century, the world population increased fourfold, while global industrial production expanded eighteenfold. Environmental challenges that have reached global scale include climate change, water pollution, ozone layer depletion, depletion of freshwater resources, pollution of the world's oceans, land desertification and degradation, and the decline of biological diversity.

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LITERATURE REVIEW

In recent decades, environmental degradation and climate change have become central topics in global academic discourse. According to the Intergovernmental Panel on Climate Change (IPCC, 2023), the average global surface temperature has increased by approximately 1.1°C since pre-industrial times, largely driven by the rapid growth of greenhouse gas emissions resulting from fossil fuel consumption and industrial expansion. This warming trend poses serious risks to ecological stability, economic development, and social well-being.

Stern (2007) highlights that failure to address climate change could result in losses equivalent to 5–20% of global GDP, emphasizing the economic urgency of mitigation policies. Nordhaus (2018) further argues for market-based mechanisms such as carbon pricing and emissions trading systems, demonstrating their effectiveness in reducing emissions while maintaining economic efficiency.

The concept of the green economy has been extensively explored by Barbier (2016), who defines it as a pathway toward sustainable development through resource efficiency, renewable energy deployment, and environmentally friendly technologies. Similarly, reports by the United Nations Environment Programme (UNEP, 2019) stress that green investments not only mitigate environmental risks but also stimulate job creation and inclusive economic growth.

International policy frameworks, including the United Nations Sustainable Development Goals (SDGs 2030), the Paris Agreement, and the Sendai Framework for Disaster Risk Reduction, provide institutional foundations for global climate action. These initiatives prioritize greenhouse gas reduction, climate adaptation, and disaster risk management, highlighting the importance of coordinated international efforts.

Recent empirical studies indicate that climate change disproportionately affects developing economies, particularly agricultural productivity, water availability, and energy security. Local research in Central Asia and Uzbekistan underscores

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increasing vulnerability of agrarian systems and freshwater resources, reinforcing the necessity of transitioning toward green economic models.

Overall, existing literature demonstrates that climate change is not merely an environmental issue but a multidimensional challenge requiring integrated economic, technological, and policy-based solutions.

RESEARCH METHODS

This study adopts a mixed-methods approach combining qualitative and quantitative analytical techniques. Data were collected from authoritative international sources, including IPCC assessment reports, United Nations publications, World Bank databases, and peer-reviewed academic literature.

Descriptive statistical analysis was employed to examine trends in greenhouse gas emissions, temperature change, and agricultural productivity. Comparative analysis was used to evaluate international climate strategies and green economy policies across different regions.

In addition, document analysis of international agreements and national policy frameworks was conducted to assess institutional responses to climate change. Inductive and deductive reasoning methods supported the synthesis of findings and the formulation of conclusions.

The research is grounded in the sustainable development framework and the green economy model, integrating environmental, economic, and social dimensions. This holistic methodology enables a comprehensive assessment of climate-related risks and the effectiveness of mitigation and adaptation strategies.

ANALYSIS AND RESULTS

Global climate change is considered one of the most pressing challenges of the twenty-first century. Irresponsible human attitudes toward nature and excessive dependence on fossil fuels such as oil, gas, and coal have led to a continuous rise in greenhouse gas emissions. These gases accumulate in the atmosphere,

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preventing excess heat from escaping into space and thereby causing global warming.

The main greenhouse gases contributing to climate change include water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). In 2018, atmospheric greenhouse gas concentrations reached 405.5 parts per million, representing a 146% increase compared to pre-industrial levels.

Analytical projections indicate that the number of countries exceeding critical emission thresholds may reach 57 by 2030, accounting for approximately 60% of total global greenhouse gas emissions (Figure 1).

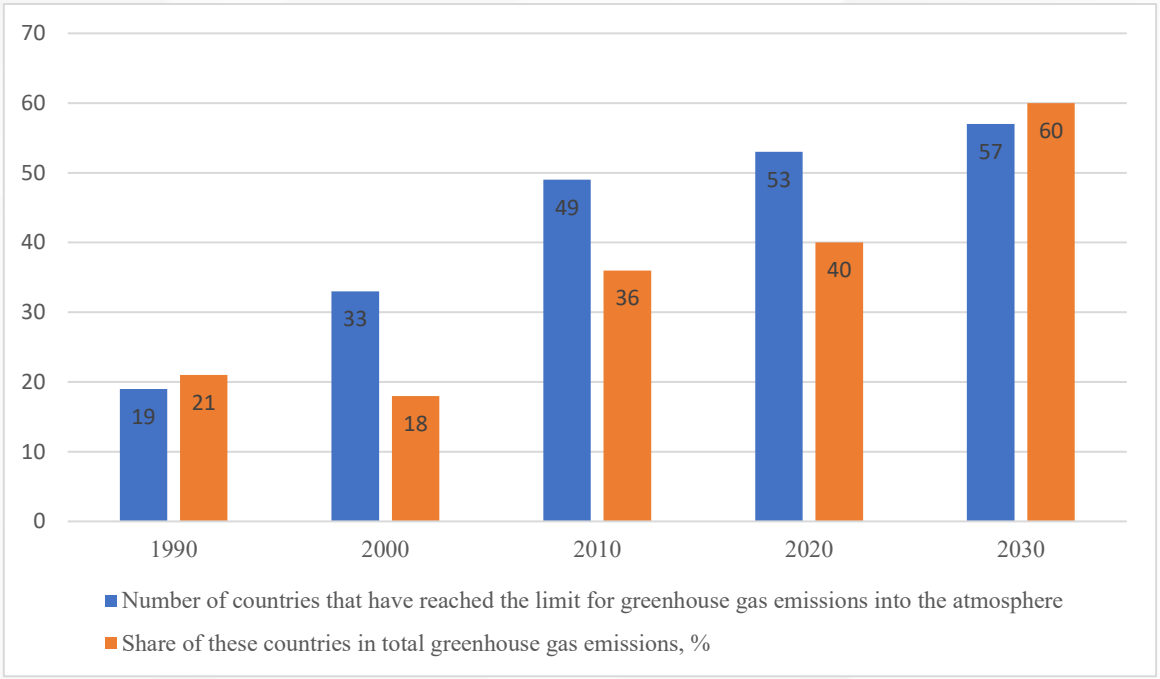

Figure 1. Global greenhouse gas emissions [1]

Climate change also exacerbates economic inequality among countries. While 26% of global greenhouse gas emissions originate from the United States and 22% from Europe, only 3.8% are attributed to Africa. Approximately 80% of

[1] The Emissions Gap Report 2018. http://www.unenvironment.org/emissionsgap.

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emissions are produced by developed economies, which have committed to reducing emissions by 20–40% by 2030.

Environmental protection goals are reflected in the United Nations Sustainable Development Goals (SDGs 2030), which aim to reduce greenhouse gas emissions by 45% by 2030 compared to 2010 levels and achieve net-zero emissions by 2050. In addition, the Sendai Framework for Disaster Risk Reduction (2015–2030) emphasizes preventing new disasters and reducing existing risks. Uzbekistan adopted Resolution No. 299 in April 2019 to implement the Sendai Framework at the national level.

Climate change represents not only an environmental challenge but also a complex threat to global economic and social stability. Since the Industrial Revolution, emissions of CO_2, CH_4, and N_2O have reached record levels, contributing to a global temperature increase of approximately 1.1–1.3°C. Extreme weather events, including heatwaves, cyclones, floods, and droughts, are intensifying worldwide. Climate change could reduce global GDP by 2–3%, with developing countries and agricultural sectors facing the greatest risks.

According to IPCC data, average global temperatures increased by 1.1°C between 1850 and 2023. If current emission trends continue, temperatures could rise by 2–2.5°C by 2050, accelerating glacier melt, ocean warming, and sea-level rise of 0.5–1.0 meters.

Extreme weather events have become more frequent, with record wildfires reported in the United States, Europe, and Australia between 2020 and 2024, causing substantial damage to human safety and economic infrastructure.

Over the past 50 years, global wildlife populations have declined by approximately 60%, disrupting ecosystem stability, weakening food chains, and reducing carbon sequestration capacity.

The economic impacts of climate change are particularly evident in agriculture. Crop yields of wheat, maize, and rice may decrease by 15–20%, while food prices rise annually by 5–8% due to climate factors. Electricity demand increases by 10–

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15% during heatwaves, while hydropower capacity declines and fossil fuel infrastructure becomes vulnerable to extreme temperatures. Moreover, climate-related disasters exert pressure on insurance markets, reducing coverage in high-risk areas and threatening economic stability.

Global climate strategies, including the Paris Agreement, aim to limit temperature increases to 1.5°C through improved energy efficiency, expanded renewable energy use, carbon taxation, and green investment incentives.

Green economy strategies promote low-carbon transportation and infrastructure, foster technological innovation, and generate employment opportunities. Many countries have adopted pathways toward carbon neutrality by 2050.

Geoeconomic and demographic consequences are also significant. By 2050, more than 200 million people may be forced to migrate due to climate impacts. Competition over water and land resources may intensify regional conflicts, while Arctic ice melt is opening new maritime routes and reshaping geopolitical balances.

Humanity's strategic responses include energy transformation, sustainable water and land management, and climate-resilient urbanization. Solar and wind energy reduce carbon emissions, green technologies support economic resilience, smart monitoring and drip irrigation improve agricultural efficiency, ecosystem restoration enhances carbon sequestration and biodiversity conservation, and green architecture alongside public transportation lowers urban emissions while mitigating heatwave impacts.

CONCLUSION

Addressing global environmental challenges requires coordinated international action and comprehensive policy measures. Key priorities include fostering planetary-scale thinking grounded in humanistic values, investigating the root causes of ecological crises, establishing robust environmental monitoring and

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forecasting systems, and strengthening global cooperation through shared resources and knowledge exchange.

Climate change represents the greatest global test of twenty-first-century civilization. Rising temperatures, extreme weather events, water scarcity, and biodiversity loss threaten ecological, economic, and social stability. Combating these challenges demands science-based policies, green economic transformation, technological innovation, and strong international collaboration. Through these efforts, humanity can create a sustainable and secure environment for future generations.

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