

ON THE NEGATIVE CONSEQUENCES OF CLIMATE CHANGE IN THE 21ST CENTURY

Madraim Khasanovich Sarikulov

Senior Lecturer, of the Almalik branch of the Tashkent
State Technical University, Almalyk, Uzbekistan
sarikulov.madraim4@gmail.com

Abstract

At present, the most vulnerable part of nature and society has become the process of climate change at the present stage. The article considers the problems of global warming in the context of air pollution, taking into account the development of scientific and technological progress. An analysis of the causes of climate change in general throughout the world and its negative consequences in the modern world is given. The article also considers the factors influencing the process of climate change, and gives recommendations for eliminating the negative consequences due to climate change.

Keywords: Global warming, greenhouse effect, extreme heat, Paris Agreement, water shortage, economic growth, carbon dioxide concentration, temperature regime, forests, World Meteorological Organization, harsh reality.

Introduction

As is known, one of the dangers threatening modern civilization and humanity is an ecological catastrophe with its numerous components, including global climate change and shortage of drinking water. At the present stage of human development, humanity has faced, perhaps, the most pressing problem - how to preserve nature and civilization, since no one knows when and in what form this or that catastrophe may occur.

The modern world is characterized by accelerated rates of technological development and the introduction of high-performance technologies for the production of material goods, as well as the creation of comfortable living conditions for the population. Meanwhile, along with the introduction of high-performance technologies, the reverse sides of these achievements are beginning to emerge. In this regard, I would like to draw attention to the negative aspects of these advantages. In particular, one of the negative aspects of these achievements is considered the inability of humanity to obey the laws of the biosphere. It is these wrong actions committed by humanity that can lead to an unpredictable abyss, that is, Man wants to dominate Nature. This in turn can have a detrimental effect on the existence of the human population.

LITERARY RESEARCH

The Earth's atmosphere has provided the conditions for the development of the biosphere for many hundreds of thousands of years. However, this source of life is currently threatened by phenomena that many scientists associate with human activity - global warming, ozone depletion, air pollution. Humanity's use of fuels such as oil, coal, and gas, as well as

deforestation, has led to a significant increase in the content of carbon dioxide (CO₂) and other greenhouse gases in the Earth's atmosphere. These greenhouse gases have the effect of trapping heat (hence the name), preventing it from escaping into the atmosphere. Since the greenhouse effect is a natural phenomenon, it is commonly called the "runaway greenhouse effect", which is one of the causes of global warming. Since the Industrial Revolution in the late 18th century, the content of CO₂ in the atmosphere has increased significantly because of human activity, and today it is at a level that has not been seen for at least 800,000 years.

As UN Secretary-General António Guterres [1] noted, the global community is more divided than ever over Russian aggression against Ukraine and the US-China standoff, but the climate crisis is a common problem for humanity. "The Earth is warming up faster and faster, making life more dangerous for everyone, everywhere," he said, calling on all countries to develop a program to combat the effects of extreme heat. He called the heat a new "epidemic" and said that it has already affected several billion people. Temperatures sometimes rise to 50°C, which in a humid climate creates conditions incompatible with human life. The heat affects the well-being of the population. More than 70% of all workers in the world, or almost 2.5 billion people, suffer from extreme temperatures, according to a report published this week by the International Labor Organization. As soon as the thermometer rises above 34°C, labor productivity falls by half, scientists have calculated. Economic damage grows in line with the temperature. The UN estimates it at \$2.4 trillion by 2030. In the 1990s, it was 10 times smaller. As the site [2] believes, everyone has a role to play in the fight against climate change. At the United Nations, we call on people everywhere to work together to address climate change and deliver on the commitments made in the 2015 Paris Agreement. This website provides up-to-date information on actions being taken by governments, businesses, civil society, youth and others in every region of the world. This is our planet, and while we know it is in crisis, we also know that the problems it faces can be solved. Action to achieve the goals – from more clean energy to more secure food supplies – is already underway. The benefits, such as green jobs, cleaner air and stronger economies, are also clear. A more sustainable and prosperous world is within reach. Join us in our work to make it happen today.

The website [3] notes that, according to the Paris Agreement on Climate Change, in order to prevent irreversible consequences, humanity must keep the increase in average temperature on the planet within 1.5–2°C compared to the corresponding indicator of the pre-industrial era. To date, 185 countries out of 197 have already ratified the document.

Water scarcity [4] is a growing concern in many parts of the world. Population growth, urbanization, increasing demand for irrigated agriculture and poor water management are important drivers of water scarcity, exacerbated by the impact of climate change, which is increasing the frequency and severity of droughts. Today, about 2 billion people already live in water-stressed areas. By 2025, half the world's population is expected to be in this situation. It is projected that every 1°C increase in temperature caused by global warming will reduce renewable water resources by 20%. Water scarcity has serious consequences for societies and threatens the sustainability of development. For example, water scarcity can negatively affect the provision of water and sanitation services and impact human health. Insufficient safe

drinking water can compromise adequate hygiene and increase the risk of diarrhoea. Water scarcity can also limit economic growth by reducing agricultural production, impact the environment and biodiversity by reducing environmental flows essential for ecosystem health, and lead to conflicts within and between countries and increased population migration.

Academician of the Russian Academy of Sciences N. Moiseyev [4] believes that active industrial activity leads to a continuous increase in the concentration of carbon dioxide in the atmosphere: in the 20th century, it increased by 20 percent. This causes an increase in the average temperature of the planet, which in turn changes the nature of atmospheric circulation and the distribution of precipitation. And these changes are reflected in the vital activity of the plant world, the nature of polar and continental glaciation changes - glaciers begin to melt, the ocean level rises, etc.

The source [6] notes that the results of rising global temperatures include rising sea levels, changes in the amount and nature of precipitation, and the expansion of deserts. Other consequences of warming include: an increase in the frequency of extreme weather events, including heat waves, droughts, and heavy rains; ocean acidification; the extinction of biological species due to changes in temperature. Consequences that are important for humanity include a threat to food security due to the negative impact on crop yields (especially in Asia and Africa) and the loss of human habitats due to rising sea levels.

According to the website [7], weather cataclysms will become more frequent under any scenario, even the most favorable one. Scientists from all over the world have completed a multi-year medical examination of the planet and have unanimously made a diagnosis: global warming is in full swing, and its indisputable cause is man. "There is no doubt that the atmosphere, ocean and land have warmed up (Fig. 1) under the influence of human activity," the landmark climate report says.



Figure 1. Illustration of dangerous heating of the planet.

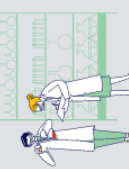
Based on data from the website [8], it can be stated that the average global surface temperature in 2024 was 1.55 degrees Celsius above the average for the period 1850-1900, with an uncertainty of 0.13 degrees, according to a consolidated analysis by the World Meteorological Organization (WMO). This means that the world has likely experienced the first calendar year when the average annual temperature exceeded the pre-industrial period level by more than 1.5 degrees. "Today's analysis by the World Meteorological Organization once again proves that global warming is a harsh reality," said UN Secretary-General António Guterres. He also noted that "Exceeding the 1.5 degree Celsius mark in some years does not mean that this goal cannot be achieved in the long term. It means that we need to work even harder to get back on track. Record temperatures in 2024 require transformative climate action in 2025. We still have a chance to avoid the worst of the climate emergency, but leaders must act – and act now." Guterres called on governments to submit new national climate plans this year to keep long-term global temperature rise to 1.5 degrees Celsius and help the most vulnerable communities cope with the devastating impacts of climate change.

According to researchers [9], it is necessary to create new giant forests. Specialists from the Federal Technical University of Zurich (ETH Zurich) have proposed combating climate change on Earth by creating new giant forests, and they assign a key role to Russia. Scientists have calculated that if trees are planted in different areas of the planet over a total area of 0.9 billion hectares, this will clear the atmosphere of a significant portion of the greenhouse gas carbon dioxide that has entered it as a result of human economic activity. The results of the study were published in the American scientific journal Science.

Methodology

Due to climate variability, annual precipitation is expected to decrease in the long term in some parts of the world, while in other regions, variations in precipitation and temperature will significantly affect the growing season of some plants. In other places, annual precipitation may remain the same, but it may fall at longer intervals, in the form of much heavier and shorter rainfalls, causing increased droughts and floods. The intensity of severe storms and their variety, hurricanes, may increase. An example of this is the devastating hurricanes that have occurred in many parts of the world today, with the majority occurring in the United States. The potential impacts of climate change are varied and wide-ranging, and preventing them has become a high priority on the global development agenda.

Climate change is one aspect of the development of the modern world. Given its potential impact on many aspects of human life, it is probably one of the most important development issues of human existence today. Rich countries, which have long been among the industrialized countries, bear the main responsibility for the problem of climate change, while the poorest communities and countries suffer the most from the consequences, since they usually bear the brunt of severe floods, droughts, storms and other predictable events, which they lack the means to effectively combat. In fact, due to climate change, which leaves people in poverty, the achievements of world development can be lost.



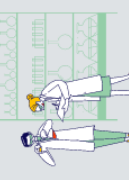
The anthropogenic origin of modern climate change is confirmed, in particular, by studies of the greenhouse gas content in air bubbles frozen into ice. They show that such a concentration of CO₂ as at present has not been observed over the past 650,000 years. At the same time, compared with the pre-industrial period (1750), the concentration of carbon dioxide in the atmosphere has increased by a third. Modern global concentrations of methane and nitrous oxide have also significantly exceeded pre-industrial values. According to experts, the increase in the concentration of these main greenhouse gases since the mid-18th century is due, first of all, to the combustion of carbon fossil fuels (oil, gas, coal, etc.), the development of industry, and the cutting down of forests, which actively absorb CO₂ from the atmosphere.

The role of humans in the ongoing climate change is also evidenced by the results of comparing the data of modeling the growth of global temperature with the data of real observations. Currently, various models of past and future changes in the temperature of the Earth's surface have been developed. Some of them took into account only the natural causes of warming, while others took into account the anthropogenic factor. When the results of modeling were superimposed on the data of direct meteorological observations, it turned out that they coincide with those models that took into account the influence of humans. This indicates that, according to the models, without the influence of the anthropogenic factor, the temperature on Earth today would be lower than observed.

And yet, a clear answer about the role of the anthropogenic factor in climate change is still impossible. It is only clear that man influences the climate with his economic activity. It is quite likely that this influence will be decisive in the long chain of causes that determine climate change.

Authorized and illegal logging remains one of the main problems for the ecology and climate of the Earth today. According to NASA estimates, the rate of deforestation has increased by 62% over the past ten years, reaching record levels. Every year, according to satellite measurements, the Earth loses huge forest areas equivalent in area to the island of Ceylon. Most of this logging occurs in the tropics, but it does not bypass Russia and other northern countries. However, today it is much more important to take into account something else – that climate change is already happening and, as forecasts show, will probably only intensify. Therefore, regardless of human involvement in it, it is necessary to take measures to counteract these changes in order to avoid dangerous and irreversible consequences for nature, the economy and society in the future.

The most important task of the modern world is to reduce emissions that pollute the atmosphere. Everyone knows that exhaust gases from cars contribute to the greatest pollution of the environment. Unfortunately, electric cars or cars running on a hydrogen engine have not yet become widespread, so a modern motorist can only reasonably handle his transport. In this regard, it would be desirable for every driver to properly configure the engine of his vehicle, using gas equipment and not starting the engine in idle mode. In addition, it should be taken into account that walking is much more beneficial to human health than driving a vehicle to the destination.

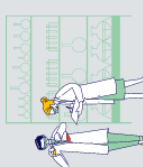


Conclusions

In conclusion, I would like to note that the Earth's nature has gifted the human population with a number of benefits, which provides humanity with a variety of food products, clothing, housing, fresh water, clean air, fertile soil for cultivating agricultural products and other benefits. In order for the human population to survive, it should comply with all the rules and laws of the biosphere. Based on this, all measures should be taken so that each person should treat the natural environment with care, take from it as much as needed and should not be thoughtless about all the riches of nature and should strive to eliminate the negative consequences of climate change in the 21st century.

REFERENCES

1. <https://www.un.org/en/climatechange/extreme-heat>
2. <https://www.un.org/ru/climatechange/recovering-better/six-climate-positives-actions>
3. <https://tass.ru/>
4. International Seminar on Water Scarcity. Taking Action in Transboundary Basins and Reducing Impacts on Human Health
Geneva, December 11-12, 2017 <http://www.unece.org/index.php?id=43633>
5. <https://www.nkj.ru/archive/articles/10376/> (Science and Life, ECOLOGY IN THE MODERN WORLD)
- 6.↑ Battisti, David; Naylor. Historical warnings of future food insecurity with unprecedented seasonal heat (eng.) // Science : journal. – 2009. – Vol. 323, no. 5911. – P. 240-244. - ISSN 0036-8075. – doi:10.1126/science.1164363. – PMID 19131626. Archived April 24, 2012.
7. <https://www.ipcc.ch/report/ar6/wg1>
8. UN News <https://news.un.org/story/2025/01>
9. <https://nangs.org/news/ecology>
10. Toshov J., Baratov B., Sherov K., Mussayev M., Baymirzaev B., Esirkepov A., Ismailov G., Abdugaliyeva G., Burieva J. Ways to optimize the kinetic parameters of tricone drill bits // Material and Mechanical Engineering Technology, Kazakhstan, 2024, No. 1, pp. 35-45
11. Toshov, Javokhir & Toshov, B.R. & Baratov, Bakhtiyor & Haqberdiyev, A.L.. (2022). Designing new generation drill bits with optimal axial eccentricity. Mining informational and analytical bulletin. 133-142. 10.25018/0236_1493_2022_9_0_133.
12. Baratov B. N., Umarov F. Ya., Toshov Zh. B. Assessment of the performance of tricone drill bits / Mining Journal - Moscow, 2021. - No. 12. – P.60-63.
13. O.V. Tuyboyov, N.F. Raxmanova, B.N.Baratov. Investigation into sustainable innovations in mining engineering for resource optimization and environmental efficiency// “Kon mashinalari va texnologilar” Ilmiy-technik magazine, Toshkent, 2024, No. 1(7), pp.51-58.
14. Toshov, Z.B., Rahutin, M.G., Toshov, B.R., Baratov B.N. Tracking prevention in roller cone bit drilling // Eurasian Mining, 2024, 41(1), pages 62–66. DOI:10.17580/em.2024.01.15
15. Toshov, Javokhir & Baratov, Bakhtiyor & Baynazov, Umid. (2020). Method of calculating the gear ratios of the cones of tricone drill bits. E3S Web of Conferences. 201.01012.10.1051/e3sconf/202020101012.



16. Toshov, B. & Toshov, Javokhir & Akhmedova, L. & Baratov, Bakhtiyor. (2023). The new design scheme of drilling rock cutting tools, working in rotation mode pairs. E3S Web of Conferences. 383. 1-6. 10.1051/e3sconf/202338304069.