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TOWARDS THE STUDY OF THE PROBLEM OF CLIMATE CHANGE IN CENTRAL ASIA

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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 climate change in the Central Asian region in the context of air pollution. An analysis of the causes of climate change in the territories of the Central Asian republics and its negative consequences in the modern world is given. The article also considers the factors influencing the process of climate change.

Keywords: Climate change, World Meteorological Organization, harsh reality, food and energy security, salt and dust storms, carbon neutrality.

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.

Today, it has been established with sufficient certainty that the Earth's climate is affected by both internal climate changes and various astronomical phenomena, which, when superimposed on each other, can either strengthen climate cycles or weaken them. In addition, all modern theories indicate that climate changes in individual regions (including Central Asia) should be considered within the framework of global climate change trends.

According to climate experts, the countries of Central Asia and south of the Sahara are expected to suffer the most from global warming. Temperatures in these areas may rise by more than 5 degrees Celsius. Regional experts claim that salt and dust storms from the Aral Sea have raised the level of solid particles in the Earth's atmosphere by more than 5 percent, which has seriously affected global climate change.

LITERARY RESEARCH

No one could have predicted forty years ago that the drying up of the Aral Sea would be so According to the findings of the Intergovernmental Panel on Climate Change (IPCC), climate

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risks are expected to be more serious than previously thought. Adaptation to increasing global warming is becoming increasingly difficult. The reports emphasize that around 3.6 billion people in the world live in areas with high levels of climate change impact. It is also noted that the mortality rate associated with extreme weather events in vulnerable areas is 15 times higher than in less vulnerable areas.

The scientific community's view of climate change in Central Asia has undergone significant changes over time. Modern science shows that climate change in the region is subject to global trends, but with its own regional characteristics. The situation with water resources against the backdrop of a changing climate does not have clearly expressed correlations with temperature changes, is subject to strong fluctuations and changes not only from year to year, but also from place to place, although more indicators indicate a tendency towards humidification, at least in mountainous areas.

Based on data from the website [1], 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 Antonio Guterres. He also noted “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 the source [2], the air temperature in Central Asia is rising faster than the world average. This creates serious risks for food and energy security. This was stated by the head of the Ministry of Foreign Affairs of Uzbekistan Bakhtiyor Saidov, speaking at the general debate of the 79th session of the UN General Assembly. Thus, according to the Minister of Foreign Affairs of Uzbekistan, the level of water supply per capita in Central Asia has halved over the past few decades. The Aral Sea disaster continues to have an extremely negative impact on the ecosystems of all states in the region. "We call on the international donor community to expand projects in the Aral Sea region aimed at mitigating the devastating consequences of this disaster," the speaker continued. He also recalled that the Aral Sea was the first region in the world to which the UN granted the status of a Zone of Ecological Innovation and Technology. "Our best practices could benefit other countries facing similar problems," Saidov said.

Huntington E [3] believed that the linear approach to the development of Central Asia, when history was viewed as a direct movement from a water-rich era to a drought era, was quickly replaced by various theories about the cyclical nature of the region's climatic history. Even supporters of the idea of drying out did not always insist on a linear approach. A follower of

the ideas of geographical determinism and geopolitics, the American geographer Ellsworth Huntington (1876–1947), while proving that the entire globe is in a state of progressive drying out, nevertheless pointed out that the earth's climate periodically had deviations towards increased humidity. He called these deviations pulsations (Huntington 1907).

In the work of V.V. Klimenko [4] the modern trends of climate change for the planet as a whole and Central Asia are considered. There is no consensus, since climatologists have to take into account too many factors. Most often, they talk about further warming, but deviations towards cooling are also allowed. The beginning of the 20th century was characterized by a cold twenty-year period (1911–1930), after which the growth of average temperatures continued. According to the reconstruction of V.V. Klimenko, the average annual temperatures in the cold era of the early 20th century, compared to the period 1981–2000, for Central Asia were colder by 0.5–1.5 °C depending on the region, average summer temperatures were also colder by 0.0–1.5 °C. Winter temperatures of 1911–1930 differed from winter temperatures of the 80–90s of the twentieth century significantly more towards cooling than summer temperatures (by 1–3 °C).

The source materials [5] note that, according to data from 13 meteorological stations with an observation period of about 100 years, located in different regions, the increase in the average annual temperature for 1884-1994 in Kazakhstan as a whole for the territory amounted to 1.3 °C, and the annual precipitation decreased by 17 mm. By season, these changes looked like this: warming in winter and spring was higher (1.8 and 1.9 °C) than in summer and autumn (0.8 and 0.7 °C). The combination of an increase in temperature by 1.3 °C and a decrease in precipitation by 17 mm in the 20th century indicates an increase in aridity in most of the territory. According to research from the same source, it is indicated that for the entire territory of Kyrgyzstan (taking into account data from both flat and mountainous regions), the average annual temperature in the 20th century, converted to 100 years, increased by 1.6 °C, which is significantly higher than global warming. The greatest warming was observed in winter (2.6 °C), and the least in summer (1.2 °C). At the same time, it was significantly different both in individual climatic regions and in stations within regions, that is, high-altitude zones. As for precipitation, in general, in the 20th century, its amount per year increased insignificantly in Kyrgyzstan - by 23 mm, or 6%. However, there is a clear trend of their increase from 1-2 to 20-30% in all climatic regions of Kyrgyzstan, except for the Inner Tien Shan. Here, in the high-mountain zone, precipitation in some places significantly decreased (by 41-47%), which significantly increased the aridity of this territory. Similar changes in climatic conditions in the 20th century were also observed in Tajikistan and Turkmenistan.

According to the authors [6], a positive temperature trend was also established for Uzbekistan, which has been increasing oscillatingly since the 1930s and corresponded to fluctuations in global temperature. The trend values of warming, calculated for 100 years of the 20th century, are within 0.5-1°C. Significant fluctuations in annual precipitation were recorded in Uzbekistan, while a weak trend towards an increase was observed on average across the territory.

The materials on the website [7] note that by 2050, climate change, which is becoming an increasingly powerful driver of migration, could force 216 million people in six regions of the

world to move to other parts of their countries. “Hotspots of internal climate migration could emerge very soon – as early as 2030 – and the scale and intensity of this process will continue to increase as we approach 2050. However, as follows from the report, immediate and concerted action to reduce global emissions and support green, inclusive and sustainable development could reduce the scale of climate migration by as much as 80 percent,” the document says. The website also noted that climate change is a powerful driver of internal migration, as it affects the sources of income of the population and sharply worsens the quality of life in the areas most exposed to its impact. By 2050, the number of internal “climate” migrants in sub-Saharan Africa could reach 86 million, in East Asia and the Pacific – 49 million, in South Asia – 40 million, in North Africa – 19 million, in Latin America – 17 million, and in Eastern Europe and Central Asia – 5 million.

METHODOLOGY

Central Asia, with its unique geographical position on the continent, combines many landscape forms, climatic zones and biological species. The uniqueness of Central Asia lies in this ecosystem, which connects all the countries of the region. In addition, when trouble knocks, it knocks on all the countries of the region. The root of all current environmental problems in Central Asia lies in the disruption of the natural cycle - the depletion of water resources due to global climate change leads to an increase in the number of natural disasters, desertification and the disappearance of biological species.

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 withstand the worst 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.

Today, the Central Asian region is increasingly experiencing the effects of climate change related to water shortages, land degradation and natural disasters. Due to the Aral Sea tragedy, the negative effects of climate change in the Central Asian region are felt more acutely. The increase in air temperature is twice the world average. According to the UN Development Program, the average annual temperature in Central Asia has increased by 0.5 degrees Celsius over the past three decades. It is predicted to increase by 2.0–5.7 degrees by 2085.

One of the factors influencing climate change in Central Asia is largely coal, its production and use predominates in the energy sector of the economy. In Kazakhstan, its share among renewable sources is about 40%. The total volume of industrial emissions in Kazakhstan is 85% of the total, exceeding 2.5 million tons annually.

Tajikistan and Kyrgyzstan, despite their developed hydropower, are also not yet able to abandon the use of coal in the energy sector in cities. The most striking example is the Dushanbe CHPP-2, which runs on coal, and which annually "gifts" residents and guests of the

Tajik capital with over 14 thousand tons of carbon dioxide. Cement plants located in the city, which use coal as fuel, also make their contribution. In addition, the Bishkek CHPP burns about 1.5 million tons of coal annually, while the entire population of the country uses just over 1 million tons for household needs.

The decree of the President of Uzbekistan Shavkat Mirziyoyev notes that, "despite the measures taken, the energy intensity of the domestic economy remains high, the level of diversification of the fuel and energy balance due to the involvement of renewable energy sources in industrial production does not meet global trends. In the production of electric and thermal energy, the existing, fairly high potential of renewable energy sources is practically not used." In addition, this document prescribes "stage-by-stage work to transfer enterprises producing bricks, cement, greenhouses and a number of others to alternative types of fuel." Therefore, there is no doubt that Uzbekistan is making its "feasible contribution" to the common Central Asian greenhouse gas cauldron.

The territory of Tajikistan, which occupies a leading position in the number of glaciers, is, in fact, a water donor for the region. The "snow crown" of the republic stretches for more than 8.5 thousand square kilometers and feeds the river systems of the Amu Darya and Zeravshan, on which Uzbekistan, Kazakhstan and Turkmenistan largely depend. However, against the backdrop of global climate change, the glaciers of the republic are retreating, their total area is rapidly decreasing due to rising air temperatures. If the most pessimistic forecasts of experts come true, then the average annual increase in temperature in Central Asia by the end of the century could be 5.6 °C.

Despite the declared plans to achieve carbon neutrality, the Central Asian states are unlikely to be able to abandon coal in the foreseeable future, its role in their fuel and energy balance is too great. The use of coal is not limited to emissions into the atmosphere. Natural reservoirs and agricultural lands are also being “hit”, being withdrawn from circulation due to the emergence of unfavourable man-made reliefs that arise during the development of coal basins.

CONCLUSIONS

Thus, we can state that climate change in Central Asia has a negative impact not only on the natural environment, but also on the socio-economic conditions of existence of the population in this region. These changes hinder food security, poverty reduction and sustainable development efforts. The Aral Sea disaster and rising air temperatures remain a serious problem for the countries of Central Asia.

In conclusion, we 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 future.

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