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# MITIGATION AND ADAPTATION OF THE IMPACTS OF CLIMATE CHANGE

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**Abstract:**

Climate change and its environmental consequences are the main problem of our time. This paper examines the impact of climate change on the Fergana Valley as an example. The consequences of climate change and adaptation to them are discussed.

**Keywords**: climate, climate change, temperature change, winds, precipitation, environmental problems.



## Introduction

Climate influences all biotic and abiotic processes on Earth, including society. No matter how advanced science and technology are, humanity and its society are still dependent on climate conditions. Global warming associated with human activity causes changes in the natural and geographical environment in all parts of the Earth. Natural phenomena such as droughts, floods, hurricanes, increased precipitation, sudden cold snaps and warming are observed. Similar environmental incidents and events occur in our country.

In particular, the above-mentioned regional and global environmental problems have a negative impact on the stable economic and social development of the Fergana Valley. Global climate changes, which have occurred repeatedly in the geological history of the Earth, have accelerated the consistent development of society. Preventing climate change is a difficult task. But it is possible to mitigate its consequences and find and implement ways of adaptation.

A gradual and significant increase in air temperature across the region, an increase in the number of days with high air temperatures and a decrease in the number of days with low temperatures are regional indicators of climate change. According to the "Review of Climate Change Problems in Uzbekistan", over the past 50 years the air temperature has increased by 1.5 degrees. The average rate of climate change in the next 50 years is, According to the secret "scenario", the average warming will be about 2-3° C. An increase in air temperature in Uzbekistan has been observed since 1951. According to him, the rate of warming in the country is twice the world average, with especially serious changes observed in the summer and autumn months. In mountainous regions, the rate of warming is relatively lower. Analyzing the results of comparing climate changes for 1911–1980 and 1978–2007, the following situation can be observed: the number of days with temperatures below 15° C in the northern and mountainous

regions is 28–48%, while 20° C is lower, it is clear that the number of days decreased by more than 1.5 times throughout the country.

Rising temperatures affect the amount and pattern of precipitation. The National Report notes that analysis of long-term data from 1933 to 2010 shows a trend of increasing changes in interannual precipitation patterns and an increase in precipitation due to rapid warming in the region. The number of days with precipitation of 15 mm per day was 2-10 days at the beginning of the 20th century, and by the beginning of the 21st century the number of such days reached 6-15.

Changes in precipitation under the medium impact "scenario" are highly uncertain. The increase in precipitation is 48 mm per year in the desert region and 42 mm in the foothills, while in mountainous areas, on the contrary, it decreases by 10 mm. Precipitation increases during the autumn and winter months. In June-August the amount of precipitation is minimal. This distribution of precipitation has a strong negative effect.

An increase in air temperature causes the snow line to shift upward and reduce snow reserves in mountainous areas. It is known that most of the rivers of the Fergana Valley originate from glaciers in the mountains. Rising air temperatures are causing the rapid melting of glaciers. On the eve of 2000, the size of glaciers decreased by 20%. By the 2030s, it could decline by another 20%. The rate of glacier reduction is 0.2-1% per year. River waters are currently increasing due to rapid melting of glaciers, but from 2030 river water consumption will decrease. The volume of water resources will decrease. By 2050, water consumption in the Syrdarya basin will decrease by 2–5%, and in the Amudarya basin by 10–15%.

The western and central parts of the Fergana Valley are located in the desert soil-bioclimatic region, where atmospheric wind activity is strong. The wind in this area is caused by different air pressure in the atmosphere of the Fergana Valley and Mirzachul. In the atmosphere of the Fergana Valley, which became lighter due to the heating of the air, an air mass from Mirzachul entered through the 8-9 km Khojand Gate (Fergana Strait), and it spread from the strait in a cone-shaped manner to the east in a diffuser at high speed. It is known that crops, gardens, people and the national economy as a whole suffer greatly from this process. Due to rising air temperatures, the number of days with strong (15 m/s) windy days in this area has increased from 30-35 days to 40-45 days. It is likely to increase even more in the future.

In the Fergana Valley, especially in its central and western parts, drought persists, intensifying with any climate change. Increasing air temperature increases the amount of evaporation. In areas where strong winds blow, evaporation is even greater.

The increase in precipitation predicted in various projects is offset by an increase in evaporation. The demand for water for agricultural crops will not only remain at a high level, but will also increase. According to Uzhydromet calculations based on the CROPWAT and ISAREG models recommended by FAO, due to changing climate conditions, average irrigation rates will increase by 5% in 2030, by 7-10% in 2050 and by 12-16% in 2080.

Climate change also affects various geographical processes occurring in nature. As air temperatures rise, the process of drought, in other words, desertification, will intensify. The risk of desertification will be high in Western and Central Fergana.

The risk of flooding increases with rising temperatures and increased precipitation. Because increased precipitation and extreme variability in precipitation, precipitation levels and rapid and heavy snow melt increase flood activity. In 2030-2050, an increase in the frequency of floods on watercourses is projected to increase by 17-19%. According to Uzhydromet, 12% of the territory of Uzbekistan are places with a high risk of flooding. 468 streams and watercourses are subject to flooding. Floods often occur in the mountainous areas of the Fergana Valley. Under the new conditions of climate change, the risk of increased and intensified floods will be at a higher level.

When farming in changed climatic conditions, it is necessary to select and zone varieties of crops that are resistant to drought. It is necessary to use water-saving irrigation technologies, especially advanced methods such as drip irrigation and underground irrigation.

One of the ways to mitigate the effects of climate change in the Fergana Valley is to close the Fergana Strait, which is the source of the winds. If the wind corridor is blocked at the height of the hills on both sides of it, then wind activity will sharply decrease in conditions of rising air temperatures and increasing desertification. As a result, the climate becomes milder and wind damage is reduced. Redistribution of precipitation occurs throughout the valley. The amount of precipitation will increase. Like many closed valleys between mountains, winters are warm and summers are relatively cooler. In any case, the climate changes in a humid-subtropical direction. The material for the barrier created in the path of the wind can be waste generated in valley cities and other populated areas. Thus, as a result of creating a wind barrier:

- Western and Central Fergana are subject to the influence of strong wind activity of the atmosphere. The characteristics of the subtropical humid climate will increase and favorable conditions will be created for the cultivation of industrial as well as subtropical crops;
- The problem of recycling industrial and household waste in valley cities will be solved.

Adaptation to new conditions of climate change requires the economical use of water, the widespread introduction of modern irrigation technologies, such as drip and rain irrigation, underground irrigation, strengthening forest reclamation, in particular forest plantations, and reducing industrial waste and discharges.

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