

Issues Of Ensuring Food Security Under Climate Change Conditions

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Abstract

Sharp climate changes pose serious risks such as reduced water resources, an increase in natural disasters, and a decline in agricultural productivity, which altogether hinder the sustainable development of our region. These consequences primarily have a negative impact on vulnerable segments of the population.

Keywords: environment, biodiversity, climate change, food balance, decarbonization, agricultural productivity, land degradation.

Introduction

Today, the impact of humans and wildlife on the environment and natural resources is increasing. Unsustainable agricultural practices, food waste, the growing disparity in food balance between developed and developing countries, global warming, water scarcity, biodiversity loss, soil degradation, and declining fertility lead to a series of negative consequences.

In his speech at the UN Climate Change Conference (COP28), President of the Republic of Uzbekistan Shavkat Mirziyoyev emphasized: *"Climate challenges have already become the most critical threat to sustainable development. These risks even affect the global geopolitical architecture. The negative consequences of climate change are particularly severe in Central Asia due to the Aral Sea disaster"* [1]. Abrupt climate changes trigger serious risks, including decreased water resources, increased natural disasters, and reduced agricultural productivity, which overall obstruct the sustainable development of our region. Such consequences primarily affect vulnerable populations.

Literature Review

Numerous studies and reports highlight that Uzbekistan is highly vulnerable to climate change impacts. The country has experienced a temperature increase of 1.6°C since 1880, and projections suggest an additional rise of 1.5–3°C by 2050. According to FAO and the World Bank, water scarcity and soil degradation are among the major threats to agricultural sustainability in Uzbekistan [2,3]. The Paris Agreement and Uzbekistan's national strategies focus on decarbonization, renewable energy, and sustainable agriculture.

Methodology

The research is based on:

- Analysis of climate trends in Uzbekistan from 1880 to 2020;
- Review of national strategic documents, including the "Green Economy" -Strategy (2019–2030) and the National Adaptation Program;
- Assessment of agricultural productivity and water resource dynamics;
- Evaluation of adaptation measures and investment needs using reports from FAO, IFPRI, and the World Bank.

Results

Climate Change Dynamics in Uzbekistan

Uzbekistan is among the countries with the highest climate risk. Since 1880, the country's average annual temperature has increased by 1.6°C (from 13.2°C to 14.8°C) (Figure 1). By 2030–2050, the temperature in

Central Asia is projected to rise by another 1.5–3°C, with the highest increase expected in the Aral Sea region due to local climate shifts caused by the sea's desiccation.

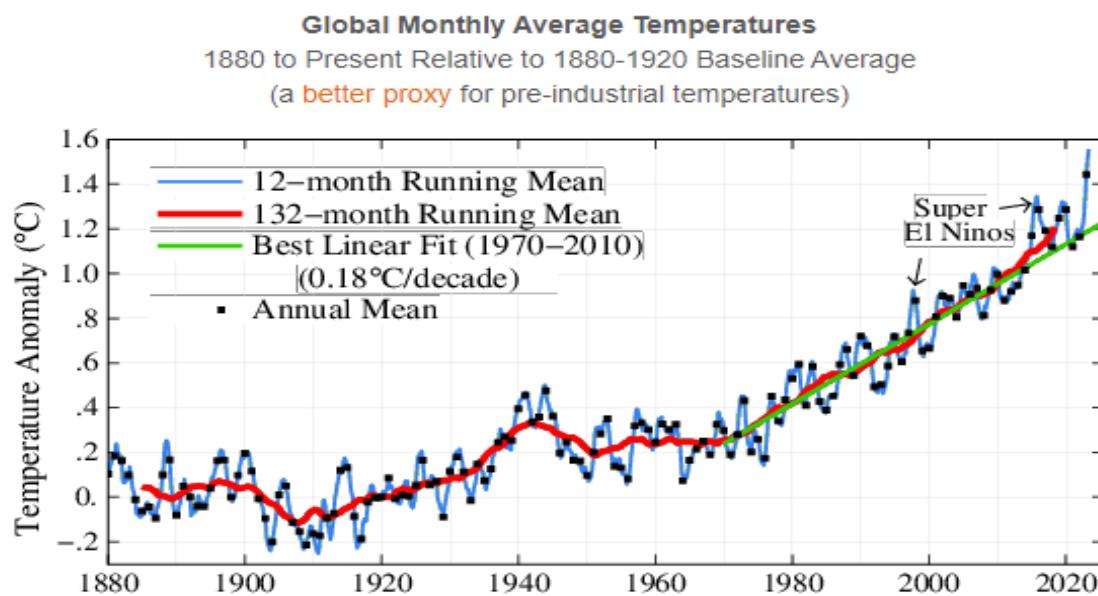


Figure 1. Change in Average Annual Temperature in Uzbekistan (1880–2020)

Vulnerability and Socioeconomic Risks

By 2030, at least 8 million people in Uzbekistan are expected to live in areas with very high climate risk. If no adaptation measures are implemented, the national economy could shrink by 10% by 2050 compared to a no-climate-change scenario. This will significantly reduce employment and household incomes.

Water Scarcity and Irrigation Challenges

Uzbekistan is projected to become one of the most water-stressed countries globally in the next 20–25 years. Water scarcity will be driven by inefficient water use in agriculture and industry, outdated irrigation infrastructure, and climate-induced reductions in river flows. Currently, 39 billion m³ of water is consumed annually in agriculture, but 36% of it is lost in soil channels and ditches, and another 5–6 billion m³ due to outdated irrigation methods.

National Strategies and Decarbonization Goals

Uzbekistan ratified the Paris Agreement in 2018, committing to limit the rise in global temperature to well below 2°C. The country aims to reduce greenhouse gas emissions per unit of GDP by 35% by 2030 compared to 2010 levels. The “Green Economy” Strategy outlines measures to expand renewable energy, improve energy efficiency, and promote sustainable agriculture.

Agricultural Adaptation Measures

The National Adaptation Program includes:

- Improving soil conservation practices;
- Introducing climate-resilient crops;
- Expanding climate-smart agriculture;
- Modernizing irrigation and drainage infrastructure;
- Establishing agro-meteorological monitoring systems.

Specific initiatives:

- Restoration of 1 million hectares of degraded pastures in the Aral Sea region;
- Establishment of shelterbelts in Karakalpakstan, Khorezm, Bukhara, and Kashkadarya;
- Introduction of water-saving technologies and laser leveling;
- Development of intensive horticulture and viticulture on 300 hectares with drip irrigation systems.

Discussion

Adaptation to climate change requires integrated measures at multiple levels—policy, investment, technology, and education. For instance, transitioning to climate-resilient agriculture and decarbonization of the energy sector will require about \$400 billion by 2060, with a significant share expected from private investment. Such investments can prevent losses from climate change, enhance food security, and reduce poverty.

Conclusion

Achieving Uzbekistan's climate and decarbonization goals requires large-scale investments in green technologies and sustainable practices. These efforts will:

- Increase agricultural productivity by \$4.6 billion within 10 years;
- Save more than 1.8 billion m³ of water annually;
- Prevent environmental degradation and health risks;
- Create new jobs in the green economy.

Failure to act will lead to severe consequences, including a 10% reduction in GDP, loss of agricultural output, and increased poverty.

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