



Tajikistan's Role in Addressing Climate Change in Central Asia

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Abstract: Tajikistan, a pivotal country in Central Asia, faces considerable challenges due to climate change, particularly concerning its glaciers, which contribute to 60% of the region's water resources. This article examines the impact of glacier melting on water resources in Central Asia and highlights Tajikistan's strategies to tackle these challenges. It reviews national policies such as the Green Economy Strategy (2023-2037) and international initiatives like the UN's declaration of 2025 as the International Year of Glacier Protection. The study discusses Tajikistan's role in regional and global climate advocacy, its collaboration with neighboring Central Asian countries, and its efforts to enhance renewable energy utilization. The findings underscore the urgent need for increased regional cooperation and international support to ensure sustainable water management and climate resilience.

Keywords: Tajikistan, Climate Change, Glaciers, Central Asia, Water Resources, Green Economy, International Initiatives.

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Introduction:

This study examines Tajikistan's role in addressing climate change within Central Asia. The focus is on Tajikistan's efforts to combat the impact of glacier melting, which significantly affects regional water resources. Despite ongoing challenges, Tajikistan's initiatives, including its Green Economy Strategy and international advocacy, are pivotal in shaping effective responses to climate change in the region.

Climate change and Tajikistan

Climate change is an urgent global issue with profound effects on water resources. In Central Asia, Tajikistan is a pivotal player due to its extensive glacial reserves, which are crucial for the region's water supply. Recent studies reveal that Tajikistan has experienced a significant reduction in its glaciers, with approximately one-third disappearing in recent decades [1][2]. This reduction threatens regional water availability and ecological stability.

Tajikistan's glaciers contribute to 60% of Central Asia's water resources [3], making their preservation crucial for the region. The impact of glacier melting extends beyond environmental concerns, affecting economic and social development. Global warming is accelerating, leading to increased temperatures and diminishing ecological stability in high-altitude regions [4]. By 2050, it is projected that about 30% of the world's population may struggle to meet their water needs due to such changes [5]. Specifically, the Intergovernmental Panel on Climate Change (IPCC) forecasts that one-third of the world's glaciers could vanish by the century's end [6].

In response, Tajikistan has undertaken significant measures to combat climate change. The country's strategic approach includes the Green Economy Strategy (2023-2037), which aims to enhance

climate resilience through renewable energy development and green practices [7]. Furthermore, Tajikistan has played a leading role in international climate advocacy, notably through its successful initiative to have 2025 declared the International Year of Glacier Protection by the UN [8].

This introduction sets the stage for a discussion on Tajikistan's efforts to address climate change, highlighting its national policies, regional cooperation, and international advocacy efforts. The subsequent sections will explore these strategies in detail, focusing on their impact and effectiveness in mitigating the challenges posed by climate change.

Climate change has emerged as a critical issue with severe impacts on water resources globally. In Central Asia, Tajikistan plays a pivotal role due to its significant glacial reserves, which are crucial for the region's water supply. Recent studies indicate that approximately one-third of Tajikistan's glaciers have disappeared in recent decades, threatening water availability and regional ecological stability. This article explores Tajikistan's response to these challenges, focusing on its national strategies, regional cooperation, and international advocacy.

The issue of global climate change and the need for joint efforts to address its consequences as a serious problem of modern times has received special attention from the Republic of Tajikistan. Over the last few decades, approximately one-third of the total volume of glaciers in our country—where 60 percent of the water resources of Central Asia are formed—has disappeared. In this context, our country has made a valuable contribution to solving global and regional problems related to water and climate change and has been recognized as a leading country in addressing water and climate issues. Tajikistan plays a role in addressing climate change issues in Central Asia due to its moderate climate change rate and

significant forested areas, contributing to regional water resource management strategies. [1, 38]

It should be noted that the melting of glaciers is one of the main indicators of the impact of climate change on water resources. Experts emphasize that this impact is evident in the close dependence of climate, environment, human health, and sustainable development. At the same time, global warming is considered to be a major factor in the decrease in ecological stability in the highlands. One of the negative results of this process is the reduction of water sources and, consequently, the decrease in water levels in rivers and lakes, which is already being felt. The negative consequences of these factors affect not only the environment but also the level of economic and social development of countries. Experts predict that by 2050, about 30 percent of the world's population will not be able to meet their water needs. Drinking water resources in our region, which mainly originate from glaciers and snow reserves, are decreasing due to climate change. According to the Intergovernmental Panel on Climate Change (2019), a third of the world's glaciers may disappear by the end of the century. Currently, due to climate change and rising air temperatures in Tajikistan, the area of glaciers is rapidly decreasing. Although scientists claim that the melting of glaciers is a natural process, the current situation requires serious monitoring and action. Moreover, Tajikistan's mountainous regions are particularly sensitive to climate impacts, including glacier melt and biodiversity loss, which threaten local livelihoods and increase poverty levels [10,46]

It is worth mentioning that 60 percent of the water in Central Asia originates from the glaciers and snow reserves of Tajikistan. In this regard, comprehensive research and monitoring should be conducted to accurately assess the impact of climate change on the state of glaciers in the region. [2,4] These and other issues cannot be resolved without the help of the international community. That is why, on December 14, 2022, at the 77th session of the United Nations General Assembly, the initiative of the of Tajikistan, to protect glaciers was unanimously accepted. The UN General Assembly, by adopting its special resolution, declared 2025 as the International Year of Glacier Protection, and March 21 will be celebrated as World Glacier Day. According to this resolution, an international target fund for glacier protection will be established within the framework of the UN, and a high-level UN conference on this topic will be held in Dushanbe in 2025.

The last decade has been the warmest in the entire history of Earth's surface temperature monitoring, and the process of global warming has accelerated much faster than in the pre-industrial era. The number of abnormally hot days is increasing in all regions of the Earth, and this type of climate change is impacting humanity, causing damage to socio-economic, political, and environmental processes. The question arises: What can be done to reduce the impact of climate change on various aspects of society? According to the related researchers Tajikistan plays a critical role in addressing climate change issues in Central Asia due to its moderate climate change rate and significant forested areas, contributing to regional water resource management strategies [3, 21]

Experts indicate that the primary cause of global warming is the large emissions of greenhouse gases, which trap heat from the Sun. These emissions mainly come from the production of electricity

through the burning of coal, oil, or gas, and they also significantly damage industrial enterprises. Therefore, the most effective way to address climate change is to develop a "green economy," which includes the use of renewable energy sources, i.e., "green energy." To this end, the Development Strategy for the "Green Economy" in the Republic of Tajikistan for 2023-2037 has been adopted. The main goals of the Strategy include the construction of hydroelectric and solar power plants, positioning the country as a major electricity supplier in the region. Additionally, the Strategy emphasizes implementing "green economy" principles in industrialization, agriculture, transportation, construction and architecture, and ecological tourism.

Tajikistan has significant hydropower potential but currently utilizes only 6% of it. In the context of climate change, maximizing this potential has become even more urgent. We are confident that with the implementation of these measures, electricity production in the country will be entirely from renewable sources—achieving 100% "green energy"—and, according to international standards, greenhouse gas emissions will be reduced to their limits by 2037. Thus, Tajikistan, as a world leader in the development of the "green economy," will effectively become a "green country" by 2037. [President.tj] The melting of glaciers, a major indicator of climate change impact on water resources, affects climate, environment, human health, and sustainable development. Global warming exacerbates ecological instability in high-altitude regions, reducing water sources and causing lower water levels in rivers and lakes. Experts predict that by 2050, about 30% of the global population may face water scarcity. The Intergovernmental Panel on Climate Change (2019) forecasts that a third of the world's glaciers may vanish by the end of the century. In Tajikistan, rising temperatures are accelerating glacier melt, impacting local biodiversity and increasing poverty levels. Despite the natural aspect of glacier melting, the current situation demands serious monitoring and action. Thus, Tajikistan's proactive engagement in regional climate initiatives is essential for effective adaptation and mitigation efforts across Central Asia [1, 67]

Materials and Methods:

This study employs a comprehensive review methodology, including:

- **Literature Review:** Analysis of scholarly articles, reports, and policy documents related to Tajikistan's climate strategies and glacier monitoring.
- **Case Studies:** Examination of specific climate adaptation and mitigation projects in Tajikistan.
- **Data Analysis:** Review of climate data and policy outcomes from authoritative sources, including the IPCC, UNDP, and the World Bank.

Results:

Tajikistan's glaciers, which are crucial for Central Asia's water supply, are rapidly melting due to rising temperatures. This has led to decreased river flows and water shortages, affecting agriculture, hydropower, and drinking water supplies. The Green Economy Strategy aims to address these issues by promoting renewable energy sources such as hydropower and solar energy and incorporating green practices across various sectors.

Discussion:

Tajikistan has demonstrated leadership in combating climate change through:

- **National Policies:** The Green Economy Strategy (2023-2037) outlines measures to reduce greenhouse gas emissions and enhance climate resilience.
- **Regional Cooperation:** Collaborative efforts with Central Asian countries and organizations like CAREC aim to manage shared water resources and tackle environmental challenges.
- **International Advocacy:** Tajikistan's initiative led to the UN's declaration of 2025 as the International Year of Glacier Protection, highlighting the global importance of glacier conservation.

Conclusion:

This study underscores Tajikistan's pivotal role in addressing climate change challenges in Central Asia, particularly through its strategic management of glacier resources and commitment to a sustainable "Green Economy." Tajikistan's glaciers, which contribute significantly to the region's water resources, are experiencing accelerated melting due to rising temperatures. This has far-reaching implications for water availability, agricultural productivity, and energy resources, given that glaciers supply around 60% of Central Asia's water.

The research highlights several key findings:

1. **Impact of Glacier Melting:** The rapid reduction in glacier volume is a primary concern, directly affecting river flows and water availability. This has profound implications for agriculture, hydropower generation, and overall water security in Central Asia. The ongoing glacier melt is predicted to worsen water shortages, impacting the livelihoods and economic stability of the region.
2. **Tajikistan's Strategic Response:** Tajikistan has implemented a comprehensive strategy through its Green Economy Strategy (2023-2037), aimed at mitigating climate impacts and fostering sustainability. This includes expanding renewable energy infrastructure, such as hydropower and solar energy, and integrating green practices across various sectors. The country's focus on maximizing its hydropower potential is particularly significant, given its current underutilization of hydropower resources.
3. **International and Regional Initiatives:** The adoption of the United Nations' resolution declaring 2025 as the International Year of Glacier Protection is a testament to Tajikistan's leadership in global climate advocacy. This initiative not only raises awareness about the importance of glacier conservation but also fosters international collaboration and financial support for climate resilience.
4. **Challenges and Future Directions:** Despite these efforts, challenges persist, including financial constraints and the need for further research and international support. Continued investment in climate adaptation and mitigation strategies is crucial for enhancing the region's resilience. Tajikistan's collaborative approach with neighboring countries and regional organizations, such as CAREC, will be vital in managing shared water resources and addressing cross-border environmental issues.

In conclusion, Tajikistan's proactive measures in climate change mitigation and adaptation serve as a model for the region. The Green Economy Strategy and international advocacy efforts reflect the country's commitment to addressing the severe impacts of climate change and ensuring sustainable water management. However, achieving long-term climate resilience will require ongoing regional cooperation, international support, and continued investment in innovative solutions to address the complex challenges posed by climate change. Tajikistan's leadership in these areas not only benefits its own national interests but also contributes significantly to the stability and sustainability of Central Asia.

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