CLIMATE RISK MANAGEMENT (CRM) AND EFFECTIVE STRATEGIES IN UZBEKISTAN

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ABSTRACT.

Objective*: Economies, ecosystems, and population well-being are all impacted by climate change, which presents serious challenges for nations around the world. Uzbekistan, a surrounded country in the Central Asia. This article provides an overview of Uzbekistan's methods for mitigating the effects of climate change and adapting to them. It also looks at the country's strategy and risk management programs.*

Methods: Type of research: *a comprehensive literature review and semi-structured interviews are provided to analyze the overview and main points of the risks of climate. The selection of prior research was based on articles indexed by Emerald insight.com Discover Journals, Books & Case Studies and Google scholar journals.*

Findings:

The detailed explanation of the climate risk management, as well as the latest risks to economic supply chain of the current era, are formulated. Threats to a nation's economic and financial management are explored, focusing on the latest risks associated with climate and global environment. Based on this, an analysis of various threats arising from climate changing progress is given.

Keywords*: climate risk management, types of risks in management, global supply chain risks and regulatory risks.*

INTRODUCTION

Risks to many different regions of the world are greatly increased by global issues like climate change. The Central Asian all sides locked country of Uzbekistan is particularly vulnerable to the effects of climate change. The nation has a difficult time controlling climate risks because of its dry climate, reliance on agriculture, and scarce water supplies. This article will examine the strategies Uzbekistan has put in place to manage climate risk and will address the significance of adaptation and mitigation measures in preserving the nation's future.

One of the most important concerns of our day is climate change, and it is critical for citizens, communities, and policymakers to be aware of the risks involved. We will examine the idea of climate risk in detail in this extensive guide, looking at its many facets and consequences. This guide attempts to give a thorough understanding of climate risk and its significance in influencing our economic future, covering everything from the effects of extreme weather events to the long-term effects on ecosystems and human health.

Every part of our lives is impacted by the urgent issue of climate change. The effects of climate change are becoming more noticeable every day, from extreme weather events to rising sea levels. Therefore, putting into practice efficient strategies for climate risk management is essential for individuals, businesses, and governments. We will look at some of the best tactics in this article to help reduce the risks brought on by climate change and guarantee a sustainable future for future generations.

Conducting an exhaustive evaluation of current and projected climatic conditions is essential to gaining a comprehensive understanding of climate risks in Uzbekistan. This evaluation ought to cover a wide range of variables, including variations in temperature, patterns of precipitation, and the frequency and severity of extreme weather events.

Researchers can create a baseline for the current climate risks and determine how these risks may change over time as a result of climate change by examining these components.

It is also critical to determine which industries in Uzbekistan are most vulnerable to the effects of climate change. Water resources, infrastructure, energy production, agriculture, and human health are a few examples of these industries. Policymakers and stakeholders can focus their efforts on putting into place efficient adaptation and mitigation measures by identifying which sectors are most vulnerable. For example, shifting patterns of precipitation may result in lower crop yields in the agricultural sector, requiring the use of drought-resistant crop varieties and water management techniques.

All things considered, an exhaustive study of climate risks in Uzbekistan must look at both the present and future state of the country's climate in addition to pinpointing the particular industries most vulnerable to its effects. By carrying out these evaluations, policymakers can gain a deeper comprehension of the problems caused by climate change and create focused plans to protect communities and industries that are particularly vulnerable.

Methods:

To explore climate risk management and strategies in Uzbekistan, in this article is employed a mixed-methods approach. First, a comprehensive literature review was

conducted to understand the existing policies, initiatives, and research related to climate change and its impacts on the country. Second, semi-structured interviews were conducted with key stakeholders, including government officials, non-governmental organizations, and climate experts. These interviews provided insights into the current state of climate risk management and adaptation strategies in Uzbekistan.

Results and Discussion:

Climate change risk management strategies actually can be categorized into four main groups:

•**Mitigation**: These are actions taken to decrease the emissions of greenhouse gases of uzbek industries, aimed at limiting the extent of climate change.

•**Adaptation**: At this point Uzbek government should focus on enhancing society's ability to cope with the consequences of climate change, allowing for more effective responses to shifting environmental conditions.

•**Geoengineering or Climate Engineering**: Uzbek economy need to establish and organize some deliberate interventions in the Earth's systems to counteract some of the effects of greenhouse gas emissions, often through advanced technologies.

•**Knowledge Expansion**: These approaches Uzbek agricultural industries has to deepen our understanding of the climate system, providing a foundation for informed and proactive risk management decisions.

The results of this research demonstrate that Uzbekistan has begun putting a number of risk management and adaptation strategies into practice in response to the urgency of climate change.

National Climate Change Adaptation Plan: Uzbekistan has developed a National Climate Change Adaptation Plan that details the country's approach to lowering climate risks and promoting resilience in a number of industries, including infrastructure, agriculture, and water resources.

The results of this study demonstrate that Uzbekistan has begun putting a number of risk management and adaptation strategies into practice in response to the urgency of climate change. In its Strategy 2030, the Asian Development Bank (ADB) noted "tackling climate change, building climate, and disaster as one of its seven operational priorities, resilience, and improving environmental sustainability"[1].

[1] World Bank Open Data (2020). Data Retrieved October 2020. Data Bank: World Development Indicators. URL: https://databank.worldbank.org/source/world-development-indicators 2 World Bank Group (2020). World Development Indicators. URL: https://data.worldbank.org/indicator/NY.GDP.MKTP.Uzbekistan Exports, Imports and Trade Partners. URL: https://atlas.media.mit.edu/en/profile/country/uzb/]

Climate change is currently taking place everywhere. The framework for 2017–2030 identifies the mainstreaming of climate considerations into corporate strategies and policies, sector, and practices, climatic project design, implementation, monitoring, and evaluation; thematic operational plans; and country programming.

The primary institutional measure to fulfill its obligations under Strategy 2030 is to take change into consideration. environment of ADB. All projects must go through a full climate risk assessment as part of the risk management framework at the concept stage.

and adaptation evaluations for medium- to high-risk projects.

The Republic of Uzbekistan, a landlocked nation in Central Asia that borders Tajikistan, Afghanistan, Kazakhstan, Turkmenistan, and Afghanistan, with a total land area of 447,400 square kilometers. Kyrgyzstan. With 33.5 million people, it is the most populated nation in Central Asia. The one of the nations with the fastest increasing GDPs in 2019 was Uzbekistan, whose GDP increased by 5.6% countries' economy.

The majority of the nation's exports are made up of primary sector goods, which provide the highest profits. originating from cotton, natural gas, and metals (gold, copper, and zinc). Uzbekistan participates in international partnerships and cooperation in order to exchange best practices for managing climate risk and get access to climate funds. Due to the potential effects of water shortage on crop output and the lives of the population depending on agriculture, this poses a serious danger to Uzbekistan's agricultural industry. Climate change is also making Uzbekistan's water shortage a bigger problem.

Since Uzbekistan depends on water from upstream nations like Tajikistan, Afghanistan, and Kyrgyzstan, the melting of their glaciers as a result of rising temperatures is concerning for them. These glaciers are melting at an alarming rate as a result of climate change and rising global temperatures, which is forcing Uzbekistan to have less water supplies.

Additionally, droughts in Uzbekistan are becoming more frequent and intense as a result of global warming (Towards a Greener Economy in Uzbekistan, 2022).

In Uzbekistan, droughts are occurring increasingly often, and the country's desert environment and high temperatures are making matters worse. According to projections, droughts will worsen and last longer in the future, causing serious problems for agriculture and people's quality of life.

Uzbekistan must create comprehensive policies for the sustainable use of water resources in order to address these climate risks effectively (Usmanov et al., 2016).

This entails taking action to preserve water, promoting effective irrigation techniques, investigating other water sources like desalination, and investing in infrastructure for water management and storage.

To lessen the impact of climate change on water resources, Uzbekistan should emphasize the development of mitigation and adaptation techniques. The increased frequency of extreme weather occurrences in Uzbekistan, such as heavy rainstorms and flash floods, is one new climate danger.

These occurrences have the potential to exacerbate the consequences of droughts and water scarcity by causing erosion, landslides, and damage to irrigation systems. A thorough strategy to climate risk management is required in order to manage these new climatic threats in Uzbekistan successfully.

Collaboration amongst a variety of stakeholders, such as government agencies, global organizations, researchers, and local communities, should be a part of this strategy. In order to increase the precision of weather forecasts and provide early warning, efforts should be concentrated on advancing scientific research and monitoring systems.

To increase the precision of weather forecasts and allow early warning systems for extreme occurrences, efforts should be concentrated on improving scientific research and monitoring systems. Investment in the creation of climate-resilient infrastructure is also crucial. Examples include irrigation systems and water storage facilities that can survive severe weather events.

Additionally, capacity-building programs should be established to improve farmers' and other stakeholders' knowledge and expertise in climate-resilient agricultural methods.

These include strategies like drought-tolerant plant selection, agricultural diversification, and conservation agriculture.

The COVID-19 pandemic has resulted in unprecedented negative social and economic consequences. Moreover, it has illustrated the compounding effects of introducing another crisis on top of the numerous challenges that vulnerable communities already grapple with daily. This situation has the potential to lead to severe health, social, economic, and environmental crises, leaving a profound and enduring impact.

However, as governments swiftly respond and establish the groundwork for their financial, economic, and social recovery, they find themselves in a unique position to build economies that are more sustainable, inclusive, and resistant to future shocks.

In both short and long-term recovery strategies, it is crucial to prioritize investments that stimulate employment and economic growth, have positive effects on human, social, and natural resources, preserve biodiversity and ecosystem services, enhance resilience, and promote the transition to low-carbon economies.

Uzbekistan experiences an arid, continental climate characterized by significant temperature fluctuations both within days and across seasons. The majority of the country (approximately 79% of its total area) consists of flat terrain, mainly semi-desert steppes and desert regions. These desert areas, primarily in the far west, have developed due to the shrinking of the Aral Sea. The southeastern regions, encompassing major cities such as Tashkent and Samarkand, have a continental climate and feature high mountains, which are part of the Tien-Shan and Gissar-Alai Ranges.

The summer season is characterized by long, scorching, and dry conditions, with the hottest month, July, having an average monthly temperature of 27.2°C. In many major cities, the daily maximum temperature reaches an average of 35°C during this period. Winters, on the other hand, are cold, with average monthly temperatures ranging from -1°C to -3°C between December and February, as per the latest climate data from 1991 to 2023[1].

The temperature increases in Uzbekistan showed significant regional differences. The most rapid warming was observed in the northern regions and major cities, with temperatures rising by 0.30°C to 0.43°C per decade. In contrast, mountainous areas experienced milder warming, with temperatures increasing by 0.10°C to 0.14°C per decade. The warming trend was particularly pronounced during spring (0.39°C per decade) and autumn (0.31°C per decade), while winter saw a relatively modest temperature rise of 0.13°C per decade[2]

On March 31, 2022, the "Taliban" Pre-Afghanistan principles started a project for the construction of a large canal in the north of the country. According to him, the Koshtepa canal, which starts from the Amudarya in Balkh region, is being built. The Amudarya water drops to 34 cubic kilometers around the low water level. If this canal is completed, about 10 cubic kilometers, that is, a third of the river's water will flow into the interior of Afghanistan. This may have serious consequences for Khorezm, Bukhara, Surkhandarya and Navoi regions, as well as the Republic of Karakalpakstan and Turkmenistan. Koshtepa channel is not so small that it is already clearly visible from space. Construction continues on a 65-kilometer section.

The canal is being built to receive 10 cubic kilometers of water from the Amudarya per year. "Even if half of the water from the transboundary river is turned

[1] Centre of Hydrometeorological Service, Republic of Uzbekistan (2016). Third National Communication of the Republic of

[2] Uzbekistan Under the UN Framework Convention on Climate Change. URL: http://www.un-gsp.org/sites/default/files/documents/ tnc_of_uzbekistan_under_unfccc_english_n.pdf 18 WBG Climate Change Knowledge Portal (CCKP, 2020). Climate Data: Historical. URL: https://climateknowledgeportal.worldbank.org/country/Uzbekistan/climate-data-historical.

to the new channel, it will have a significant impact on the downstream countries which led to drought," the Taliban journalist said.

Today, the average annual flow of Amudarya is 79 cubic kilometers. Its length from its source to the Aral Sea is 2540 km. However, due to the lowering of the level, the river no longer reaches the Aral Sea. Now the water of the river ends in the Mejdurechensk reservoir, which feeds the Aral lakes. it is worth noting that the absence of any water distribution agreement between Central Asian countries and Afghanistan could lead to significant challenges. This situation arises from the fact that Afghanistan has not ratified the United Nations Convention on the Protection and Use of Transboundary Watercourses and International Lakes.

The Central Asian countries' Inter-State Coordinating Water Commission had previously foreseen the likelihood that Afghanistan would assert its entitlement to water resources, and indeed, this expectation has materialized.

The term "transboundary waters" and the applicable principles under international law are outlined by the UN Convention on the Protection and Use of Transboundary Watercourses and International Lakes, which defines these waters as including both surface and groundwater.

Under Article 9 of the Convention, it is mandated that the concerned parties must engage in negotiations to establish bilateral, multilateral, or other types of agreements based on principles of equity and fairness.

The New Canal is 285 km long (of which more than 100 km have already been dug out), 100 m wide, 8.5 m deep, and cost roughly $684 million to build. It is rumored that governmental monies are being used to build the canal. The Project is expected to be finished in full by 2028. The building project included over 6,000 employees.These kind of threats can led to misunderstanding and conflict over the water issue but now some convention are being presented and governments are struggling to safe and agree on the both side benefits.

In Uzbekistan, it is anticipated that average temperatures will experience a substantial increase by the 2090s when compared to the baseline of 1986-2005. This warming trend is projected to surpass the expected global average temperature rise. The considerable disparity among emissions pathways underscores the potential impact of global emissions management. Notably, both the highest and lowest temperatures are forecasted to increase at a faster rate than the daily mean temperatures. Specifically, a temperature rise of 5.6°C is projected for the 2090s under the RCP8.5 emissions scenario for both maximum and minimum temperature indicators.

Understanding and evaluating the hazards themselves is one of the fundamental tenets of climate risk management. This entails a thorough examination of the possible effects of climate change on various industries and geographical areas. Decision-

makers may set priorities for resources, create focused adaptation plans, and strengthen resilience by determining the regions that are most susceptible to threats associated to the climate.

Diverse techniques are used to handle climate threats efficiently. Scenario analysis, which involves simulating several future climate scenarios and thei r possible effects, is one extensively utilized strategy.Given that it takes into account a number of variables, including greenhouse gas emissions, economic development, a nd technology improvements, this approach enables a more nuanced analysis of uncer tainty

The incorporation of climate risk into current risk management frameworks is a crucial component of risk management in general. This entails incorporating environmental factors into company planning, investment choices, and policy formulation.

Agriculture;

Climate change has the potential to impact food production through both direct and indirect mechanisms that affect crop growth processes.

Direct influences encompass changes in factors like carbon dioxide levels, precipitation patterns, and temperatures.

Indirect impacts involve alterations in the availability of water resources, shifts in seasonal patterns, modifications in the transformation of soil organic matter, increased soil erosion, variations in pest and disease prevalence, the introduction of invasive species, and the reduction of arable land due to salinization and desertification. It is anticipated that, even when following lower emissions scenarios, these effects will have adverse consequences on staple crop yields at an international scale.

Researchers have projected reductions of 5% in global wheat yields and 6% in maize yields, even if the warming is confined to 1.5°C. Additionally, changes in the suitable geographical areas for specific crops are unavoidable, although the magnitude and pace of these changes hinge on the chosen emissions trajectory. Importantly, water scarcity in Uzbekistan has been recognized as a significant risk to both global food trade and security.

The potential reduction in water availability poses a significant risk to Uzbekistan's irrigated agriculture, endangering the livelihoods of hundreds of thousands of agricultural workers. To mitigate this threat effectively, studies emphasize the urgent requirement to enhance irrigation efficiency and upgrade the aging and substandard infrastructure in the sector[1].

[1] World Bank (2013). Uzbekistan: Overview of Climate Change Activities. Washington, DC.: World Bank. URL: https://openknowledge. worldbank.org/handle/10986/17550 55 Bekchanov, M. and Lamers, J.P. (2016). Economic costs of reduced irrigation water availability in Uzbekistan (Central Asia).

- Spring wheat: yield reduction of 41%–57%
- Winter wheat: yield reduction of 31%–43%
- Apples: yield reduction of 39%–63%
- Potatoes: yield reduction of 37%–57%
- Tomatoes: yield reduction of 29%–57%
- Cotton: yield reduction of 25%–49%
- Alfalfa: yield reduction of 27%–39

The impact of climate change on Uzbekistan's livestock subsector, accounting for 39% of the agricultural production, is not as straightforward as it is for crop farming. It is less certain.

The anticipated increase in temperatures, coupled with more frequent and prolonged occurrences of extreme heat, is expected to directly diminish the productivity of livestock due to heat stress among the animals. This is a concerning risks, especially considering that various models predict a substantial increase in the duration of warm spells in Uzbekistan, as early as the 2030s, across all emissions scenarios.

Studies have established a relatively clear link between heat stress and various aspects of human life, such as labor productivity, household consumption habits, and, indirectly, the living standards of households.

Generally, the influence of temperature changes on these factors hinges on whether the temperature shift brings the ambient conditions closer to or farther from the ideal temperature range. The specific optimal range can vary based on local circumstances and adaptive measures in place.

Studies indicate that, on average, a one-degree rise in ambient temperature can lead to a 0.5% to 8.5% surge in electricity demand. Notably, this heightened demand is primarily attributed to the operation of cooling systems in both business establishments and residential spaces.

This increased demand puts pressure on energy generation systems, which is further exacerbated by the strain on the energy generation infrastructure itself. This strain often arises due to the energy generation system's own cooling needs, leading to a reduction in its overall efficiency.

Moreover, the count of annual cooling degree days, representing periods when these cooling systems are necessary, is anticipated to notably rise by the 2090s under the RCP8.5 scenario, potentially doubling its current level.

Strategies;

Developing effective approaches for managing climate risks within Uzbekistan's economy necessitates a comprehensive strategy targeting various economic sectors and

facets. At this point,**economic diversification** is need to enhance resilience against climate risks, Uzbek government should launch to explore diversifying its economy.

Investments in sectors beyond agriculture, such as technology, manufacturing, and services, can create alternative income sources and reduce dependence on climate-vulnerable industries.And also,Companies sould be able to promote a **sustainable farming system.**

The implementation of sustainable agricultural practices, including crop diversification, efficient water usage, and soil preservation, can bolster climate resilience. Equipping farmers with training and access to climate-resistant crop varieties can help mitigate risks linked to shifting weather patterns,while improving water management gives the broader approach to the arid climate and effective water management is essential.

Uzbek companies and financial industries can invest in modernizing irrigation systems, encouraging rainwater collection, drop irrigation and expanding water storage capabilities to address variable precipitation patterns and minimize drought-related impacts.

To improve **infrastructure resilience** as well as, upgrading infrastructure, including roads, bridges, and buildings, to withstand extreme weather events can reduce damage and ensure the continuity of crucial services during climate-related disasters.Promoting renewable energy investments in renewable energy sources like solar and wind power can reduce reliance on fossil fuels, cut greenhouse gas emissions, and enhance energy security. Incentives for adopting clean energy technologies can expedite this transition.

Uzbek policy should strengthen **disaster preparedness** by developing and fortifying early warning systems for climate-related disasters, such as floods, droughts, and heatwaves, is critical. Establishing emergency response plans and educating communities on disaster preparedness can minimize human and economic losses.Uzbek industires nowadays are establishing conservation of biodiversity and safeguarding and rehabilitating natural ecosystems, including forests and wetlands, can enhance biodiversity and contribute to climate resilience. Diverse ecosystems serve as natural buffers against extreme weather events and support agricultural productivity.

International Collaboration with neighboring nations and international organizations to exchange knowledge, technology, and resources for climate adaptation is vital.

Participation in regional initiatives can grant access to funding and expertise.Raising and educating the public on climate change risks and the significance of sustainable practices is crucial.

Communities should be encouraged to adopt climate-resilient behaviors and back initiatives that advocate for environmental conservation.Embedding climate considerations within national policies and development plans is essential.

Regular climate risk assessments and policy adjustments, guided by current scientific insights and evolving climate patterns, should be integral to this process.By embracing these approaches and fostering a coordinated, holistic strategy, Uzbekistan can enhance its ability to withstand climate risks and establish a more sustainable and climate-resilient economy.

Conclusion.

None of the risk management options are mutually exclusive. A combination of policy responses are almost certainly part of comprehensive risk management for climate change.

However, in order to be effective, policies must take into account both objective information about the climate system and our relationship to it as well as subjective value judgments about things like whether we are more concerned about the risks of climate change or the potential effects of policy responses, how we evaluate questions of fairness among nations and peoples, and whether we should take into account nonhuman animals or cultural heritage. A challenging risk management situation is resulting from this, which is frequently disputed.

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