Regional Water Crisis: A Case Study of Uzbekistan and its Neighboring Countries

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Article

Regional Water Crisis: A Case Study of Uzbekistan and Its Neighboring Countries

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Abstract: This study explores the geopolitical dynamics of water conflicts in Central Asia, focusing on Uzbekistan and its neighboring countries. Using a mixed methods approach within the framework of political geography, the research analyzes interactions among regional countries and the implications of population growth, agricultural industrialization, and economic competition, which heavily rely on shared irrigation systems and watersheds. It establishes research objectives, evaluates the water crisis, addresses challenges in water management, and examines contentious issues like hydropower, resource hegemony, and ethnic conflict. Also, the study uncovers historical and contemporary factors influencing water conflicts, regional power dynamics, and the complexities of water governance. The findings highlight the potential for conflict, regional instability, and disruptions to peace resulting from population growth and economic competition within shared watersheds. The study concludes with recommendations to enhance regional cooperation, sustainable water management, and peacebuilding, drawing on soft power theory and advocating for collaborative approaches. This research provides valuable insights for policymakers, researchers, and stakeholders involved in water management and regional cooperation amid evolving geopolitical challenges, contributing to informed decision-making, and promoting strategies for sustainable development in the region.

Keywords: geopolitical dynamics; water conflicts; Central Asia; Uzbekistan; regional cooperation

Introduction

Central Asia has long been a volatile region riddled with geopolitical tensions and relentless conflicts over water resources. Among the post-Soviet republics in Central Asia, Uzbekistan, as a landlocked country, finds itself grappling with formidable challenges in effectively managing its water resources (Holmatov et al., 2016). Given its arid climate and surging water demand, it is imperative for Uzbekistan to urgently embrace sustainable water practices. Unfortunately, the region heavily depends on the Amudarya and Syrdarya rivers as its primary water sources, while neighboring republics unabashedly consume copious amounts of water through extensive irrigation. The catastrophic decay of irrigation infrastructure, predominantly remnants of the Soviet era (Brauch, 2009), has only exacerbated the loss of water and the abysmal efficiency in its utilization. The heart of the matter lies in the shared rivers, where conflicts and disputes erupt among neighboring countries over the use and distribution of this precious resource. In recent years, Uzbekistan's new government, assuming power after 2017, has half-heartedly initiated feeble efforts to tackle the water-related challenges and repair the crumbling irrigation infrastructure. These feeble attempts manifest in the form of hollow regional water diplomacy and cooperation, purportedly aimed at resolving disputes over water resources. However, it is apparent that the government's actions fall woefully short of addressing the dire need for effective water management and distribution in the region. Unfortunately, tensions over water resources persist unabated, continuing to mold the geopolitical landscape with each passing day.

This study endeavors to embark on a comprehensive examination of the geopolitical dimensions underlying the water issue between Uzbekistan and its neighboring republics, with a specific focus on the Amudarya and Syrdarya river basins. The primary objective is to dissect and analyze the causes and factors that contribute to conflicts and disagreements surrounding water issues. By doing

so, we aim to shed light on the far-reaching implications these conflicts have on peace, security, and human welfare in Central Asia. Moreover, we dare to explore holistic solutions to avert the impending water crisis looming large over the region. A multidisciplinary approach serves as the cornerstone of this study, combining incisive geopolitical analysis, rigorous geographic examinations, and the invaluable insights garnered from a myriad of relevant studies and works. Qualitative research methods such as meticulous literature reviews, comprehensive data analysis, and insightful case studies shall be employed to forge a holistic understanding of the intricate web of water-related challenges plaguing Central Asia.

In our quest for a comprehensive understanding of the water issue, we turn to the concept of resource nationalism or hegemony, which is most apt in dissecting the dynamics of water resources within the region. Through this lens, we seek to unravel how the stranglehold on the control and distribution of water resources shapes precarious geopolitical relationships and fuels unrelenting conflicts. Inextricably linked to this study is the seminal soft power theory pioneered by Joseph Nye in the 1990s. Soft power, characterized by a nation's ability to exert influence through cultural, economic, and diplomatic means, rather than brute military force, holds immense relevance in the context of the water issue (Zaharna, 2021). Soft power diplomacy, if genuinely pursued, can play a pivotal role in fostering cooperation, resolving conflicts, and spearheading sustainable water management initiatives throughout Central Asia.

This study aligns with previous work that has boldly examined the geopolitical dimensions of water resources in different regions. These studies highlight the critical role of resource interdependence and emphasize the need for regional cooperation to address water scarcity. Notable contributors include David Reed's *"Water, Security, and U.S. Foreign Policy"* (2017), which highlights the link between water scarcity, national security, and the importance of comprehensive water management strategies. Aaron Wolf's *"Hydropolitics along the Jordan River"* (1995) examines the geopolitical dimensions of water scarcity and aligns with our examination of tensions over shared water resources in Uzbekistan and neighboring republics. François Molle and his colleagues' *"Hydraulic bureaucracies and the hydraulic mission […]"* (2009) offers insights into managing water resources in unstable regions and inspires us to seek holistic solutions in Central Asia. Anton Earle and his colleagues' *"Transboundary water management and the climate change debate"* (2015) examines the challenges of transboundary water management and guides our analysis of increased cooperation in Central Asia. Salman & Uprety's *"Conflict and cooperation on South Asia's international rivers: A legal perspective"* (2021) extends our understanding of water conflicts and legal frameworks beyond Central Asia. Building on this work, our study aims to comprehensively analyze water issues in Uzbekistan and its neighboring countries, examine the causes of conflict and implications for peace, and present holistic solutions. Through collaborative efforts, we can overcome the grip of water scarcity and forge a better future.

Background of the Study

In January 2022, a severe power outage ensued in Uzbekistan due to a systemic failure within the power grid. The root cause of this blackout was a malfunction at the Sirdarya thermal power plant, resulting in cascading effects that affected both Kazakhstan and Kyrgyzstan (refer to Appendix, Figure A). This synchronized disruption of the power grid had profound implications for the inhabitants of Uzbekistan and its neighboring countries, particularly exacerbated by the peak intensity of the winter cold wave. The incident highlighted the lingering reliance on outdated Soviet-era power infrastructure and underscored the interdependency among these nations for their energy supply (source: www.gazeta.uz, 2022/03/16). Likewise, in May 2020, during the height of summer, a calamitous event unfolded in Uzbekistan with the collapse of the "Sirdaryo" thermal power plant "Sardoba" dam in the Syrdarya region, known as a crucial nexus in Central Asia's vital grid (Xiao et al., 2022). The breach led to the release of water into reservoirs, causing widespread flooding across extensive agricultural areas. The devastating impact extended beyond Uzbekistan, affecting neighboring Kazakhstan and Kyrgyzstan as well. The dam failure brought to the forefront the pressing issue of transboundary water management in this water-scarce region. Tajikistan, renowned for its hydropower potential in Central Asia, also grapples with the challenge of providing electricity to its citizens as water levels in the hydropower-generating rivers continue to dwindle. This

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predicament not only jeopardizes the quality of life for the populace but also poses a threat to the agricultural sector within the country (source: www.eurasianet.org, 2023/04/04).

Kyrgyzstan, a geographically mountainous nation endowed with abundant water resources, confronts the predicament of water scarcity. Despite the availability of water, the water crisis carries significant implications for the socio-economic development of the country, as Kyrgyzstan primarily exports hydroelectric energy to neighboring countries, particularly Uzbekistan. Kyrgyzstan, which encompasses the Fergana Valley of Uzbekistan, plays a crucial role in meeting the water needs of the region, leading to conflicts in the border areas. Additionally, two districts of the Fergana region are situated within Kyrgyz territory, creating enclave areas (refer to Appendix, Figure B). The water issue in Uzbekistan assumes critical proportions, capable of precipitating a regional conflict, given the interconnectedness of the Central Asian republics through water bodies. Furthermore, the entirety of the riverbeds of Uzbekistan's two main rivers lies beyond the country's current borders, further intensifying the potential for water-related disputes in Central Asia. Consequently, this situation engenders a geopolitical dynamic in the region. So, these considerations lead to the following hypotheses in this study (Figure 1):

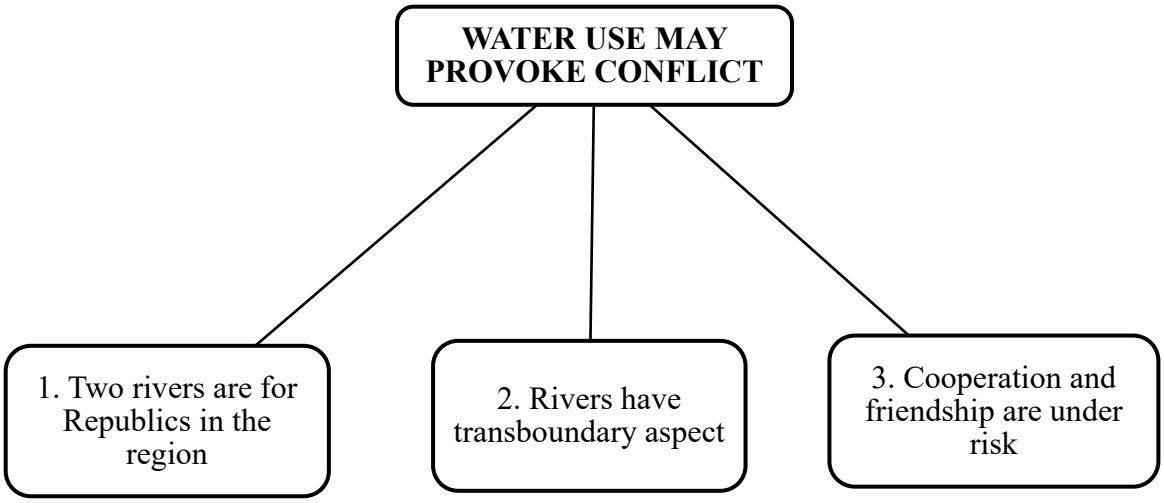

Figure 1. Hypotheses.

Thus, our study delves into the intricate nature of water resource distribution, recognizing its geopolitical ramifications. The perspectives of various Uzbek and foreign experts, as expressed in television and internet publications, have been meticulously examined. The prevailing consensus suggests that recent years have witnessed a geopolitical landscape shaped by the distribution of water resources, posing security challenges between Uzbekistan and its neighboring states. It is evident that water-related disputes will impede cooperation and partnership across various domains between Uzbekistan and its neighboring countries. Therefore, this study seeks to comprehensively explore the complexities surrounding water distribution to gain a deeper understanding of the issue.

Objective Framework

Several scholarly inquiries have employed the renowned security theory propagated by the Copenhagen School to scrutinize the multifaceted dimensions of contentious issues such as the one at hand (Glass, 2010; Thapliyal, 2011; Hadian & Rigi, 2019; Stępka, 2022; Mohapatra, 2023). The Copenhagen School posits that security is not an inherent state but a socially constructed concept, emerging through subjective interactions and discursive practices among influential actors who propose threat definitions and relevant audiences who accord recognition to such definitions. It signifies a deliberate process of constructing security (Buzan et al., 1998; Stępka, 2022). Hence, in light of the uncharted landscape pertaining to the political geography of water conflict in the Amudarya and Syrdarya watersheds of Uzbekistan, this study seeks to shed comprehensive illumination on this intricate phenomenon. Numerous factors contribute to the vexing water predicament in Uzbekistan,

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warranting careful scrutiny. Firstly, Uzbekistan boasts the highest population and the most rapid growth rate among its regional counterparts (Figure 2). Secondly, the country's increasing agricultural diversification and burgeoning industrialization, particularly evident in the oasis regions west of Tashkent, exert mounting pressure on the resolution of the water crisis confronting Uzbekistan and its neighboring states.

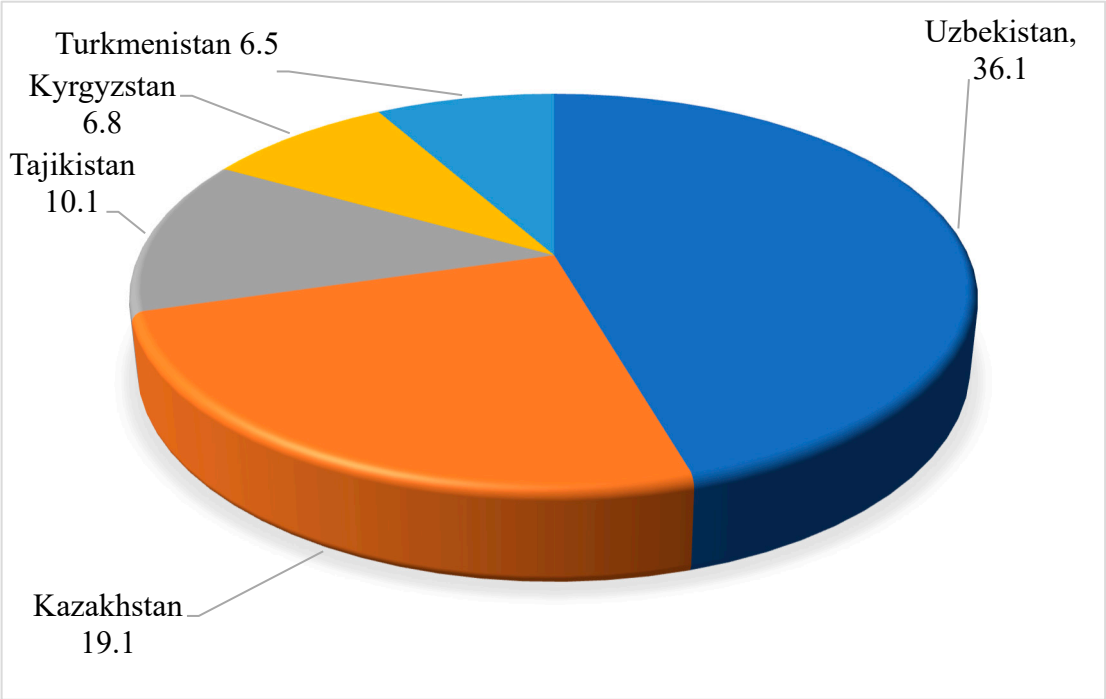

Figure 2. Population Statistics in Central Asia (Million people), 2023.

Sources: Website of each country's official statistics committee.

Notably, the issue of water resources and security in Uzbekistan assumes paramount sensitivity in the region, given its potential to significantly impact intergovernmental relations and interstate dynamics (source: www.awwa.org, www.uzsuv.uz, www.un.org, and www.worldwaterweek.org). Consequently, this study primarily adopts a theoretical perspective to explore the intricate interplay between water and security, while also contemplating potential measures that Uzbekistan and its neighboring nations can undertake to ensure regional water security. Geopolitics stands as the overarching theme that permeates this investigation (Vinogradov, 1996; Zakhirova, 2013). This study delves into the trajectories of two pivotal rivers in Central Asia, namely the Syr Darya and the Amu Darya. Considering that the Amu Darya traverses the territories of Uzbekistan and Afghanistan, and the Syr Darya courses through Uzbekistan and Kyrgyzstan, the water predicament transcends mere national confines, assuming a regional dimension (Pianciola, 2020). In this regard, the Syr Darya assumes critical importance as a primary water source for Uzbekistan, thereby wielding the potential to ignite a regional conflict embroiling Kyrgyzstan, Tajikistan, and Uzbekistan. The protracted water conflicts between Uzbekistan and its neighboring countries bear witness to the precarious precipice on which the rapidly evolving Central Asian region teeters, verging on a geopolitical impasse. The study also explores the notion of resource scarcity, colloquially known as the "threat of own resources," which constitutes the underlying trigger for the geopolitical challenges plaguing Central Asia (Karakuzu, 2017; Safranchuk et al., 2022).

Literature Review

It is widely recognized that the abundance or scarcity of natural resources has a significant impact on regional and international relations. When resources are scarce, conflicts often arise between countries, and water is no exception. The current global water scarcity issue, particularly evident in Uzbekistan and its surrounding regions, poses a regional risk and a potential threat to peace. Previous studies have analyzed water conflicts through the lens of critical and classical theories

(Dungen, 1985; Kreamer, 2012; Mohapatra, 2023). Classical literature addresses the concept of "resource scarcity" (Barnett & Morse, 1963; Barbier, 1989; Jayasuriya, 2015), and the term "water scarcity" is commonly used in scientific articles today (Kummu et al., 2016; Wang et al., 2022). Water scarcity often leads to conflicts between independent countries sharing the same water source. Disputes arise over the control of river flow, the construction of infrastructure like hydropower plants or dams, and competition between economic sectors dependent on shared water resources. Consequently, the issue of water scarcity takes on a geopolitical nature, involving struggles for power and control over water resources (Ocakli & Artman, 2023). However, it is worth noting that water scarcity does not always lead to conflict; it can also create opportunities for alliances between countries, as seen in the theory of complex interdependence (Nye, 1987). The intersection of power, knowledge, and space proposed by Michel Foucault (1984) can also contribute to improving the water situation in Uzbekistan and its neighboring countries.

United Nations reports on global water development are widely regarded as authoritative sources. According to the 2020 report, the demand for water is increasing by one percent annually, and inadequate infrastructure for water distribution currently leaves 1.6 billion people facing water scarcity (www.un.org). Population growth, changes in consumption patterns due to globalization, and economic development contribute to water scarcity, which is projected to reach forty percent by 2030 (www.reliefweb.int, 2022/03/21). In different parts of the world, some areas experience water shortages, while others face increased flooding. The UN's statistics reveal numerous floods, underscoring the magnitude of water-related problems and classifying them as significant risks (www.unstats.un.org: SDG Report-2022). Based on the theoretical and analytical data mentioned above, it is evident that the water problem presents a regional and global security challenge, as its crises are deep-rooted and can exacerbate other issues. Water scarcity, as a form of resource scarcity, has the potential to trigger major conflicts on a regional or global scale (Rheinbay et al., 2021). Considering the theoretical and scientific perspectives, the geopolitical implications of the water problem in Uzbekistan can be summarized as follows:

Water is an essential resource for Uzbekistan, but it is also a shared resource with neighboring countries. The utilization of this resource influences relations between the post-Soviet republics of Central Asia. Climate change, global warming, the drying up of the Aral Sea, declining water levels in major rivers like the Amudarya and Syrdarya, water scarcity, population growth, and economic competition pose security challenges in the region. The analysis of these interconnected problems requires a comprehensive consideration of factors such as agriculture, economy, production, precipitation, temperature, and climate change in the region.

Climate change studies highlight the shrinking of Antarctic ice due to global warming, and some research examines the volume of water during hot and dry periods, emphasizing the possibility of regional conflicts arising from a decrease in water volume (Hamidov et al., 2018). There are examples of water-related conflicts leading to armed conflicts in specific regions (Erdonov & Mustayev, 2022). Other academic articles present case studies on unequal water use (Peña-Ramos et al., 2021; Wang et al., 2022). Disputes over water resources or ownership have been identified as underlying causes of conflicts in areas such as Iraq, Syria, Iran, Turkey, and others (Daoudy, 2008; Mueller et al., 2021; Kibaroglu & Scheumann, 2013).

In addition to climate change, water pollution poses a threat to human health and can potentially lead to social or political conflicts in regions like Uzbekistan that share water resources with neighboring countries. Although there are currently no disputes specifically related to water pollution, the existing pollution in Uzbekistan's rivers is causing soil salinization and impacting agricultural practices. Therefore, water pollution in these shared rivers cannot be confined to a single area; it has the potential to escalate into social, environmental, and regional conflicts.

Studies have also explored the water problem in the context of territorial claims, such as water conflicts between Israel and Jordan or Iraq and Turkey (Elmusa, 1995; Ferragina, 2008; www.climate-diplomacy.org, 2021). Similar cases exist in Central Asia. Thus, this research aims to provide a geopolitical analysis of how the water problem threatens peace in a specific region. Resource dependence or scarcity in countries holds geopolitical significance (Dogan, 2021; Nygaard, 2022), and the legacy of the forced resource-sharing system from the USSR era is geopolitically relevant in Central Asia. Conflicts can arise when one republic desires to build infrastructure like dams, reservoirs, or hydroelectric power plants that are perceived as potential dangers by another republic.

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At the international level, some studies suggest that China's dam construction in Tibet harms India, indicating a power struggle and inadequacy between the two countries (Miao et al., 2015; Ho et al., 2019). Such issues are seen as a quest for international political hegemony. The pressure exerted on another country or region that shares the same resource is another aspect highlighted in this context (Boehmer-Christiansen, 1996; Global Risk Report, 2023). Geopolitical considerations of "hegemony" have been applied to the water problem in North Africa (Baconi, 2018) and West Asia (Khalid, 2020). Negotiations based on supply and demand have been proposed as a potential solution to maintaining peace and cooperation (Dore et al., 2010). Central Asia also exhibits signs of resource-based hegemony, with Uzbekistan and Kazakhstan possessing more gas and oil resources while Kyrgyzstan and Tajikistan have more water resources. There is a tendency to exert pressure using their respective resources (Sehring, 2019). However, the current system of resource sharing, including electricity and some rivers or reservoirs left over from the USSR, limits immediate tensions. Nevertheless, the potential for water conflicts remains as local conflicts already occur in the region under the pretext of water (Gleason, 1997). These conflicts negatively impact people's security and ultimately threaten regional stability.

Methodology

The study utilizes a mixed methodology that combines historical analysis, critical observation, and data analysis from international and national reports.

Historical Analysis: The study examines the historical context of water-related issues in Uzbekistan, particularly considering the legacy of resource sharing from the Soviet era. It explores past situations and conflicts related to water resources between Uzbekistan and neighboring countries, with a specific focus on Kyrgyzstan and Tajikistan. By studying historical events and agreements, the analysis aims to provide insights into the dynamics of water-related conflicts in the region.

***Critical Observation*:** A critical approach is adopted to analyze the water problem in Uzbekistan and its geopolitical implications. This involves examining existing international and national reports on Uzbekistan and Central Asia, including annual reports from international organizations. The study critically evaluates the data, identifies patterns, and trends, and considers the underlying causes and consequences of the water problem. It also considers the geopolitical dynamics and power struggles between countries in the region concerning water resources.

***Data Analysis*:** The study incorporates data from various sources, such as official statistical websites (e.g., www.stat.uz, www.stat.kg, www.gov.kz, www.dataportals.org, & www.stat.gov.tm). These sources provide relevant data on water resources, population, agriculture, and other related factors. The collected data is analyzed to identify key trends, patterns, and correlations. Statistical analysis and visual representations, such as charts and graphs, may be used to present the findings in a comprehensive manner.

By combining historical analysis, critical observation, and data analysis, the study aims to provide a comprehensive understanding of the water problem in Uzbekistan, its regional implications, and its impact on security in Central Asia.

Geopolitical Perspective: Water Issues Series

Current Estimates and Data on the Water Crisis

From a geopolitical perspective, the water crisis in Uzbekistan and Central Asia as a whole presents significant challenges. This analysis utilizes historical research, critical observation, and data analysis to delve into the intricate dynamics surrounding water-related conflicts in the region. Drawing insights from international and national reports, this study provides a comprehensive examination and discussion of the available information.

Central Asia is confronted with a severe water crisis, with the average annual water supply per person in the region falling below 1,000 cubic meters (www.un.org). The projected population growth, set to exceed 100 million by 2050, further exacerbates the issue of water scarcity (Michanan, 2016). The Aral Sea, once the fourth-largest lake globally, has experienced a catastrophic decline of approximately 90% in volume since the 1960s, primarily due to irrigation practices, climate change, and other contributing factors. Consequently, the Aral Sea Basin stands out as one of the region's

most profoundly affected by the water crisis (Yanan et al., 2022). The economic ramifications of the water crisis are substantial, potentially amounting to 1.6% of the region's total gross domestic product annually, with agriculture being the sector most impacted (www.worldbank.org, 2022). Inefficient irrigation practices, including leaky canals, outdated technology, and other related factors, contribute to significant water losses estimated to be as high as 60%. Furthermore, climate change is expected to exacerbate the water crisis, with projections indicating a 20-30% decrease in water resources by the end of the century (Michanan, 2016). The transboundary water conflicts between *"Upstream"* and *"Downstream"* countries over the Amudarya and Syrdarya Rivers further compound the challenges faced by Central Asia.

Two Rivers for All

Uzbekistan heavily relies on two rivers, the Amu and Syrdarya, as its primary water sources. However, it is crucial to note that the riverbeds of these two rivers extend beyond the administrative boundaries of Uzbekistan and are shared with neighboring countries. The Amu River flows through Afghanistan, while the Syrdarya River originates in Kyrgyzstan and passes through Uzbekistan. This geopolitical reality highlights the challenges and complexities associated with the "common" utilization of these rivers in the Central Asian region. The Aral Sea Basin, located within the territories of Karakalpakstan and Kazakhstan, historically depended on these two major rivers for water supply, underscoring the pivotal role water resources have played in the region's socioeconomic development. Additionally, the mountainous regions of Uzbekistan and Kyrgyzstan contribute to the water supply through their glaciers (Rakhmatullaev et al., 2013; see Appendix, Figure C). The total annual volume of water resources in Central Asia is approximately 116 km^3, with 90% originating from the Amudarya and Syrdarya Rivers. Groundwater resources account for approximately 43.49 km^3, and water usage is distributed with around 80% allocated to agriculture, nearly 7-8% to industry, and the remaining portion for households, services, and other purposes (www.icwc-aral.uz). After the dissolution of the USSR, efforts were made to reform water resource management and regulatory systems in the region. However, most post-Soviet republics in Central Asia opted to maintain the existing Soviet water resource management structures, resulting in limited changes at the regulatory level. Economic reintegration challenges and the breakdown of previous economic ties had adverse effects on the water sector. Insufficient funding was allocated to the water supply, leading to a decline in the number of professionals working in the water sector. Although an agreement on cooperation for water resource management and security was adopted among the post-Soviet republics in 1992, Kyrgyzstan and Afghanistan did not participate in this agreement. Consequently, comprehensive, and rational utilization of the region's water resources, long-term water supply programs, and annual water usage norms were only partially implemented ("National Water Law of Central Asian Countries," www.cawater-info.net), affecting only up to 15% of water management in the region.

Chronological Synopsis

Water-related relations between Uzbekistan and its neighboring republics have undergone various stages over time. In the early 2000s, tensions surrounding water-related issues were relatively low, but disagreements later emerged regarding the construction and utilization of major hydro-technical structures on the Amudarya and Syrdarya rivers. These disagreements stemmed from differing water requirements among the independent upstream and downstream republics, whether in Uzbekistan, Kyrgyzstan, or Tajikistan. During the presidency of Islam Karimov, who assumed power in 1991, conflicts regarding water with neighboring republics began to surface. The construction of the Qambarota hydropower plant (HPP) cascade in Kyrgyzstan and the Rogun HPP in Tajikistan emerged as significant factors that politicized the situation in Central Asia and began to impact other aspects of intercountry cooperation (refer to Appendix, Figures D & E). Between 1991 and 2017, Uzbekistan experienced border demarcation disputes with neighboring countries such as Kazakhstan and Kyrgyzstan. The border agreement with Kyrgyzstan was particularly complex. Notably, Kyrgyzstan displayed skepticism towards regional water cooperation institutions, suspending its membership in the International Fund for Saving the Aral Sea since 2009. It was only in 2023 that Uzbekistan and Kyrgyzstan initiated working groups and negotiations on the demarcation of the state border (www.gazeta.uz, 2023). The demarcation problem along the Uzbek-

Kyrgyz border has also contributed to the contentious issue surrounding the location of existing water resources. Until 2016, the construction of large hydropower plants remained a significant obstacle to the development of water relations in the region. These projects also started to impact economic cooperation among the Central Asian countries. Inadequate regional cooperation, according to the German Adelphi Research Centre and the Regional Ecology Centre for Central Asia, resulted in annual losses amounting to 4 billion USD (CAREC policy brief, 2001; UNECE & UNESCAP, 2004). Consequently, water scarcity and the need for desalination have become crucial concerns for Uzbekistan and its neighboring nations. It is worth mentioning that Uzbekistan's geographical location in an arid region leads to an uneven distribution of water resources within the country and promotes wasteful water use. Mismanagement of water distribution has contributed to the tragic state of the Aral Sea, and similar challenges persist in other areas. Importantly, the unequal distribution of water resources in the region is not solely a consequence of natural conditions but also reflects the policies implemented during the Soviet Era. Large-scale cotton cultivation in Uzbekistan and the demand for expanded agricultural land in neighboring republics prompted the construction of dams, reservoirs, and additional canals. The Soviet Union failed to take effective measures to manage and conserve water resources, and a dedicated water ministry was only established in 1988. Consequently, agricultural and food production volumes increased, while the adverse consequences of inefficient water management became evident.

Political changes in Uzbekistan since President Shavkat Mirziyoyev assumed office in 2017 have marked a turning point in the region's water relations. Under his leadership, Uzbekistan has actively engaged in bilateral and multilateral cooperation with neighboring countries to address water-related issues (www.gazeta.uz; www.davr24.uz & www.kun.uz). Reforms in agriculture, land, and water management are ongoing in Central Asia. While the degree of regulation in agricultural production and land tenure has declined compared to the Soviet era, the state continues to play a significant role in planning production, allocating land, and setting agricultural product prices. The state remains a vital force in ensuring food and water security for the people of Central Asia, but this strict regulatory system has deterred private investments in the sector, particularly in infrastructure. Throughout history, water resource management in Central Asia has been predominantly under state control, even before Russian colonization. The long-standing tradition of state bureaucracy in managing water resources has been a crucial aspect of regulating water use in the region (Collins, 2004). Thus, the water crisis in Central Asia, particularly in Uzbekistan, poses significant challenges from a geopolitical perspective. The region faces severe water scarcity, with the decline of the Aral Sea and inefficient irrigation practices exacerbating the situation. Transboundary water conflicts further complicate the issue. The shared utilization of the Amu and Syrdarya rivers highlights the complexities of managing water resources in the region. Border demarcation disputes and the construction of large hydropower plants have also influenced water-related relations among the Central Asian countries. However, recent political changes in Uzbekistan have brought about a renewed focus on addressing water issues through bilateral and multilateral cooperation. Reforms in agriculture, land, and water management are underway, aiming to ensure food and water security while also attracting private investments in the sector. The role of the state in water resource management remains significant, given the historical tradition of state control in the region.

Geopolitical Scope of Water Issues

Above the word was opened about the location in the "upper" and "down" ranges of the two rivers. According to the geographical position, the length of the Amu Darya is 2400 km, and the river delta is 534,739 km². The Amu Darya begins at the confluence of the Panj and Vakhsh rivers at the foothills of the Pamir Mountains in present-day Tajikistan, flows through the territories of Uzbekistan, Afghanistan, and Turkmenistan, and empties into the increasingly arid Aral Sea. The Amudarya also receives water from standing rivers, glaciers, and snow; there are about 1000 glaciers in its catchment area. For example, it is also fed by the Fedchenko Glacier, the largest mountain valley glacier on Earth, and by the Hindu Kush Mountains in Afghanistan. In accordance with its geographic location, the Syr Darya flows first westward, southwestward, and then northwestward through the Uzbek regions of Andijan, Namangan, Fergana, Tashkent, Syr Darya, Sughd in Tajikistan, and Kizilorda in Kazakhstan, eventually emptying into the Aral Sea. The area of the river basin is about 462,000 km², and the catchment area is 219,000 km². The republics of Uzbekistan, Kazakhstan,

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and Turkmenistan live in the lower reaches of the Syr Darya and Amudarya. The above facts are important for the geopolitical analysis of water in this region. The geopolitical issue here is the study of two rivers or water distribution between Uzbekistan and neighboring republics (Hamidov, et al., 2018). We have already mentioned several times that in some regions there is a situation of "pressure" under the pretext of "resource hegemony" or "resource dependence" (Mohapatra, 2023). Between the post-Soviet republics of Central Asia, in addition to the water conflict, there is also a unique mutual "dependence" on gas resources. That is, Kyrgyzstan and Tajikistan are "dependent" on Uzbekistan, Kazakhstan, and Turkmenistan for gas. In terms of water, Kyrgyzstan and Tajikistan are mainly "dependent" on Uzbekistan and Kazakhstan. This situation is a factor that tends to "threaten" regional peace and cooperation against the background of water distribution. According to the analytical information texts on the Internet, a "confrontation" over water against the background of water distribution can trigger a conflict in the political and social spheres. It follows that water alone is a sufficient resource to threaten security in this region. This is because, as we mentioned in the "Background" part of the study, climate changes have a unique effect on the region from a natural geography perspective. Large-scale urban shifts were observed after the tragedy on the island. In addition, Uzbekistan is leading in population growth and significant changes in economic development have been observed. At the same time, there is a shortage of water in the country. The fact that there is a food crisis or economic competition in the region and development reforms are implemented quickly will affect the increase in water demand. So, we can say that there is a "resource hegemony" in the region, even if it is not openly expressed. That is, the republics of Kyrgyzstan and Tajikistan have the character of a "hydro-hegemony" in relation to Uzbekistan as countries that are at the beginning of water. Therefore, the geopolitical landscape can be represented according to the importance of the location "upstream" and "downstream" in the region. This reflects the risk of water conflict with its neighbors for Uzbekistan in the process of agricultural diversification alone (Table 1).

Table 1. Central Asia – Agricultural Statement.

Country	Population (2023)	Main products	Sector's share in GDP (by %, in 2021	Sector's share in Labor force (by %, 2021)
		Upstream		
Kyrgyzistan	6,827,959	tobacco, cotton, grapes, fruit	20	40
Tajikistan	10,142,434	wheat, rice, barley	22.6	45.7
		Downstream		
Kazakhstan	19,410,938	wheat, barley, cotton, sunflower, rice	5.03	30
Turkmenistan	6,281,596	cotton, wheat, corn, subtropical fruits	11.7	40
Afghanistan	41,405,866	wheat, other grain crops	33.48	unknown
Uzbekistan	34,839,209	cotton, wheat, barley, corn	25	26

Note: The authors made the table using the statistical data website of each country.

Mapping the "Geopolitical Fashion" of the Study Area

A) Upstream Countries

In agriculture, Kyrgyzstan specializes mainly in the cultivation of tobacco, cotton, potatoes, vegetables, grapes, fruits, and berries. Agriculture in Kyrgyzstan accounts for 20% of the gross domestic product and employs about 40% of the country's labor force. It is common knowledge that the agricultural sector cannot develop without water. In particular, the republic receives 90% of its water from the Amudarya and Syrdarya rivers, as it is located in the headwaters of the water bodies. In addition, due to global climate changes, 16% of the existing glacier area in Kyrgyzstan has melted. This will clearly defeat the strategy of "free sharing" with Uzbekistan in water distribution.

In agriculture, Tajikistan has specialized primarily in the cultivation of wheat, rice, and barley. This sector generates 22.6 % of the country's GDP and provides employment for 45.7 % of the population. It is common knowledge that the agricultural sector cannot develop without water. In particular, the Republic receives 90% of its water from the Amudarya and Syrdarya rivers, as it is located in the headwaters of these waters. It is also said that 30% of the existing glacier area in Tajikistan has melted due to global climate change. This, of course, will destroy the strategy of “welcome sharing” with Uzbekistan in water distribution.

B) Downstream Countries

In agriculture, Kazakhstan specializes mainly in cereal crops. Wheat ranks first in the region in terms of acreage under cultivation. Barley, cotton, sunflower seeds, and rice are also grown. This sector accounts for 5.03 percent of the country's gross domestic product. About 30 percent of the population's income is derived from agricultural employment. It is common knowledge that the agricultural sector cannot develop without water. In particular, this country also needs the water of the Syrdarya River, as it is located downstream. This clearly defeats the strategy of "free sharing" of water in the region.

Turkmenistan's main agricultural products are cotton, wheat, and corn. In addition, grapes, almonds, vegetables, oranges, pomegranates, figs, olives, and subtropical fruits are also grown. This sector generates 11.7% of the country's gross domestic product and employs 40% of the labor force (www.esru.strath.ac.uk). Due to the dry climate, almost all cultivated areas are irrigated. It is common knowledge that the agricultural sector cannot develop without water. In particular, this republic also needs the water of the Amudarya River, as it is located downstream. This clearly defeats the strategy of “free sharing” of water in the region.

Afghanistan's agricultural sector mainly grows wheat and cereals. This sector accounts for 33.48 percent of the country’s GDP and the amount of labor is unknown. The country also relies on water supply from the Amudarya River, as it is downstream. It is common knowledge that the agricultural sector cannot develop without water. It is obvious that this will destroy the strategy of "free sharing" in water distribution in the region.

In agriculture, Uzbekistan specializes mainly in the cultivation of cotton, wheat, barley, and corn. This sector generates about 25% of the country's GDP and employs about 26% of the labor force. It is common knowledge that the agricultural sector cannot develop without water. In particular, the Republic receives 90% of its water from the Amudarya and Syrdarya rivers, which are located in the lower reaches of the water. Thus, the strategy of “welcome sharing” of water in the region has clearly failed. Thus, the above points are sufficient to explain the disagreement or dispute over water between Uzbekistan and its neighboring countries. However, it is also possible to examine the situation of water or water resources management in any part of the republic, but in order not to expand the topic too much, this was not addressed.

Examination of Water Distribution

In the preceding chapter, the geographical features and significance of the Syr Darya and Amu Darya rivers were outlined. It is noteworthy that during the Soviet Union's dominance over Central Asia, the strategic value of these rivers' water resources for agriculture was duly recognized, leading to a centralized approach to water distribution. Consequently, the river basins were largely devoid of conflict due to the Soviet system's centralized management methodology. However, following the post-Soviet independence of the republics, the dynamics shifted, warranting an examination of water distribution within a broader geopolitical framework.

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Water Management in the Syr Darya Basin

The Syr Darya basin and its water distribution patterns in Central Asia offer valuable insights into the geopolitical research landscape (refer to Figure 3 and Figure 4). Along the Syr Darya, several substantial reservoirs are controlled by Tajikistan, Kyrgyzstan, and Uzbekistan.

A) In Uzbekistan.

Farkhod Hydroelectric Power Plant (HPP) is located in the Bekobod district of the Tashkent region, near the Tajikistan border. Water is channeled from the Syr Darya River to the Tashkent Region and the Farhod Reservoir through the Farhod Canal. Additionally, the Dostlik Canal transports water to the semi-arid regions of the Jizzakh Region, known as "Mirzachul." Bekobad spans an area of 0.76 thousand km² with an irrigated area of 37.9 thousand hectares, while Mirzachul covers 10 thousand km² with an irrigated area of 205 thousand hectares. The Shardara Reservoir, located in the middle stream of the Syr Darya, straddles the right bank in the South Kazakhstan region and the Jizzakh region of Uzbekistan. The Kyzylkum main channel is situated on the left bank of the middle stream of the Syr Darya. Water from this channel is distributed to new land in Mirzachul (Jizzakh, Uzbekistan) and irrigated land in South Kazakhstan.

B) In Tajikistan.

The Kayraqkum Water Reservoir and Kayraqkum HPP are primarily located in Tajikistan's Khujand region, with a small portion extending into Uzbekistan's Fergana region to the west. Water from the Kayraqkum reservoir is distributed to the Fergana Valley and the northern districts of Tajikistan, with a permanent irrigated area exceeding 475 thousand hectares.

Consequently, the Syr Darya river, from its origin to its mouth in the Aral Sea, features a complex network of tributaries and channels. Human intervention, particularly the construction and operation of large dams, reservoirs, canals, and collectors across most tributaries, has significantly altered the river's flow. Monitoring data from recent years reveals a substantial decline in the average annual water flow at Khujand (Tajikistan) to 476 m³/s and in the upper part at Gazali (Kazakhstan) to 158 m³/s.

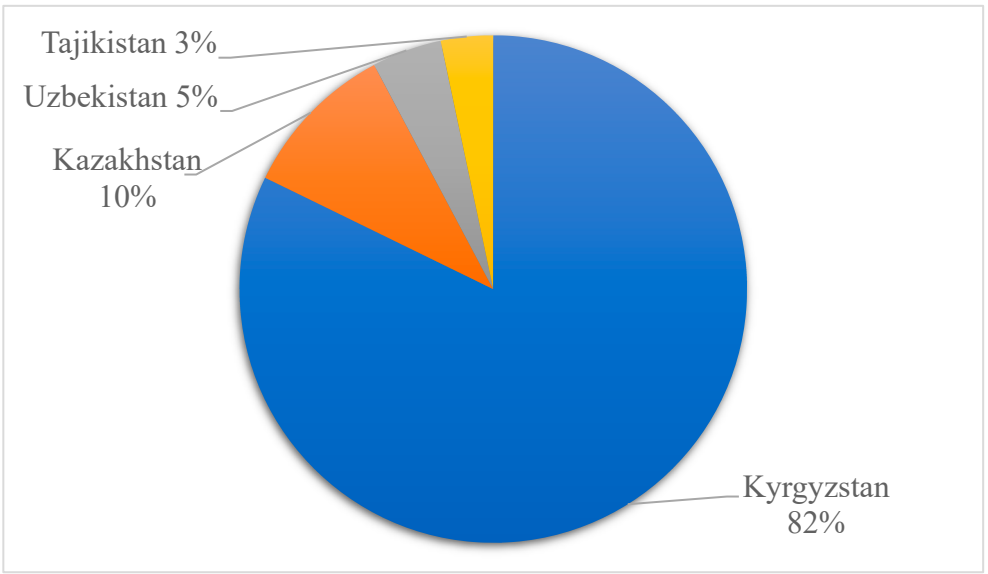

Figure 3. Syr Darya Crossing in Central Asian Republics (%).

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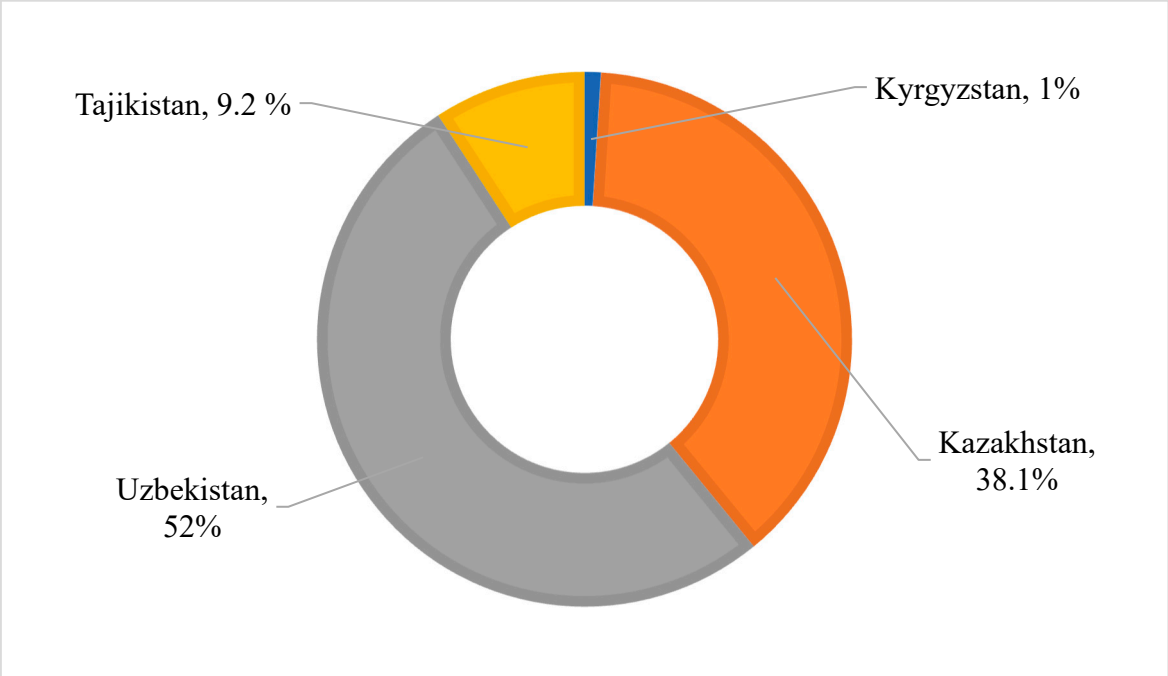

Figure 4. Share of water from the Syrdarya of Central Asian countries (by %).
Note: Both figures were made by the author using Wikipedia and Official Report Data.

Water Management in the Amu Darya Basin

The Amu Darya basin encompasses Tajikistan, Uzbekistan, Afghanistan, and Turkmenistan. Notably, the Norak Reservoir and Norak Power Plant are the largest hydropower installations in the Amu Darya basin. While the Syr Darya possesses several reservoirs and dams, the Amu Darya basin boasts significant hydropower resources. The total hydropower capacity stands at 63.2 million kilowatts (Ergashev et al., 2023). Uzbekistan and Turkmenistan stand as the primary consumers of water from the Amu River (refer to Figure 5 and Figure 6). The Amu River's importance is expected to increase due to population growth and agricultural diversification. However, the Amu River's glaciers, which serve as its source, are rapidly melting due to global warming and climate change—an issue previously addressed. Afghanistan has initiated the construction of the "Kushtepa" canal, spanning 285 km in length and 100 meters in width. It is designed to divert one-third of Amu Darya's water and exacerbates water scarcity in multiple regions of Uzbekistan. Similar to the Syr Darya, the Amu Darya River system exhibits diverse tributaries and channels before reaching the Aral Sea. Predictions indicate that the river's source glaciers could experience up to a 20% reduction by the 2030s. Furthermore, climate change may result in temperature increases of up to 30 degrees by the 2050s. Reports suggest that glaciers in Tajikistan are diminishing by 20-30%, while those in Afghanistan face a more significant decline of 50-70%. Such changes have significant implications for water availability. In the 2080s, a 20% decrease in Amu Darya's water flow could render up to 50% of the cultivated land within the basin (around 2 million hectares) without access to water, greatly impacting agriculture. Consequently, a geopolitical landscape is emerging due to these factors (www.un.org).

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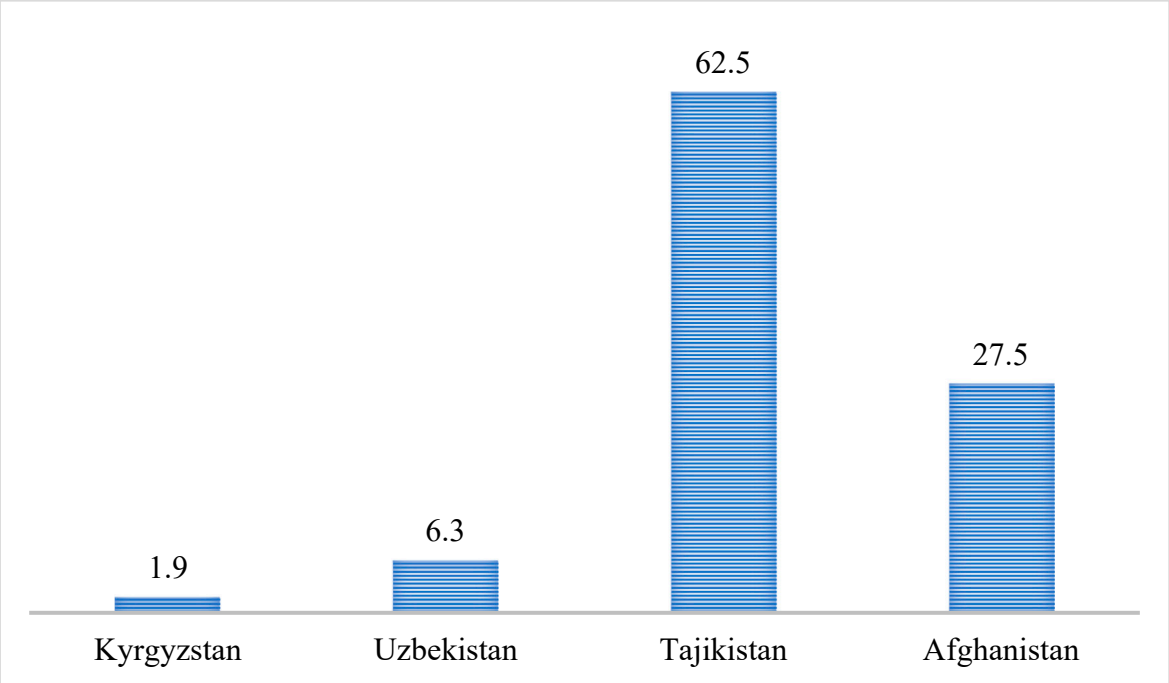

Figure 5. Amu Darya Crossing in Central Asian Republics (%).

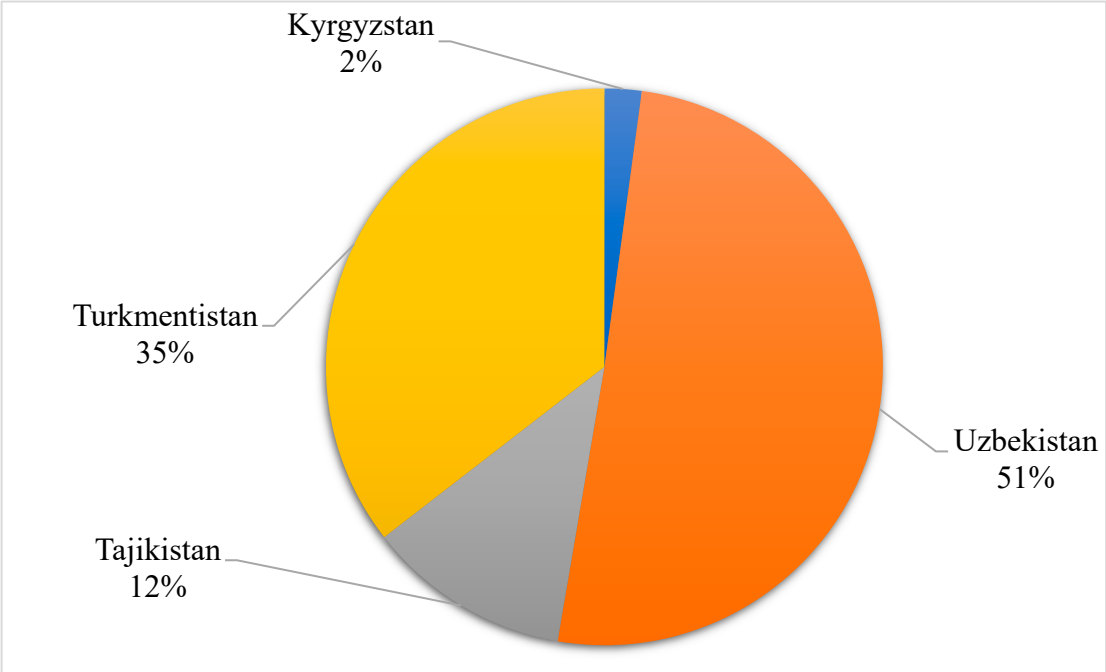

Figure 6. Share of water from the Amu Darya of Central Asian countries (by %)
Note: Both Figures above were made by the author using Wikipedia and official information.

The geopolitical analysis of water distribution in Central Asia, encompassing the Syr Darya and Amu Darya rivers, highlights the complex interplay between water resources, infrastructure development, climate change, and regional politics. The concepts of water security, transboundary water management, and resource dependencies intersect in this context, shaping the region's geopolitical dynamics. Effective management of water resources and the resolution of water-related disputes require comprehensive approaches grounded in geopolitical theories such as hydro-hegemony, critical geopolitics, and resource diplomacy. Thus, by understanding these theories and concepts, policymakers can navigate the complex water challenges in Central Asia and foster regional stability.

Controversies: "Resource Hegemony" or "-Nationalism"

In line with the Soviet regime's policy of developing agriculture in Central Asia, an Energy Union was established in the region. Uzbekistan joined the energy union, which was called the "Unified Energy System of Central Asia and South Kazakhstan." This "unified energy system" functioned in isolation from the other regions of the Soviet state (Almaty Declaration, 21.12.1991). The indicators of the energy system: frequency and other operating parameters were regulated independently of the control of the dispatching center in Tashkent. But now this interconnection has "split". The attainment of independence in the 1990s required the construction of additional or new hydropower plants to ensure high agricultural productivity and to meet the energy needs of each republic in the region. Currently, Turkmenistan and Tajikistan operate separately from this "unified system." Since 2003, Turkmenistan has started cooperation with the Iranian energy system on its own initiative. With Uzbekistan, it began to cooperate in a closer framework under the so-called "island" programs.

According to the documents, Tajikistan repeatedly violated the terms of the "Unified Energy System of Central Asia and South Kazakhstan" association and was separated from this "system." As a result, Tajikistan, with financial support from the Asian Development Bank, has made a number of efforts to reconnect to the unified energy system. The "common system" left behind by USSR became one of the reasons for remaining in power cooperation with Uzbekistan. Thus, Tajikistan has independently regulated the energy system with the help of large water reserves in hydroelectric power plants. However, Kazakhstan, Kyrgyzstan, and Uzbekistan are trying to supply the energy system by building thermal and small hydropower plants. But the 2022 blackout showed how vulnerable they are. Therefore, strategies such as the "distant neighbor" and the "Central Asian Ring" are urgently needed in the region (Scientific Research Institute of Irrigation and Water Problems, 2022). In this part of our topic, to explain the geopolitical situation, we will give our comments after reviewing some previous works on water.

Therefore, hydropower projects have become one of the most urgent tasks of any republic. However, the construction of these projects requires concern for water resources. This increases the possibility of conflicts between Uzbekistan and its neighbors in the pursuit of the goals of high agricultural productivity and adequate coverage of energy needs (Jalilov, 2011).

The most controversial projects for Uzbekistan are the Rogun hydropower plant in Tajikistan and the Qambar Ota hydropower plant in Kyrgyzstan. These projects were proposed as early as the 1970s and 1980s but were not put into action until the 2010s. Islam Karimov, the first president of Uzbekistan, first raised concerns about hydropower plants and discussed them on the international stage. In a meeting with the first president of Kazakhstan, Islam Karimov made the rational use of water and energy reserves the main topic. Concerns were expressed that the construction of hydroelectric power plants would endanger the lives of people in the surrounding areas. Therefore, it was clear from the speech of the first president that he first asked Tajikistan and Kyrgyzstan to submit this dam to international experts, and after their refusal, the objections began. Below is a quote from the speech of the first President Karimov:

"Amudarya and Syrdarya are transboundary rivers. When using these rivers, we must not forget to follow the norms set out in the Convention UN. This applies to Tajikistan and Kyrgyzstan as well as to all of us (Kazakhstan and Turkmenistan)! The sites of hydroelectric power plants are located in seismically dangerous areas. They (the governments of Tajikistan and Kyrgyzstan) do not understand that the lives of thousands of people are at stake. Can you imagine the consequences of the disaster if the Tokhtagul reservoir is connected, and the dammed water is released in an earthquake? Before we build anything, before we make an agreement with big countries (USA and Russia), we should make a real test. We should give a clear explanation to the people, our people. What will happen tomorrow to our people who will live below these rivers?"

Kazakhstan's first president Nazarboev echoed Karimov's opinions:

"(Karimov's concerns) are important for all republics. We would like to send another "greeting" to our "friends" upstream and remind them that water is running out for Kazakhstan, Uzbekistan, and Turkmenistan, which are downstream." (Kazakhstan, Astana International Press Conference-2012, retrieved from "BBC Uzbek" internet outlet – authors translated from Uzbek into English).

So, against the background of water scarcity, the area of pastures and agricultural land will decrease. Today, the total area of pastures and hay meadows in Uzbekistan is 21.1 million hectares,

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or 46.5% of the country's land area. According to the analysis, 16.4 million hectares (78 percent) of the country's pastures are in crisis, and the productivity of more than 20 percent of pastures has declined (Report of the Legislative Chamber of the "Oliy Majlis" of Uzbekistan, January 7, 2019; Ruzmetov, 2021).

Although agriculture accounts for up to 90 percent of the republic's total water consumption, it is experiencing declines due to water scarcity. 20% of the cultivated land in this sector is irrigated and 40% of the total food production is produced on this land (Nicoleta, 2020). Currently, losses in water supply and irrigation network maintenance are estimated at 40% (Ministry of Agriculture, 2019). The World Bank predicts that by 2050, the decline in water supply could be 2-5% in the Syrdarya Basin and 10-15% in the Amudarya Basin. As a result, water scarcity will increase [reference]. If the population of Uzbekistan reaches 40 million people by 2030, this will reduce the available water resources by 7-8 cubic kilometers. Under these conditions, the level of water scarcity could increase from 13-14% to 44-46%. This will negatively affect the development of agriculture and industry (Alimjanov, 2020).

Geopolitical Conflicts: A Case Study of Uzbekistan and Neighboring Country

The geopolitical disputes between Uzbekistan and its neighboring countries: Tajikistan, Kyrgyzstan, and Turkmenistan, primarily revolve around water resources and hydropower projects. These conflicts pose significant challenges to regional stability and necessitate meticulous analysis and viable solutions.

1) Uzbekistan and Tajikistan

The ongoing dispute between Uzbekistan and Tajikistan centers around the construction of the Rogun Dam project. Under the leadership of Karimov, Uzbekistan implemented a cessation of gas supplies and imposed restrictions on material transportation to Tajikistan as a retaliatory measure against the project. Uzbekistan expresses apprehensions regarding the dam's seismic vulnerability, which could lead to a catastrophic flood endangering the region. In contrast, Tajikistan considers the Rogun Dam crucial for attaining energy independence and socioeconomic development. This situation exemplifies a scenario of "resource hegemony" wherein Tajikistan endeavors to assert control over water resources. The construction of the Rogun Dam poses significant risks to Uzbekistan, particularly in terms of agricultural devastation. Studies estimate that the dam could result in a decrease in agricultural areas, cotton production, and an overall economic decline in Uzbekistan. Furthermore, the dam's construction may yield adverse environmental consequences, including heightened flood risks, alterations in hydro botanical conditions, and water pollution. Additionally, the absence of compensation for potential damages from the Tajikistani government further exacerbates tensions in the region. To address this issue, it is imperative to underscore cooperation and acknowledgment of shared obligations. Employing the concept of "soft power" diplomacy, with a focus on resource exchange, water supply, and electricity, can facilitate a resolution to these challenges. Continuing dialogue and negotiations between Uzbekistan and Tajikistan, with a profound understanding of each other's concerns, can lead to a mutually beneficial outcome.

2) Uzbekistan and Kyrgyzstan

The controversy between Uzbekistan and Kyrgyzstan originates from the construction of the Qambar-Ota hydropower plant in Kyrgyzstan. The project's impact on the Syrdarya River, which traverses the Fergana Valley, has strained relations between the two countries. Uzbekistan has voiced objections to the plant, resulting in a reduction of water flow and the suspension of gas exports to Kyrgyzstan. The situation escalated to tightened border controls and military deployments until a change in Uzbekistan's government in 2017. Similar to the Uzbek-Tajik dispute, concerns regarding the dam's placement in an earthquake-prone area and potential disruptions to agriculture intensify the tensions. The verbal sparring between the two nations reflects a pursuit of geopolitical hegemony, with Kyrgyzstan attempting to leverage its relationship with Russia against Uzbekistan. Resolving this issue requires the recognition of shared obligations and sustained cooperation. The interdependence of Uzbekistan, Kyrgyzstan, and Kazakhstan concerning water, gas, and electricity necessitates diplomatic efforts centered on soft power. The achieved agreement between Uzbekistan and Kyrgyzstan, along with ongoing dialogues, indicates progress in addressing these challenges.

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3) Uzbekistan and Turkmenistan

Water trade between Uzbekistan and Turkmenistan encompasses economic, political, and environmental factors. Both countries heavily rely on the Amudarya River for water supply, resulting in protracted negotiations. The dispute primarily revolves around the utilization and management of Amudarya's waters, encompassing concerns regarding upstream dam construction and its repercussions on Uzbekistan's water supply. Turkmenistan aims to develop hydropower and expand agricultural production, further complicating the negotiations. Encouragingly, recent years have witnessed positive developments in water negotiations between Uzbekistan and Turkmenistan. Both nations have initiated cooperation through joint water management committees and restoration projects aimed at preserving wetlands and ecosystems. However, achieving sustainable and equitable water usage remains a pivotal challenge that necessitates continued efforts and diplomatic engagement.

Importance of Regional Cooperation

The significance of regional cooperation on water-related challenges cannot be overstated. The state plays a pivotal role in ensuring food and water security, acting as the sole stabilizing force in Central Asia. As agricultural, land, and water reforms continue in the region, Afghanistan, following the Taliban's rise to power, has initiated dialogues with the Central Asian republics, expressing its views on the water issue. Consequently, water scarcity emerges as a common problem among the six countries. Experts contend that these nations lack the financial and technical expertise necessary to address water scarcity effectively. Therefore, collaborative efforts among governments are essential to resolving the water problem. Economic cooperation between countries emerges as a pressing concern. Failure to foster economic cooperation may not only lead to the emergence of common issues but also provide an excuse for exploiting even minor problems. Consequently, economic cooperation and water-related matters now serve as a cohesive force connecting all the republics. Recent endeavors have been made to understand the specific aspects of economic cooperation, exemplified by political platforms such as the meeting of foreign ministers of Central Asian countries. Establishing a pragmatic and stable system of cooperation among the leaders of Central Asian nations is critical. Building upon these mutual relations, it is imperative to foster regional cooperation, primarily through institutions dedicated to nature conservation and water resource management. Given the construction of massive reservoirs like Rogun and Qambar-Ota, prioritizing their safety is paramount. Establishing a regional organization responsible for the safety and utilization of large-scale water facilities represents a timely and progressive step forward. It is important to note that the water issue transcends borders for Uzbekistan, making cooperation with Tajikistan and Kyrgyzstan crucial for all Central Asian republics, particularly Afghanistan. While Tajikistan and Kyrgyzstan consume water, the water supply is dwindling in Kazakhstan and Uzbekistan, with the peak water usage season coinciding with the summer. Therefore, solving this problem based on cooperation is of utmost importance.

The issue of cooperation in addressing water-related challenges has garnered considerable attention from experts, revealing several crucial factors that merit examination (Table 2).

Table 2. Factors and solutions for the water issue.

Main factors	Solutions
There is mistrust between the republics	Restoring mutual trust
Population and economic activity increase	Develop measures to increase water demand
The upstream countries are in a "stubborn" mood	Friendly and tolerant cooperation with downstream countries
Friendship between Tajikistan and Kyrgyzstan isn't strong	Expansion of friendly relations (this will also be of great benefit to Uzbekistan - Fergana Valley)

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Lack of management mechanisms in water distribution	Joint development of principles for effective water management

This scientific discourse seeks to analyze these factors and their implications in addressing collaboration challenges. By considering per capita water consumption, addressing agricultural inequities, modernizing water distribution mechanisms, resolving territorial disputes, and fostering common interests, a comprehensive understanding of the geopolitical nature of water can be achieved, leading to the development of effective solutions.

The first factor to consider is per capita water consumption. Understanding the water usage patterns of each country or region in Central Asia is crucial in achieving equitable distribution of water resources. By assessing the water requirements of each nation, accounting for population sizes and water needs, a fair allocation of water resources can be attained. A thorough analysis of per capita water consumption enables policymakers to formulate strategies that promote equitable access to water, thereby facilitating regional cooperation.

The second factor entails addressing the unequal distribution of water resources in agriculture. This disparity poses a significant challenge to cooperation efforts. A comprehensive approach is needed to ensure equitable access to water for agricultural purposes. Implementing policies that promote efficient irrigation techniques, water recycling, and advanced technologies can transform the agricultural sector. Equitable distribution of water resources in agriculture not only enhances food security but also fosters cooperation among countries engaged in sustainable agricultural practices.

The third factor involves modernizing water distribution mechanisms. Outdated water distribution mechanisms impede effective cooperation in tackling water-related challenges. Modernizing these mechanisms is vital for optimizing water resource allocation and management. Leveraging technological advancements such as remote sensing, data analytics, and smart infrastructures can enhance countries' ability to monitor and allocate water resources efficiently. Modernization efforts should also consider climate change projections to ensure resilience against future water scarcity. By introducing innovations and improving the effectiveness of water distribution mechanisms, Central Asian countries can promote cooperation and strengthen regional water management.

The fourth factor pertains to the resolution of territorial disputes. Territorial conflicts over shared water resources often impede cooperation efforts. Resolving these disputes is essential to foster cooperation and establish a stable foundation for regional collaboration. Diplomatic negotiations facilitated by international organizations and mediators can play a crucial role in finding mutually agreeable solutions. Open dialogues, exploration of alternative dispute resolution mechanisms, and adherence to the principles of international water law can help defuse conflicts and promote cooperation. By addressing territorial disputes, Central Asian countries can focus on common water management objectives, thereby enhancing regional cooperation and stability.

Lastly, increasing the overlap of common interests is a pivotal factor. Promoting cooperation on water-related challenges requires identifying and strengthening common interests among Central Asian countries. Joint initiatives that prioritize common goals such as climate change adaptation, water security, and sustainable development can enhance the convergence of shared interests. By emphasizing the mutual benefits of cooperation, countries can overcome political differences and work towards a common solution. Promoting dialogue, facilitating knowledge sharing, and fostering regional partnerships will contribute to a more harmonious and cooperative approach to water management.

So, the academic discourse has shed light on five key factors that demand attention in resolving water resources cooperation issues in Central Asia. By addressing per capita water consumption, agricultural inequities, modernizing water allocation mechanisms, resolving territorial disputes, and fostering common interests, countries can effectively manage the geopolitical nature of water. Addressing these factors will lay the foundation for equitable water governance, promote sustainable development, and strengthen cooperation among Central Asian states. Through comprehensive strategies and collective efforts, the region can overcome water-related challenges, paving the way for a more prosperous and cooperative future.

So, the aforementioned facts and considerations provide a comprehensive overview of the water conflict's intricacies. The analyses demonstrate that water resources have the potential to create geopolitical tensions between Uzbekistan and its neighboring nations, effectively establishing a new frontier in the geopolitical landscape. Without cooperation grounded in a systemic approach like "soft power," states may resort to flexing their power against each other. Consequently, the water conflict itself becomes a disruptive force, undermining regional security and inflicting socio-economic and socio-political damage on each country, particularly in terms of export-import dynamics, economic development, agriculture, and the food chain. The considerations presented underscore the significant impact of water-related issues on the geopolitics of Uzbekistan and its neighboring countries. Given the all-encompassing importance of water resources for Central Asia's development, it is imperative to strengthen regional cooperation in addressing water-related challenges.

Conclusion

Thus, this study has conducted a political geographic analysis of water issues in the Amu and Syrdarya basins, shedding light on their implications for regional security. Drawing upon political geography approaches and ongoing debates, several significant lessons have been gleaned, and recommendations have been formulated to navigate the complex geopolitical landscape of water in Central Asia. The analysis underscores the importance of examining the region through the lens of upstream and downstream countries to grasp the uneven distribution of water resources and the resulting socio-political dynamics. Population growth, agriculture's dominance, resource hegemony, and the potential for ethnic conflict emerged as key factors contributing to water scarcity, emphasizing the intricate nature of the region's geopolitical situation. Notably, negotiations concerning the Amu Darya and Syr Darya Basins have underscored the need for enhanced water cooperation among nations. The research highlights the importance of fostering better compatibility in negotiations between Uzbekistan and Turkmenistan, as well as among Tajikistan, Kyrgyzstan, and Uzbekistan. Furthermore, the construction of a canal on the Amu Darya through Afghanistan necessitates new water cooperation strategies involving Uzbekistan. To mitigate regional conflicts and disputes, the nationalization and safeguarding of water resources become imperative. By employing classical geopolitical theories and critical approaches to analyze the geopolitical landscape of water in the region, valuable insights can be gained. These insights can inform the development of appropriate strategies and solutions while promoting effective regional cooperation.

Based on the research findings, the following recommendations are proposed to improve cooperation on water resources in Central Asia.

First, the development of new technical solutions is crucial, requiring the establishment of political and economic frameworks that enable integrated planning across all sectors.

Second, continuing reforms in the water sector are essential, with a close eye on the changes in Turkmenistan while Tajikistan and Uzbekistan sustain their ongoing reforms. The effectiveness of these reforms should dictate support from international stakeholders.

Third, the introduction of appropriate incentives is necessary, including the creation of incentives to attract private and international investment and enhance efficiency and effectiveness in the water supply sector.

Fourth, significant reforms in education and scientific research are needed, with a focus on improving the quality of education and research in the water sector.

The establishment of a water innovation laboratory with dedicated funding would be a valuable step in this direction. Implementing these proposals will strengthen water resource management, promote sustainable development, and reduce the risk of water-related conflicts in Central Asia. Ensuring long-term stability and prosperity in the region requires the cooperation of the republics in areas of common interest. Addressing the complex water problems in Central Asia necessitates a scientific understanding and application of globally accepted ideal approaches and theories of political geography. Adopting a basin-based approach to water management is crucial for fostering cooperation and equitable sharing of resources. As water resources transcend political boundaries, mechanisms for cooperative management should be established among countries sharing the same river basins.

Implementing transboundary water agreements and creating joint management institutions can ensure sustainable water use while defusing conflicts. Recognizing power dynamics and the role of

diplomacy in conflict management are central aspects of political geography. Multilateral forums such as the United Nations and regional organizations can facilitate dialogue and negotiations among Central Asian states. Promoting power-sharing arrangements and equitable decision-making processes can effectively address concerns about resource hegemony and foster confidence-building measures between nations. Given the potential of water scarcity to intensify conflicts, adopting an environmental security framework becomes imperative. This framework entails identifying and resolving interconnected environmental, social, and political dimensions associated with water conflicts. Emphasizing sustainable development practices, and ecosystem protection, and considering environmental factors in policymaking enables comprehensive solutions.

Furthermore, Central Asia can benefit from regional integration initiatives that promote cooperation and strengthen economic interdependence. Aligning water management strategies and investing in joint infrastructure projects can cultivate mutually beneficial relationships while reducing the likelihood of conflict. Leveraging regional platforms such as the Central Asia Regional Economic Cooperation (CAREC) program facilitates transboundary cooperation and promotes development. Therefore, inclusive, and participatory governance approaches are crucial for effectively managing water conflicts. Engaging diverse stakeholders, including local communities, civil society organizations, and water user associations, improves transparency, accountability, and overall water governance effectiveness. Incorporating different perspectives and local knowledge leads to context-specific solutions that ensure the equitable distribution of benefits. To conclude, by adopting these globally recognized ideal proposals underpinned by theories of political geography, Central Asian countries can navigate the intricate complexities of water conflicts and advance sustainable and cooperative water management. These approaches promote regional stability, facilitate socio-economic development, and contribute to the broader global agenda of water security and environmental sustainability.

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