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Water at the Center of Central Asian Geopolitics: Security, Conflict, and the Reconfiguration of Regional Power

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Water resources in Central Asia, due to their uneven geographical distribution, the interdependence of upstream and downstream countries, and their close nexus with energy and food security, have become one of the determining components of regional geopolitics and security. The present study aims to elucidate the role of water in regional power relations, analyze the mechanisms underlying the emergence of water-related conflicts, and examine their implications for the reconfiguration of regional power in Central Asia. In terms of purpose, this is a fundamental research study, while methodologically it adopts a qualitative approach based on a descriptive–analytical method. Research data were collected through documentary analysis and the examination of scholarly sources, specialized reports, and regional agreements, and were analyzed using the theoretical frameworks of water geopolitics, regional security, and hydro-hegemony. The findings indicate that inequalities in the distribution of water resources, control over hydraulic infrastructure, and the conflict between the energy priorities of upstream countries and the agricultural requirements of downstream states have created a structure of asymmetric interdependence that provides the basis for political competition and bargaining. Furthermore, the collapse of the Soviet Union's integrated water–energy management system, climate change, weaknesses in institutional mechanisms, and the involvement of extra-regional powers have increased the complexity of water relations in the region. Nevertheless, bilateral and multilateral agreements, together with the potential of regional diplomacy, demonstrate that water interdependence can be transformed into institutionalized cooperation. The study concludes that the future of the geopolitical water order in Central Asia depends on how power asymmetries are managed, the extent to which joint water governance is strengthened, and the capacity of regional states to establish a balance between national interests and the imperatives of collective security.

Keywords: *water geopolitics, water security, Central Asia, hydro-hegemony, water conflicts, reconfiguration of regional power.*

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1. Introduction

Water, as one of the most fundamental strategic resources, plays a decisive role in sustaining human life, maintaining ecosystem stability, promoting economic development, and ensuring the political stability of societies. Today, water is no longer merely an environmental and economic component; rather, it has become a strategic issue in national policymaking and international relations. Within this framework, the concept of water security has become an important component of security studies and encompasses

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dimensions such as sustainable access to water, food and energy security, political stability, and the management of shared resources. Water-related pressures can also weaken states' capacity to manage water resources and create conditions conducive to the intensification of political and security tensions. The significance of this issue is particularly pronounced in regions such as Central Asia, where the uneven distribution of resources and the interdependence of states have transformed water management into an integral part of regional power and security equations (Huang et al., 2026). Central Asia, comprising Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan, is regarded as one of the world's most sensitive regions in terms of water security because of its geographical and climatic characteristics (Suleimenova, 2018). A substantial proportion of the region's surface water resources originates in the Tien Shan, Pamir, and Pamir-Alay highlands and flows downstream through the transboundary Amu Darya and Syr Darya rivers. The concentration of water resources in upstream states, particularly Tajikistan and Kyrgyzstan, coupled with the dependence of downstream states, especially Uzbekistan and Turkmenistan, has created a form of geographical and structural asymmetry in regional water relations. This asymmetry affects not only access to resources but also political bargaining capacity, national development priorities, and the ability of states to exert influence (Wang et al., 2021). Because of their close connection with hydropower generation, irrigation systems, and food security, the Amu Darya and Syr Darya occupy a central position in interstate relations (Abdullaev et al., 2025). Accordingly, the geography of water resources in Central Asia should be regarded as part of the geopolitical structure of resource distribution, interdependence, and power inequality among states (Khikmatov et al., 2026).

Many of the current complexities of water governance in Central Asia are rooted in the legacy of the centralized resource-management system of the Soviet era, under which water allocation was based on centralized planning and on the linkage between hydropower generation in upstream republics and the agricultural requirements of downstream republics. The operation of major dams and reservoirs such as Toktogul, Nurek, Charvak, and Bukhtarma was likewise embedded within a mechanism intended to balance the water, energy, and agricultural requirements of the republics of the region (Abdullaev & Rakhmatullaev, 2015). Following the collapse of the Soviet Union and the independence of the Central Asian states, this integrated structure disappeared, and the management of shared resources became increasingly associated with national sovereignty and competition among economic interests. Consequently, upstream countries prioritized hydropower generation and domestic energy supply, whereas downstream countries remained dependent on regular water releases for agricultural purposes. This divergence in national priorities created the conditions for the emergence of hydropolitical tensions (Zhiltsov, 2025). At the same time, the expansion of irrigation networks and increasing withdrawals from shared resources generated extensive environmental consequences and contributed to the severe contraction of the Aral Sea (Khikmatov, 2026).

In recent decades, the intensification of climate change, population growth, and the expansion of economic activities have further complicated the dimensions of the water-security crisis in Central Asia (Reyer et al., 2017). Estimates suggest that more than 30% of Central Asia's glaciers may disappear by 2050, a development that could significantly affect the sustainability of transboundary river flows (Kong et al., 2025), while water resources may decline by approximately 5% in the Syr Darya Basin and approximately 15% in the Amu Darya Basin by 2050 (Prniyazova et al., 2025). Low water-use efficiency and the extensive dependence of agriculture on surface-water resources have further intensified the vulnerability of regional states; Central Asia consumes approximately 2.5 cubic meters of water for every dollar of gross domestic product (World, 2025). Climate change and demographic pressures should therefore be regarded not merely as environmental threats but also as factors contributing to intensified water dependence, competition, and geopolitical tensions (Huang et al., 2026; Sadyrov et al., 2025).

Alongside natural and structural factors, geopolitical relations and competition among regional and extra-regional powers have added to the complexity of water governance in Central Asia. Water infrastructure, particularly dams, hydropower plants, and water-transfer networks, has become an instrument for enhancing states' bargaining power and political influence. At the regional level, the divergence between

the energy priorities of upstream countries and the agricultural needs of downstream countries has contributed to the persistence of hydropolitical disputes (Aituarova & Kh, 2025). At the extra-regional level, the involvement of Russia, China, and the European Union through infrastructure investment and economic and environmental cooperation influences regional power relations and policy orientations (Xenarios et al., 2018). Continued disagreements over water allocation and dam operation have prevented existing forms of cooperation from evolving into a stable and binding system of joint governance (Jonoski & Seid, 2016).

Accordingly, this study aims to explain the relationship among the uneven geography of water resources, water security, and patterns of power distribution and redistribution among the Central Asian states. The significance of the study derives from the fact that regional water relations are not determined solely by natural access to resources but are shaped by the interaction of geographical location, control over infrastructure, national development priorities, economic interdependence, and competition among extra-regional powers. The innovative aspect of this study lies in providing an integrated analysis of water simultaneously as a natural resource, a security variable, and an instrument of geopolitical power. By linking the national, regional, and extra-regional levels, this approach goes beyond conventional analyses based solely on resource scarcity or bilateral disputes and explains the mechanisms through which water contributes to the reconfiguration of power in Central Asia. Within this framework, the principal research question is: How, and through what mechanisms, do water resources affect security, patterns of conflict, and the reconfiguration of regional power in Central Asia? Addressing this question can contribute to a deeper understanding of the relationship among the geopolitics of natural resources, regional security, and transformations in the regional power order of Central Asia.

2. Theoretical and Analytical Framework of the Study

In this study, water geopolitics is understood as the intersection of natural resources, political power, and interstate relations. Because of its uneven geographical distribution, the interdependence of states, and its role in food security, energy security, and economic development, water possesses not only natural and economic value but can also become an instrument through which states exercise power and influence the behavior of other actors. From this perspective, hydropolitics examines interactions among actors concerning access to, allocation of, and management of shared water resources, as well as the conditions that generate cooperation and conflict (Allan, 2001; Waterbury, 1979). With the intensification of climate change, population growth, and increasing water demand, the management of shared resources has become an increasingly important component of international security and stability (Mikhalev, 2025; Saeed & Saud, 2026). Water scarcity does not in itself produce conflict; rather, the distribution of resources, inequalities in access, institutional capacity, and the management of interdependence determine whether environmental pressures, growing demand, and unequal water distribution are transformed into political tensions (Homer-Dixon, 1994). Water security therefore does not depend solely on the quantity of available resources but is also influenced by distributive structures, governance quality, cooperative capacity, and the mutual vulnerability of states (Saeed & Saud, 2026).

Regional Security Complex Theory provides an appropriate framework for explaining the relationship among water resources, security, and power relations in Central Asia. According to this theory, states whose security issues and concerns are mutually interdependent form a security complex in which the security of each member cannot be analyzed independently from that of the other states (Buzan & Wæver, 1991, 2003). This interdependence is shaped by factors such as geography, the distribution of power, and patterns of amity and enmity, and can be analyzed at the domestic level, in interstate relations, through regional interactions, and in relations with global powers (Buzan & Wæver, 2003). The relevance of this theory to Central Asia derives from the sharing of water resources and the security dependence of regional states on the transboundary Amu Darya and Syr Darya basins. Within this framework, the upstream states' need for hydropower generation is intertwined with the downstream states' need for a stable water supply for agriculture. Accordingly, each state's decisions concerning the volume and timing of water storage or release can have economic, environmental, and security

consequences for other states (Dinar, 2012; Saeed & Saud, 2026). Water security in Central Asia should therefore be understood as a regional phenomenon influenced not only by domestic factors but also by interstate relations and the involvement of extra-regional powers.

Alongside Regional Security Complex Theory, the concept of hydro-hegemony is employed to analyze how geographical position and material capabilities are transformed into political power in water relations. This concept emphasizes the importance of asymmetric power distribution, upstream and downstream positioning, possession of water infrastructure, economic capabilities, and political influence in the management of shared resources (Dinar, 2012). From this perspective, controlling water flows, constructing dams and hydropower facilities, influencing agreements and institutional arrangements, and using water dependence as a bargaining instrument constitute important mechanisms for exercising power. Nevertheless, an upstream position does not by itself imply political superiority, because states' bargaining power depends on a combination of geographical, economic, infrastructural, and institutional capacities (Saeed & Saud, 2026).

In Central Asia, differences between upstream and downstream positions and the divergence between energy and agricultural priorities provide an appropriate context for examining mechanisms of power. Based on the integration of these two perspectives, the relationship among water, security, and conflict is neither linear nor inevitable but is shaped by interactions among natural, structural, political, and institutional factors. The divergence between upstream states' need for hydropower generation and downstream states' demand for agricultural water, combined with weak binding regional mechanisms, has created conditions conducive to recurrent tensions (Saidmamatov, 2020). Nevertheless, water interdependence does not necessarily result in conflict and can also create opportunities for cooperation and integration through interstate agreements and the joint management of river basins (Elhance, 1997). Climate change, population growth, and conflicting national development priorities have further increased the need for participatory water-resource management. Conversely, fragmented decision-making, the predominance of political considerations over scientific assessments, and weak long-term planning instruments constrain the prospects for sustainable cooperation (Huang et al., 2026). Accordingly, an analysis of water geopolitics must encompass not only resource constraints but also the structure of power distribution, governance quality, and the institutional capacities of states to manage interdependence.

On this basis, the analytical framework of the present study rests on three principal dimensions. The first dimension concerns geopolitical structure and water inequality and examines upstream and downstream positions, the geographical distribution of resources, control over infrastructure, and energy–agriculture interdependence. The second dimension addresses security implications and patterns of regional interaction, including water security, conflicts of national interests, transboundary cooperation, institutional mechanisms, and the effects of climatic and demographic factors. The third dimension concerns power relations and the reconfiguration of the regional order and examines the capacity to control and manage resources, states' bargaining power, mechanisms of hydro-hegemony, and the role of extra-regional actors. The interaction of these three dimensions illustrates how geographical inequalities in water resources lead to differences in power capabilities, how these differences affect regional security and conflict, and how they transform patterns of cooperation, competition, and political influence in Central Asia. Water is therefore treated in this study not merely as an environmental and economic resource but as a strategic variable in the formation and transformation of the region's geopolitical order.

3. Political Geography of Water Resources and the Structure of Water Dependence in Central Asia

The geography of water resources in Central Asia constitutes one of the fundamental factors shaping political and security relations among the countries of the region. Within this context, understanding the structure of river basins, the historical legacy of resource management, and pressures arising from climate change is essential for explaining the role of water in contemporary Central Asian geopolitics.

3.1. Political Geography of Transboundary Basins and Inequality in the Structure of Water Dependence

Central Asia is predominantly an arid and semi-arid region in which agricultural and economic activities are extensively dependent on surface-water resources (Tian et al., 2023). The Amu Darya and Syr Darya are the region's most important surface-water resources. They originate in the Pamir, Hindu Kush, and Tien Shan highlands and, after crossing the territories of several countries, flow toward the Aral Sea Basin. According to data concerning the origins of water flow, approximately 80% of the Amu Darya's flow originates in Tajikistan, 12% in Afghanistan, 6% in Uzbekistan, and 3.5% in Turkmenistan; in the Syr Darya Basin, Kyrgyzstan, with approximately 74.2% of the total flow, constitutes the principal source area (Suleimenova, 2018). This hydrological pattern demonstrates the concentration of water-resource generation in mountainous upstream areas and the dependence of a substantial share of downstream economic activity on transboundary flows. This geographical inequality has produced a form of structural dependence among the regional states. Kyrgyzstan and Tajikistan, because of their control over headwaters and favorable topographical conditions, occupy important positions in water generation and flow regulation; by contrast, Uzbekistan, Turkmenistan, and parts of Kazakhstan depend on the continuity of shared river flows to meet agricultural and economic requirements (Dinar, 2012).

Within this context, the Fergana Valley, as one of the region's major population and agricultural centers, occupies a particularly important position in water relations. The Syr Darya is formed through the confluence of the Naryn and Kara Darya rivers, whose headwaters lie in the mountainous areas of Kyrgyzstan, and subsequently flows toward Uzbekistan and Kazakhstan. Consequently, the geography of shared basins not only determines patterns of state access to water resources but also creates interdependence and differences in bargaining power (Huang et al., 2026). Differences between countries' hydrological positions and economic requirements constitute the most important structural divide in the geopolitics of water in Central Asia. Upstream states, particularly Kyrgyzstan and Tajikistan, prioritize hydropower generation and water storage in reservoirs because of their limited fossil-fuel resources and favorable natural conditions, whereas downstream countries, especially Uzbekistan and Turkmenistan, require stable water flows during the warmer months to sustain agricultural production and irrigation. This divergence in priorities creates a conflict between upstream energy security and downstream agricultural security and constitutes a core component of regional hydropolitics (Dinar, 2012). Nevertheless, such interdependence can also provide a basis for cooperation and the joint utilization of resources (Saeed & Saud, 2026).

3.2. Historical Legacy of Water Management, the Collapse of the Soviet System, and the Intensification of Geopolitical Vulnerability

The contemporary structure of water relations in Central Asia is substantially influenced by the historical legacy of centralized water-resource management. During the Russian Empire, the adoption of the "Temporary Regulations on Irrigation in the Turkestan Region" in June 1877 gradually brought water-resource management under state control and restricted the utilization rights of local communities. During the Soviet period, water management was pursued within the framework of centralized economic planning and the development of irrigated agriculture. Stalin's 1948 Plan for the Transformation of Nature and subsequent land-improvement and development programs led to the expansion of water infrastructure, while decisions concerning water allocation and reservoir management remained largely under the authority of the central government (Zhiltsov, 2025). One of the principal characteristics of the Soviet system was the institutional linkage between water and energy management: Kyrgyzstan and Tajikistan supplied downstream republics with agricultural water during the warm season, while states possessing oil, gas, and coal resources supplied the upstream regions with fuel. This arrangement partially contained conflicts between hydropower and agricultural requirements (Saidmamatov, 2020). Following the collapse of the Soviet Union in 1991, responsibility for water management was transferred to the newly independent states, while their hydrological interdependence remained transboundary. Consequently, the weakening of the integrated water–energy exchange system and the absence of a binding substitute mechanism increased disputes concerning the timing and volume of water

allocation (Saeed & Saud, 2026). This transformation intensified the discrepancy between the political boundaries of independent states and the natural structure of shared river basins. States adopted independent water policies in accordance with their respective national priorities and economic requirements, although decisions concerning dam construction, water storage, and water releases continued to affect neighboring states and generated conditions conducive to political and border disputes (Zhiltsov, 2023, 2025). At the same time, climate change, population growth, and increasing agricultural demand intensified pressure on water resources and heightened the vulnerability of regional states (Abdullaev & Rakhmatullaev, 2015). Moreover, fragmented decision-making, the predominance of political negotiations over scientific assessments, and weak long-term planning have constrained the sustainable management of shared resources (Huang et al., 2026). Geopolitical vulnerability in Central Asia therefore does not arise solely from natural water scarcity but from the interaction of the Soviet institutional legacy, the independence of national policymaking, geographical inequality, and climatic and economic pressures.

4. Water and Regional Security: From Interdependence to Conflict

Water in Central Asia is not merely a natural and economic resource but constitutes a strategic factor linking national security, economic development, and regional stability. This section examines the security dimensions of water dependence and the capacity for regional cooperation in managing these challenges.

4.1. Water Security and the Water–Energy–Food Nexus in the Regional Security Structure

Water security in Central Asia is shaped by resource constraints, uneven geographical distribution, increasing demand, and the interdependence of regional states. A substantial proportion of renewable water resources originates in the Tien Shan, Pamir, and Pamir-Alay highlands and is distributed among the five regional countries through the transboundary Amu Darya, Syr Darya, Chu, Talas, and Ili rivers. Climatic and topographic differences have also resulted in average precipitation levels in Tajikistan and Kyrgyzstan that are approximately twice those of Uzbekistan and Turkmenistan (Khikmatov et al., 2026). Combined with differences in population size, consumption patterns, and economic capacity, this inequality has become a geopolitical issue because the water security of downstream states depends upon resource-management policies adopted by upstream countries (Didovets et al., 2026; Khikmatov, 2026). This dependence is particularly evident in the water–energy–food nexus. In upstream countries, especially Kyrgyzstan and Tajikistan, water resources and storage capacities are strategically important for hydropower generation, which accounts for approximately 85% and 98% of electricity production in the two countries, respectively. By contrast, downstream states, particularly Uzbekistan and Turkmenistan, depend on regular water flows during the growing season for agricultural production and food security. The allocation of more than 90% of annual freshwater withdrawals to agriculture in some regional countries, including Uzbekistan, Turkmenistan, and Kyrgyzstan, demonstrates the importance of this issue (Khikmatov et al., 2026). The principal challenge is therefore not simply water scarcity but also conflicts concerning the timing and mode of its use: upstream countries tend to store and release water according to hydropower requirements, particularly during the cold season, whereas downstream countries require larger volumes during the warm growing season. Climate change, population growth, and increasing economic demand can transform these interdependencies into broader security vulnerabilities (World, 2025). Consequently, Central Asian water security forms part of an interconnected security system in which disruptions to water availability can affect regional stability (Huang et al., 2026).

4.2. Water Disputes, Interstate Conflicts, and the Capacity for Cooperation in Managing Interdependence

The conflict between the hydropower requirements of upstream states and the agricultural requirements of downstream states constitutes one of the principal sources of tension in Central Asian water relations (Dinar, 2012). The construction of large dams and reservoirs, such as Toktogul in Kyrgyzstan and Nurek in Tajikistan, has enabled electricity generation and river-flow regulation but has also transformed control over the timing and volume of water releases into an influential factor in regional political relations. Upstream states

emphasize water storage to meet domestic energy requirements, whereas downstream countries require predictable water flows for irrigation and the continuation of agricultural production (Elhance, 1997). Accordingly, national decisions concerning dam construction and the timing of water releases may generate transboundary consequences and disputes over shared resources (Saeed & Saud, 2026). Under these conditions, water infrastructure possesses geopolitical as well as economic and technical significance because control over water storage and flows affects states' bargaining power and patterns of interdependence. Nevertheless, regional water disputes are not merely the result of competition over the volume of available water; they are also rooted in the legacy of Soviet centralized management, divergent national development priorities, and weak post-independence coordination mechanisms. The collapse of the Soviet system and the replacement of regional planning by national priorities complicated the coordinated management of shared resources (Saidmamatov, 2020). Thus, despite numerous agreements and negotiations, tensions between upstream and downstream countries remain among the principal challenges associated with shared-river management (Abdullaev & Rakhmatullaev, 2015). Despite these tensions, water interdependence can also provide a foundation for institutional cooperation and the joint management of resources. Equitable and efficient allocation of transboundary water, particularly under intensifying climatic and demographic pressures, requires transparent, data-driven mechanisms based on long-term assessments (Huang et al., 2026). In this respect, decision-support systems that integrate hydrological data, climate projections, and sectoral requirements can facilitate the examination of water-allocation scenarios and the evaluation of the consequences of national decisions (Jonoski & Seid, 2016). Regional water stability therefore depends not only on the quantity of natural resources but also on the quality of cooperative institutions, the balance of bargaining power, and states' capacity to jointly manage their interdependence.

5. Geopolitical Competition among Central Asian States over Water

By focusing on the geopolitical positions of regional states and significant examples of conflict and cooperation, this section examines the mechanisms through which water resources are transformed into instruments of interstate influence and bargaining.

5.1. Geopolitical Position of States, Power Asymmetry, and Competition over Control of Water Resources

Water competition in Central Asia derives from inequalities among states' hydropolitical positions and the geographical separation between areas of water generation and water consumption. Uzbekistan, as one of the major downstream countries, is highly dependent on the Amu Darya and Syr Darya for meeting agricultural requirements, particularly for cotton and food production. The country consumes approximately 56 cubic kilometers of water annually, accounting for nearly 45% of regional consumption, approximately 90% of which is allocated to agriculture (Prniyazova et al., 2025). By contrast, Tajikistan and Kyrgyzstan, owing to their upstream positions and hydropower potential, possess bargaining power through their control over reservoirs and water facilities, whereas Uzbekistan, Turkmenistan, and, to some extent, Kazakhstan remain vulnerable to decisions concerning river-flow regulation (Huang et al., 2026; Prniyazova et al., 2025). Kazakhstan and Turkmenistan are also substantially dependent on transboundary water resources. Kazakhstan relies on the Syr Darya, Chu, and Talas rivers for agriculture in its southern regions, whereas Turkmenistan depends on the Amu Darya for agricultural water supply. The development of the Karakum Canal and the expansion of water-intensive agriculture have also intensified competition over water shares between Turkmenistan and Uzbekistan (Zonn & Kostianoy, 2014). The positions of these countries are therefore shaped not only by whether they are located upstream or downstream but also by their degree of economic dependence, infrastructural capacity, and bargaining power (International Crisis, 2005). From a geopolitical perspective, water inequality becomes a source of power when states are capable of transforming geographical position and economic and infrastructural capacities into instruments of influence. Upstream countries affect downstream access through reservoir management, the timing of water releases, and the expansion of hydropower dams; downstream countries, in turn, employ their economic capacity, energy resources, and diplomatic instruments to influence upstream decisions.

This situation has created a form of asymmetric interdependence that intensified competition over resources and infrastructure following the collapse of the Soviet water–energy exchange system. Consequently, water has become not only an economic and environmental resource but also an instrument for enhancing bargaining power and regional influence (Huang et al., 2026).

5.2. Water Conflicts, Interstate Diplomacy, and the Reconfiguration of Regional Cooperation Patterns

Cases of conflict in Central Asia demonstrate that water competition manifests itself in disputes concerning dam construction, river-flow regulation, and political bargaining. In Kyrgyzstan–Uzbekistan relations, the Toktogul Reservoir and the Kambarata hydropower project have constituted major sources of disagreement. Kyrgyzstan prefers winter water releases for electricity generation, whereas Uzbekistan requires water during the summer irrigation season. During the 1990s, this divergence led to reciprocal economic and security measures, including the deployment of Uzbek military forces near Toktogul in 1997 and the suspension of gas exports to Kyrgyzstan in 1998 (Huang et al., 2026). Similarly, Tajikistan's Rogun Dam project contributed to disagreements between Tajikistan and Uzbekistan because of concerns regarding its potential consequences for Amu Darya flows and Uzbekistan's agricultural security (Bologov, 2017; Saeed & Saud, 2026). Water competition is not confined to relations between upstream and downstream states. Disputes between Uzbekistan and Turkmenistan over the Amu Darya and the Karakum Canal, particularly during periods of reduced river flow, derive from their shared dependence on the river and extensive agricultural withdrawals. Weak coordination and inefficient irrigation systems further intensify this competition (Zonn & Kostianoy, 2014). By contrast, disagreements between Kyrgyzstan and Kazakhstan concerning the financing and maintenance of shared infrastructure on the Chu and Talas rivers were partially institutionalized through the 2000 agreement (Bure, 2009; Saeed & Saud, 2026). The intensity of conflict therefore depends not only on water scarcity but also on political relations, power asymmetries, the quality of institutional agreements, and possibilities for reciprocal compensation. At the regional level, the 1992 Almaty Agreement and the establishment of the Interstate Commission for Water Coordination provided a framework for joint resource management and the continuation of Soviet-era water quotas. The 1998 Syr Darya Agreement was likewise intended to restore water–energy exchanges; however, disagreements regarding infrastructure costs, instability in payments, and weak mechanisms for managing fluctuations in river flow limited its effectiveness (Huang et al., 2026). In recent years, improved relations between Uzbekistan and upstream countries, together with proposals for participation in the construction of multipurpose reservoirs, have strengthened opportunities for cooperation based on mutual interests. Kazakhstan's efforts to restore parts of the Aral Sea also underscore the importance of joint resource management (Xenarios, 2022). Nevertheless, the sustainability of cooperation depends on the financing of shared infrastructure, data transparency, the participation of relevant stakeholders, and the revision of existing agreements. Water relations in Central Asia are therefore gradually shifting from confrontation and distrust toward conditional cooperation based on mutual interests, a process that is likely to influence the distribution of power and the formation of the region's future geopolitical order.

6. The Role of Extra-Regional Powers in Reconfiguring the Geopolitics of Water

Given the strategic importance of water resources in Central Asia, any analysis of the region's water geopolitics that neglects competition among external powers and the capacity of regional states to manage such competition would remain incomplete.

6.1. Competition among Extra-Regional Powers and the Reconfiguration of Influence in Central Asian Water Geopolitics

Owing to the historical and institutional legacy of the Tsarist and Soviet periods, Russia remains one of the influential actors within Central Asia's political, economic, and security structures. Russian influence has continued through the Collective Security Treaty Organization, the Eurasian Economic Union, economic and energy linkages, and cultural and linguistic ties (Omelicheva, 2018). In the field of water, the legacy of the Soviet centralized management system and historical water-allocation agreements has likewise provided a

basis for continued Russian influence. However, the war in Ukraine and associated economic constraints have reduced Moscow's capacity to perform its traditional role in the region and have affected its regional position (Strilchuk et al., 2025). Russian influence in water geopolitics should therefore be examined not merely in terms of direct investment but also with reference to its institutional legacy and its energy and political linkages. China, by contrast, has expanded its presence in Central Asia through economic capacity and infrastructure investment, particularly within the framework of the Belt and Road Initiative (Cannon, 2025). The development of transportation corridors, energy-transmission lines, and communication projects has strengthened Beijing's economic influence while also affecting patterns of regional dependence and demand for water resources (Wilson, 2025). At the same time, the European Union and the United States are present through development cooperation, support for good governance, energy transition, and institutional capacity-building. The United States has also used the "Central Asia + United States" diplomatic framework and support for diversification of energy-transit routes to expand the region's connections with global markets (Yan & Bolshakov, 2026). Nevertheless, a distinction should be drawn between direct competition over water resources and broader economic and geopolitical competition, because the influence of external powers is primarily exercised through investment, energy, infrastructure, and institutional arrangements. Overall, the involvement of these actors has increasingly linked Central Asian water geopolitics to broader Eurasian competition and transformations in the international order (Khan & Koch, 2023).

6.2. Multi-Vector Diplomacy, Regional Cooperation, and the Capacity for Independent Agency among Central Asian States

Competition among external powers in Central Asia has not only expanded the influence of outside actors but has also created opportunities for regional states to enhance their strategic room for maneuver. The five Central Asian states have adopted a multi-vector foreign policy approach through which they seek to preserve relations with Russia while simultaneously utilizing China's economic capacities and development cooperation with the European Union and the United States to advance national objectives (Strilchuk et al., 2025). This approach rests on diversification of external partners, preservation of national sovereignty, attraction of investment, and avoidance of strategic dependence on a single power (Van den Bosch et al., 2021). Increased coordination and the development of joint diplomatic formats also indicate the efforts of regional states to strengthen their political agency and independent position (Wilson, 2025). Developments following the war in Ukraine have further increased the need to balance traditional relations with Russia against expanding cooperation with other powers (Yan & Bolshakov, 2026). In the water sector, the capacity of Central Asian states for independent agency depends on their ability to transform external cooperation into sustainable mechanisms for managing shared resources (Huang et al., 2026). Foreign investment in water and energy infrastructure, technology transfer, and the development of information systems can improve water-use efficiency; however, in the absence of regional coordination, such involvement can generate new forms of financial and technical dependence. Strengthening shared institutions, ensuring transparency in water allocation, and linking water policies to regional development programs are therefore essential (Xenarios, 2022). This necessity is particularly pronounced in view of the interdependence of upstream and downstream states and the close relationship among water, energy, and food. Overall, multi-vector diplomacy will strengthen geopolitical autonomy only if, in addition to balancing external powers, it enhances collective decision-making and regional governance capacities (Prniyazova et al., 2025). The future Central Asian water order will therefore result from the interaction among competition between external powers, the agency of regional states, and their capacity to establish sustainable cooperative arrangements.

7. Reconfiguration of Regional Power and Future Scenarios of Water Geopolitics

Geopolitical transformations, changing patterns of external-power involvement, and intensifying climatic and economic pressures are reshaping the sources of power and security relations associated with water in Central Asia. Under these conditions, control over water infrastructure, the capacity to regulate transboundary river flows, and the ability to influence institutional

arrangements have become important components of states' bargaining power. The future of regional water geopolitics will therefore depend on the interaction among interstate competition, institutional cooperation, and the degree of strategic autonomy possessed by regional states.

7.1. Redistribution of Sources of Power and Transformation of the Regional Water Order: From Infrastructure Competition to Joint Governance

In Central Asian water geopolitics, sources of power are no longer confined to states' geographical locations upstream or downstream of rivers. Control over water-storage and transmission infrastructure, hydropower-generation capacity, the ability to regulate the timing of water releases, and bargaining power within regional institutions have acquired increasing significance. Consequently, states' hydropolitical positions are shaped through a combination of natural advantages and technical, economic, and institutional capacities. Upstream countries, especially Kyrgyzstan and Tajikistan, possess the capacity to influence water flows through their control over headwaters and hydropower infrastructure, whereas downstream countries such as Uzbekistan, Turkmenistan, and Kazakhstan depend on stable water flows for agriculture and food security and employ economic, commercial, and diplomatic instruments to protect their water interests (Yan & Bolshakov, 2026). This situation reflects a form of asymmetric interdependence in which geopolitical power derives not merely from ownership of or access to resources but from the ability to control flows, manage infrastructure, and influence joint decision-making. From this perspective, the transformation of great-power competition from primarily military-political confrontation toward economic and infrastructural competition has further increased the importance of these variables (Afroz & Sarabdeen, 2026). Nevertheless, continuation of a water order based on unilateral national priorities may transform interdependence into a source of distrust and conflict. Conversely, redefining water as a shared regional interest and a public good requires movement beyond bilateral and temporary agreements toward multilateral, rule-based arrangements (Saeed & Saud, 2026). Although the Interstate Commission for Water Coordination in Central Asia possesses institutional capacity, it has not yet fulfilled all the requirements of integrated management of shared basins. Strengthening this institution through joint monitoring, transparent exchange of hydrological data, benefit-sharing mechanisms, economic compensation for upstream countries' requirements, and mechanisms for dispute settlement could reduce asymmetries and increase mutual confidence (Cohen et al., 2025). The reconfiguration of power within the regional water order will therefore contribute to sustainable stability only when states' geographical and infrastructural advantages are managed within common rules and equitable mechanisms.

7.2. Future Scenarios of Water Geopolitics: Intensified Competition, Institutional Cooperation, and Asymmetric Dependence

The future of Central Asian water geopolitics can be analyzed through three principal scenarios. The first is intensified competition and the securitization of water resources. Under this scenario, continued prioritization of short-term national interests, increasing pressures resulting from climate change, growing agricultural and energy demand, and the expansion of unilateral dam-building and water-transfer projects would intensify disagreements between upstream and downstream states (Suleimenova, 2018). Weak regional institutions and continued distrust could further transform technical disputes concerning the timing of water releases and reservoir operations into political and security conflicts. The realization of this scenario would not necessarily imply direct warfare over water; rather, it could manifest itself through economic pressure, restrictions on energy exchanges, diplomatic disputes, and intensified competition for control over infrastructure. Post-Soviet experience demonstrates that, despite widespread concerns over possible water conflicts, pessimistic scenarios involving comprehensive armed confrontation have not thus far fully materialized. A distinction should therefore be maintained between the conflict-generating potential of water and the inevitable occurrence of conflict (Cohen et al., 2025). The second scenario involves institutional cooperation and the emergence of a regional water-governance regime in which states, by recognizing their hydrological and economic interdependence, elevate shared-resource management from ad hoc bargaining to rule-based multilateral cooperation (Haider Bukhari, 2026). Data sharing,

agreements on water allocation and flow timing, integration of water and energy policies, benefit-compensation mechanisms, and the use of mediation and arbitration constitute important components of this scenario. Within such a framework, water could be transformed from a source of contention into a foundation for confidence-building and regional integration (Wang et al., 2025). The third scenario concerns asymmetric dependence and the expansion of extra-regional influence. Under this scenario, weak financial and technical capacities among regional states, ineffective shared mechanisms, and increasing requirements for investment in water and energy infrastructure would facilitate an expanded role for external actors. Russia, China, the European Union, and the United States could influence regional water policies through financing, technology transfer, infrastructure investment, and institutional cooperation (Yan & Bolshakov, 2026). Although such involvement may improve the technical and managerial capacities of Central Asian countries, the absence of a common strategy and institutional oversight could generate asymmetric financial, technological, and political dependencies. Under such conditions, external competition could intensify interstate divisions and disparities in bargaining power rather than strengthen regional cooperation (Strilchuk et al., 2025). Overall, the realization of each scenario will depend on a combination of factors, including states' political willingness to prioritize shared interests, the effectiveness of regional institutions, transparency and information exchange, financial and technical capacity, the intensity of climatic and demographic pressures, and the management of relations with external powers.

8. Hydropolitical Position, Power Asymmetry, and Mechanisms of Regional Conflict and Cooperation

The hydropolitical positions of states within the Amu Darya and Syr Darya basins constitute one of the principal structural determinants of power distribution and security relations in Central Asia. The concentration of a substantial proportion of water headwaters within the territories of upstream states, namely Kyrgyzstan and Tajikistan, combined with the dependence of downstream states—Uzbekistan, Turkmenistan, and Kazakhstan—on stable flows from these rivers, has created a form of asymmetric interdependence. Nevertheless, this asymmetry is not limited to differences in geographical access but acquires meaning through its interaction with economic capacity, energy and agricultural requirements, control over dams and reservoirs, and the ability to regulate water flows (Dinar, 2012). Upstream states possess the ability to influence the timing and volume of water releases, whereas downstream states influence water relations through economic capacity, market requirements, and political and diplomatic instruments. Bargaining power in Central Asian water geopolitics is therefore the product of geographical position, infrastructure control, and economic and institutional capacities (Huang et al., 2026). This finding is consistent with hydro-hegemonic approaches and analyses of interdependence in water relations, according to which resource inequality does not in itself render conflict inevitable; rather, what matters is how such inequality is transformed into an instrument of power (Abdullaev et al., 2025; Elhance, 1997). Power asymmetry becomes more likely to intensify water conflicts when benefit-compensation mechanisms, allocation rules, and cooperative arrangements lack sufficient effectiveness. The collapse of the integrated Soviet system disrupted the organized water–energy exchange and replaced the previous centralized structure with divergent national priorities: upstream countries increasingly emphasized hydropower generation and winter energy supply, whereas downstream countries remained dependent on summer water releases for agriculture (Peña-Ramos et al., 2021). Tensions associated with the Toktogul Dam and disputes between Kyrgyzstan and Uzbekistan exemplify the transformation of interdependence into an instrument of political and economic pressure (Murthy & Mendikulova, 2017). The implementation problems of the Syr Darya Agreement, including disputes over infrastructure-maintenance costs, energy compensation, and the management of annual fluctuations in water flow, further demonstrate that formal agreements lacking effective implementation mechanisms and equitable distribution of costs and benefits cannot resolve structural disputes (Huang et al., 2026). Nevertheless, the existence of conflict-generating conditions has not necessarily resulted in widespread confrontation. Economic and geographical interdependence among regional states, the high costs of confrontation, and the continuation of bilateral and

multilateral negotiations have served as restraining factors against crisis escalation (Saeed & Saud, 2026).

9. Interaction of Domestic, Regional, and Extra-Regional Factors and Their Implications for the Geopolitical Water Order

The geopolitics of water in Central Asia cannot be explained solely through natural variables or bilateral interstate competition; rather, it emerges from the interaction of domestic, regional, and extra-regional factors. At the domestic level, weaknesses in water governance, inefficient irrigation infrastructure, low water-use efficiency, the historical prioritization of water-intensive agriculture, and inequalities in states' economic and technical capacities intensify water vulnerability (Reyer et al., 2017). At the regional level, divergent state priorities, the absence of a comprehensive and binding water-allocation regime, and the limited capacities of shared institutions complicate the management of interdependence. Moreover, several historical and statistical claims require further verification against the original sources during the final review of the references (Kong et al., 2025).

At the extra-regional level, competition among powers such as Russia, China, the United States, and the European Union influences the strategic environment of the region through investment, economic cooperation, infrastructure development, and support for institutional mechanisms. These factors acquire greater importance under conditions of intensifying climate change and population growth (Prniyazova et al., 2025). Existing estimates suggest that water will become increasingly interconnected with food security, energy security, environmental sustainability, and political stability (Abdullaev et al., 2025; Duku et al., 2026). Water insecurity in Central Asia should therefore be understood as a multicausal phenomenon resulting from the interaction and mutual reinforcement of environmental pressures, institutional weaknesses, and geopolitical competition. Despite these limitations, an examination of regional agreements and institutional arrangements demonstrates that Central Asian states have developed capacities for cooperation during the post-Soviet period in order to prevent the escalation of conflicts. The 1992 Almaty Agreement and the establishment of the Interstate Commission for Water Coordination, the 1993 agreement concerning the problems of the Aral Sea, the 1998 Syr Darya Agreement, and the 2006 Framework Convention for the Protection of the Environment for Sustainable Development in Central Asia represent important attempts to maintain cooperation and manage shared resources. Alongside these multilateral arrangements, bilateral agreements such as the 1996 agreement between Uzbekistan and Turkmenistan concerning the Amu Darya and the 2000 agreement between Kazakhstan and Kyrgyzstan concerning the management of water facilities on the Chu and Talas rivers demonstrate the importance of bilateral diplomacy in dispute management (Cuterstam, 2025; Salangi, 2021; Zhiltsov, 2018). Nevertheless, continuing disagreements regarding infrastructure-maintenance costs, energy compensation, and the implementation of commitments demonstrate that the existence of institutions and agreements alone is insufficient to achieve effective governance. From this perspective, the principal problem is not the complete absence of cooperative frameworks but the gap between formal commitments and the capacity to implement them (Aituarova & Kh, 2025; Xenarios et al., 2018).

At the extra-regional level, competition among external powers can simultaneously generate opportunities and constraints. Investment and technology transfer may enhance the infrastructural and managerial capacities of regional states, whereas financial and technological dependence and competition over economic and energy routes may undermine their decision-making autonomy. Consequently, the multi-vector foreign policies of Central Asian countries will strengthen regional power only when states can channel external resources and support toward shared priorities and autonomous development programs rather than allowing great-power competition to replace regional cooperation (Strilchuk et al., 2025; Yan & Bolshakov, 2026). From a theoretical perspective, water geopolitics should therefore be analyzed through three interconnected levels: the natural and geographical structure of resources, power and security relations among regional states, and the involvement of extra-regional actors. Such an analysis complements approaches based on water geopolitics and regional security and demonstrates that shared resources can simultaneously function as instruments of power and as foundations for cooperation and integration (Haider Bukhari, 2026).

Ultimately, the direction of Central Asia's water order will depend on the extent to which states can move from competitive and short-term resource management toward transparent, cooperative governance based on mutual interests (Afroz & Sarabdeen, 2026; Wang et al., 2025). Table 1 summarizes the role of water in security, conflict, and the reconfiguration of regional power in Central Asia on the basis of the analytical framework of the study.

Table 1

Explanation of the Role of Water in Security, Conflict, and the Reconfiguration of Regional Power in Central Asia Based on the Analytical Framework of the Study

Main Dimensions of Analysis	Components and Analytical Indicators	Theoretical and Conceptual Foundations	Manifestations in Central Asia
Geopolitical structure and water inequality	Geographical distribution of water resources; upstream and downstream positions; control over headwaters and river flows; dam-building and water-transfer infrastructure	Water geopolitics; hydropolitics; hydro-hegemony	Upstream position of Tajikistan and Kyrgyzstan and the dependence of Uzbekistan, Kazakhstan, and Turkmenistan on the flows of the Amu Darya and Syr Darya
Water security and regional vulnerability	Sustainable access to water; food and agricultural security	Water-security theory; human-security approach; Homer-Dixon's environmental-scarcity theory	Conflict between upstream states' hydropower requirements and downstream states' agricultural-water needs; impacts of drought and climate change
Interdependence and patterns of cooperation and conflict	Conflict of national interests; patterns of amity and enmity; disputes over water allocation; water agreements and regimes; water diplomacy	Regional Security Complex Theory; international-regime theory; hydropolitics	Water tensions between upstream and downstream states; regional agreements; cooperation in managing the shared resources of the Amu Darya and Syr Darya
Distribution of power and mechanisms of hydro-hegemony	Capacity to control water flows; infrastructural and technical power; bargaining power; influence over arrangements for resource allocation and management; asymmetric dependence	Hydro-hegemony theory; geopolitics of natural resources; theories of power and interdependence	Role of dams and hydropower facilities in enhancing upstream states' bargaining power and downstream states' capacity to influence regional arrangements
Role of extra-regional actors and reconfiguration of regional power	Political and economic influence of external powers; investment in water infrastructure; technical and financial cooperation; geopolitical competition	Regional Security Complex Theory; great-power geopolitics; hydropolitics	Role of Russia, China, the European Union, and other actors in financing, infrastructure development, and shaping water-related cooperation and competition
Geopolitical implications and future scenarios	Changes in the balance of power; strengthening or weakening of regional cooperation; intensification of competition and conflict; emergence of sustainable institutional arrangements	Integration of water-geopolitics, water-security, Regional Security Complex, and hydro-hegemony theories	Formation of a regional order based on water cooperation, continuation of competition and conflict, or expansion of asymmetric dependencies among Central Asian states

10. Conclusion and Recommendations

The present study aimed to explain the position of water resources within the geopolitics of Central Asia and to examine their effects on security, conflicts, and the reconfiguration of regional power. The findings demonstrate that water in this region is not merely a natural and economic resource but a strategic variable closely connected to political geography, energy and food security, and power relations among states. The location of the principal water headwaters within upstream countries and the dependence of downstream countries on the transboundary Amu Darya and Syr Darya rivers have created a structure of asymmetric interdependence that generates competition over water allocation, control of infrastructure, and the determination of utilization priorities. The findings further demonstrate that geographical inequality alone does not constitute a deterministic cause of conflict; rather, its consequences depend on how interdependence is managed and how costs and benefits are distributed. Upstream countries, particularly Kyrgyzstan and Tajikistan, possess capacities to control headwater resources and generate hydropower, whereas downstream states require stable water flows for agriculture and food security. Dams, reservoirs, and hydropower plants can therefore function not only as technical facilities but also as instruments of political

power and bargaining. Furthermore, the collapse of the centralized water–energy exchange system following the independence of the Central Asian republics intensified conflicts among national priorities. Nevertheless, the Almaty Agreement, the Interstate Commission for Water Coordination, and bilateral and multilateral agreements demonstrate the existence of regional cooperative capacity, although weak enforcement guarantees and inadequate compensation mechanisms continue to constrain joint governance. From the perspective of regional security, population growth, increasing agricultural demand, low water-use efficiency, and climate change are intensifying the vulnerability of the countries of the region. Water security therefore encompasses not only access to resources but also the sustainability of water flows, effective management, ecosystem protection, and coordination among national policies. Moreover, the involvement of Russia, China, the United States, and the European Union through infrastructure investments, economic cooperation, and energy relations influences the geopolitical environment surrounding water, although the absence of regional coordination may generate new forms of financial and technological dependence. Overall, water in Central Asia simultaneously constitutes a source of geopolitical competition and a potential foundation for regional cooperation, while its ultimate consequences depend on the quality of shared institutions and the management of power asymmetries. Based on the findings of the study, the following recommendations are proposed:

- **Strengthening multilateral water governance:** Enhance the effectiveness of the Interstate Commission for Water Coordination and establish transparent and binding mechanisms for allocating and monitoring shared water resources.
- **Developing water–energy exchanges:** Establish long-term agreements between upstream and downstream countries based on mutual benefits, cost compensation, and climatic conditions.
- **Strengthening water diplomacy:** Establish regional mediation and arbitration mechanisms to resolve disputes concerning the allocation and utilization of shared resources.
- **Increasing climate resilience:** Develop a joint system for glacier monitoring and drought forecasting and promote the use of scientific data in water-resource management.
- **Improving water-use efficiency:** Modernize irrigation networks, reduce transmission losses, and reform water-intensive agricultural practices.
- **Managing cooperation with extra-regional powers:** Direct foreign investment and external cooperation toward technology transfer and infrastructure development while preserving the decision-making autonomy of regional states.

Ultimately, the sustainability of the geopolitical water order in Central Asia requires a transition from competition based on short-term national interests toward joint governance and the effective management of interdependence. Such an approach can transform water resources from a potential focal point of tension into an instrument for confidence-building, regional integration, and sustainable development.

Authors' Contributions

Authors contributed equally to this article.

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In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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References

Abdullaev, I., Assubayeva, A., & Bobojonov, I. (2025). Current Challenges in Central Asian Water Governance and their Implications for Research, Higher Education, and Science-Policy Interaction. *Cent. Asian J. Water Res*, *11*, 47-58.

Abdullaev, I., & Rakhmatullaev, S. (2015). Transformation of water management in Central Asia: From State-centric, hydraulic mission to socio-political control. *Environ. Earth Sci*, *73*, 849-861.

Afroz, R., & Sarabdeen, M. (2026). Policy Pathways for a Green Transition: Assessing the Interplay of Energy Diversification and Economic Complexity on the OECD's Load Capacity Curve. *Energies*, *19*(4), 1-30.

Aituarova, G., & Kh, T. L. (2025). The Role of International and Regional Organizations in Solving the Problem of Water Shortage in Central Asia. *Вестник науки*, *4*(4), 352-358.

Allan, J. A. (2001). *The Middle East Water Question: Hydropolitics and the Global Economy*. I.B. Tauris.

Bologov, P. (2017). The Rogun Dam: A Source of Division in Central Asia. https://carnegie.ru/commentary/66334

Bure, L. (2009). Chu-Talas Activities. In *Transboundary Water Resources: A Foundation for Regional Stability in Central Asia*. Springer.

Buzan, B., & Wæver, O. (1991). *Regions and Powers: The Structure of International Security*. Cambridge University Press.

Buzan, B., & Wæver, O. (2003). *Regions and Powers: The Structure of International Security*. Cambridge University Press.

Cannon, B. J. (2025). Central Asia and the Indo-Pacific. *International Affairs*, *101*(4), 1177-1195.

Cohen, A., Hill, W. A., & Sánchez, W. A. (2025). *Central Asia Needs Regional and International Cooperation to Bolster Water Security*. https://www.atlanticcouncil.org/in-depth-research-reports/report/central-asia-needs-regional-and-international-cooperation-to-bolster-water-security/

Cuterstam, B. (2025). Towards sustainable water resources management in Central Asia. In *Central Asia Water: Social, economic, environmental and governance puzzle*. Helsinki University of Technology.

Didovets, I., Hattermann, F., Schaffhauser, T., Javed, M., Nurbatsina, A., & Umirzakov, G. (2026). Central Asian water resources in the face of climate change: Shifting seasonality and diverse spatial water availability. In *Towards sustainable future of Central Asia: Analysis of climate, resources and human security*. Springer Nature.

Dinar, S. (2012). The Geographical Dimensions of Hydro-politics: International Freshwater in the Middle East, North Africa, and Central Asia. *Eurasian Geography and Economics*, *53*(1), 129-130.

Duku, J., Tourian, M. J., Azarderakhsh, M., Abbasov, R., & Mehran, A. (2026). The Shrinking Caspian Sea: Eco-Hydrological Responses to Human and Climate Pressures. *Geophysical Research Letters*, *14*(6) 1-16.

Elhance, A. P. (1997). Conflict and cooperation over water in the Aral Sea basin. *Studies in Conflict & Terrorism*, *20*(2), 207-218.

Haider Bukhari, S. R. (2026). Hydro-Nuclear Geopolitics: Water Wars and the Nuclear Future of South Asia. *Journal of Political Stability Archive*, *3*(1), 1236-1245.

Homer-Dixon, T. F. (1994). Environmental Scarcities and Violent Conflict: Evidence from Cases. *International Security*, *19*(1), 5-40.

Huang, J., Bashiri, Z., & Disse, M. (2026). Climate-Informed Water Allocation in Central Asia: Leveraging Decision Support System. *Water*, *18*(2), 1-19.

International Crisis, G. (2005). *The Curse of Cotton: Central Asia's Destructive Monoculture*.

Jonoski, A., & Seid, A. H. (2016). Decision support in water resources planning and management: The Nile basin decision support system. In *Real-World Decision Support Systems: Case Studies*. Springer.

Khan, K. H., & Koch, H. (2023). *Emerging Central Asia: Managing great power relations*. Springer.

Khikmatov, F. (2026). State of Water Resources Across Central Asia and Current Trends. In *Towards Sustainable Future of Central Asia: Analysis of Climate, Resources and Human Security* (Vol. 84). Springer.

Khikmatov, F., Kalashnikova, O., Nurbatsina, A., Niyazov, J., Umirzakov, G., Yunusov, G., & Erlapasov, N. (2026). State of water resources across Central Asia and current trends. In *Towards sustainable future of Central Asia: Analysis of climate, resources and human security*. Springer Nature.

Kong, L., Li, Y., Ma, L., Zhang, J., Deng, X., Abuduwaili, J., & Gulayozov, M. (2025). Climate Change Impacts and Atmospheric Teleconnections on Runoff Dynamics in the Upper-Middle Amu Darya River of Central Asia. *Water*, *17*(5), 1-22.

Mikhalev, A. V. (2025). From geopolitics to hydropolitics: In search of the discipline boundaries. *Rudn Journal of Political Science*, *27*(1), 7-17.

Murthy, S. L., & Mendikulova, F. (2017). Water, conflict, and cooperation in Central Asia: The role of international law and diplomacy. *Vt. J. Environ. Law*, *18*, 400-454.

Omelicheva, M. Y. (2018). *Russia's foreign policy in Central Asia*. https://nwc.ndu.edu/Portals/71/Images/Publications/OmelichevaRussiaFPinCentralAsia.pdf

Peña-Ramos, J. A., Bagus, P., & Fursova, D. (2021). Water conflicts in Central Asia: Some recommendations on the non-conflictual use of water. *Sustainability*, *13*(1), 1-24.

Prniyazova, A., Turaeva, S., Turgunov, D., & Jarihani, B. (2025). Sustainable Transboundary Water Governance in Central Asia: Challenges, Conflicts, and Regional Cooperation. *Sustainability*, *17*(1), 1-21.

Reyer, C. P., Otto, I. M., & Adams, S. (2017). Climate Change Impacts in Central Asia and their Implications for Development. *Reg. Environ. Chang*, *17*, 1639-1650.

Sadyrov, S., Isaev, E., Tanaka, K., Murata, A., & Sidle, R. C. (2025). High-Resolution Assessment of Climate Change Impacts on the Surface Energy and Water Balance in the Glaciated Naryn River basin, Central Asia. *J. Environ. Manag*, *374*(1), 1-15.

Saeed, A., & Saud, A. (2026). Hydropolitics in Central Asia: The Role of Water Security in Shaping Regional Stability. *Central Asia*, *97*(4), 65-82.

Saidmamatov, O. (2020). Water–Energy–Food Nexus Framework for Promoting Regional Integration in Central Asia. *Water*, *12*(7), 1-18.

Salangi, A. S. (2021). The Water Situation in Central Asia and Its Relationship with Afghanistan. *Water Diplomacy*, *2*(2), 17-60.

Strilchuk, S., Matsovityi, O., & Taranov, V. (2025). The Role of Central Asia in Modern Geopolitics. *Political Science and Security Studies Journal*, *6*(4), 30-43.

Suleimenova, Z. (2018). *Water Security in Central Asia and the Caucasus – A Key to Peace and Sustainable Development*.

Tian, L., Disse, M., & Huang, J. (2023). Drought cascades across multiple systems in Central Asia identified based on the dynamic space–time motion approach. *Hydrol. Earth Syst. Sci*, *27*, 4115-4133.

Van den Bosch, J., Fauve, A., & De Cordier, B. (2021). *The Routledge handbook of contemporary Central Asia*. Routledge.

Wang, X., Chen, Y., Li, Z., Fang, G., Wang, F., & Hao, H. (2021). Water Resources Management and Dynamic Changes in Water Politics in the Transboundary River Basins of Central Asia. *Hydrol. Earth Syst. Sci*, *25*, 3281-3299.

Wang, Y., Wang, R., Tanaka, K., Ciais, P., Penuelas, J., Balkanski, Y., Sardans, J., Hauglustaine, D., Cao, J., & Chen, J. (2025). Global spatiotemporal optimization of photovoltaic and wind power to achieve the Paris Agreement targets. *Nature Communications*, *16*(1), 1-19.

Waterbury, J. (1979). *Hydropolitics of the Nile Valley*. Syracuse University Press.

Wilson, C. (2025). The great power rivalry in Central Asia. https://www.wilsoncenter.org/publication/the-great-power-rivalry-central-asia

World, B. (2025). Country Profiles with Climate Risks. https://climateknowledgeportal.worldbank.org/country-profiles

Xenarios, S. (2022). The Aral Sea Disaster and Implications for Regionalism In Central Asia. https://www.ispionline.it/en/publication/aral-sea-disaster-and-implications-regionalism-central-asia-29957

Xenarios, S., Shenhav, R., Abdullaev, I., & Mastellari, A. (2018). Current and Future Challenges of Water Security in Central Asia. In *Global Water Security: Lessons Learnt and Long-Term Implications*. Springer.

Yan, L., & Bolshakov, A. G. (2026). Ensuring Regional Stability in Central Asia: The Geopolitical Aspect Cover Page. *Ensuring Regional Stability in Central Asia: The Geopolitical Aspect*, *32*(2), 108-117.

Zhiltsov, S. S. (2018). *Water Resources in Central Asia: International Context*. People's Friendship University of Russia.

Zhiltsov, S. S. (2023). The Problem of water scarcity in Central Asia: The factor of Afghanistan. *Post-Soviet Issues*, *10*(2), 110-119.

Zhiltsov, S. S. (2025). Water politics in Central Asian countries: Political aspects. *Rudn Journal of Political Science*, *27*(1), 66-79.

Zonn, I. S., & Kostianoy, A. G. (2014). *The Turkmen Lake Altyn Asyr and Water Resources in Turkmenistan*. Springer.