

Regional Security Challenges and Water Issues in Central Asia and South Asia: A Comparative Analysis



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Abstract: *Being a vital natural resource, water is the need of all inhabitants of this planet. The strategies aiming to possess more and more water has consistently resulted into rivalries and even armed conflicts. Inter-states relations have been significantly influenced by the ever-present water conflicts and their associated complexities. The 21st century global politics may also pivot around the water disputes in different regions of the world. Clashes over water sharing in Central Asia and South Asia persisted for decades. Despite its extensive geographical area, Central Asia exhibits limited water resources and dispute over its sharing has been a lasting challenge. An exclusive water-sharing mechanism was introduced in the region during the Soviet era; however, the Central Asian Republics (CARs) have also been keen to settle this issue after the disintegration of the Soviet Union. These steps have increased their mutual interdependence for further cooperation to resolve the energy challenges too. On the other hand South Asia is still facing grave threats of conflicts between nuclear arm states, India and Pakistan. With the arbitration of World Bank, the two neighbors signed Indus Water treaty to resolve water conflicts. Nonetheless, being upper riparian India wants to get additional share of the distributed water, violating the spirit of the decade's long treaty by constructing various dams on the western rivers that are creating water shortage in Pakistan. With rapidly soaring situation of climate change and the expanding Indian projects, Pakistan seems to be severely intimidated by harsh cycles of scarcity of water in the winter and devastating floods in the summer. This paper aims to analyze the prospects and challenges to regional cooperation between India and Pakistan in the fields of water and energy resources, terribly needed for the socio-economic development of one and a half billion people in the region. Islamabad and New Delhi need to learn the lesson from the CARs as role Model to resolve their water issues and enhance the regional cooperation, for water and energy security are the life line of developing economies.*

Keywords: Central Asia, South Asia, Water Issues, Politics And Regions

Introduction

Two regions rich in historical grandeur and geopolitical significance, Central Asia and South Asia, are dominant players on the world arena. Often referred to as the "heart of Eurasia," Central Asia is made up of republics including

Uzbekistan, Kazakhstan, Kyrgyzstan, Tajikistan, and Turkmenistan. Because of its advantageous location at the crossroads between Europe and Asia, this area is important for trade, cross-cultural interaction, and geopolitical maneuvering. South Asia is a region with a rich

cultural history and immense potential that includes India, Pakistan, Bangladesh, Sri Lanka, Nepal, Bhutan, and the Maldives. These regions have geopolitical significance that goes beyond their physical borders. With its enormous natural resource deposits, including minerals, oil, and gas, Central Asia is a vital hub for energy that affects both global economic dynamics and energy security. Its strategic location along the ancient Silk Road and modern Belt and Road Initiative underscores its pivotal role in fostering economic connectivity and regional integration.

With nearly a quarter of the world's population living in South Asia, the region is significant in world politics due to its nuclear capabilities both India and Pakistan have declared themselves to be nuclear-armed states and its strategically important maritime routes, especially the Indian Ocean. The ways in which these regions interact with one another in the spheres of international politics and economy bears witness to their continuing significance in forming the framework of modern international relations. With a complicated web of relationships and conflicts, the two historically rich regions of Central and South Asia have long been entwined. Their encounters' historical background tells a tale of long-lasting rivalries, political allegiances, and cross-cultural exchanges.

Ancient times saw the establishment of historical connections between Central and South Asia, with the Silk Road acting as an essential route for trade and cultural interchange. South Asia has been greatly impacted by Central Asia, which is recognized as the birthplace of strong empires like the Timurid, Mongol, and Persian empires. The migration of Turkic tribes, the conquests of Alexander the Great, and the development of Buddhism are evidence of the close ties that exist between these areas (Frankopan, 2015). A significant part of South Asia was ruled by the Mughal Empire from the sixteenth to the nineteenth centuries. Central Asia is where its Turkic-Mongol ancestry originated. This empire not only established political and economic links across the various regions, but it also facilitated the flow of art, architecture, and culture, leaving a lasting

influence on South Asia's cultural legacy (Alam and Subrahmanyam, 2012). Historical legacies, geopolitical transformations, and current strategic goals all influence how security dynamics have evolved in Central and South Asia. These regions' shared history and changing geopolitical circumstances have shaped the complex security concerns they face today. Water is vital to civilizations, and it is crucial for both Central and South Asia. These areas, which have a variety of climates and rapidly growing populations, rely significantly on water supplies for industrial growth, agricultural output, and human survival. Water management and shortage are not just environmental issues; they are also vital components of economic stability and regional security. Because of the arid and semi-arid climate in Central Asia, irrigation through river systems is crucial to agriculture. The trans boundary nature of water resources in Central Asia and South Asia presents both opportunities and challenges. Shared rivers and water bodies necessitate collaborative management but also become potential flashpoints for conflict. The intricate web of rivers crisscrossing national boundaries underscores the interdependence of these regions' water security. In Central Asia, the Amu Darya and Syr Darya rivers are classic examples of shared water resources. The upstream countries, Kyrgyzstan and Tajikistan, control the flow of these rivers, impacting the water availability for downstream nations such as Uzbekistan, Turkmenistan, and Kazakhstan. The competition for water during the growing season often leads to tensions, requiring intricate water-sharing agreements and cooperation frameworks. In South Asia, the Indus Waters Treaty between India and Pakistan, brokered by the World Bank is a pivotal example of trans boundary water management. Despite political tensions, the treaty has endured, providing a framework for the allocation of the Indus River waters between the two countries. Water resources in Central Asia and South Asia are not only critical for survival and economic development but also play a central role in regional security dynamics. The shared nature of these resources necessitates cooperative management to ensure sustainable usage and

mitigate conflicts. As climate change and population growth intensify the pressure on these vital water systems, the importance of effective trans boundary water governance cannot be overstated. Water scarcity and management issues significantly impact the security dynamics in Central and South Asia. The Amu Darya and Syr Darya rivers in Central Asia, along with the Indus River in South Asia, are lifelines for millions. However, these trans boundary water resources are a source of tension among nations. Climate change and environmental degradation further compound the water security challenges in these regions.

Water disputes in Central Asia and South Asia add another layer of complexity to regional security concerns. In Central Asia, tensions persist between upstream and downstream countries over water allocation from trans boundary rivers. Kyrgyzstan and Tajikistan, being upstream countries, control the headwaters of major rivers like the Amu Darya and Syr Darya, leading to disputes with downstream nations such as Kazakhstan and Uzbekistan. These tensions are exacerbated during dry seasons when water becomes scarcer, leading to potential conflicts over resource distribution. In South Asia, the Indus Water Treaty between India and Pakistan, governs the use of the Indus River and its tributaries. Despite being one of the most successful water-sharing agreements, it has not been without disputes. Recent years have seen renewed tensions as both countries accuse each other of violating the treaty (Pant, 2024). The combination of these factors underscores the critical need for cooperative water management strategies and sustainable practices to mitigate the adverse effects of water scarcity and climate change. Effective governance and regional cooperation are essential to addressing these challenges and ensuring the security and stability of Central Asia and South Asia.

Objective of the Study

The study aims to examine the intersection of regional security challenges and water issues in Central Asia and South Asia, focusing on how water resource management impacts regional stability.

Significance of the Study

This study contributes academically by expanding the understanding of regional security in the context of environmental resources, particularly water, in Central and South Asia. It bridges existing gaps in the literature by offering a comprehensive analysis of water issues and their impact on regional stability. The study's policy implications are significant as it aims to inform policymakers on effective water management and conflict resolution strategies, which are crucial for mitigating water scarcity and fostering regional cooperation.

Theoretical Framework

The notion of regionalism is characterized by its complexity, and it can be analyzed through the use of different theoretical frameworks in order to better understand its essence and the way it operates. However, the current study utilizes the Liberal Intergovernmentalism paradigm. This theory is based on two fundamental assumptions that are relevant to the field of international politics. Based on the theoretical framework under consideration, it is posited that nations play a pivotal role as actors within the international system, which is characterized by the absence of a central authority. States commonly prioritize the achievement of their goals through intergovernmental bargaining and negotiation, rather than relying on a centralized authority to create and enforce political decisions. Moreover, this theoretical framework prioritizes empirical analysis of the treaty-making process, although its basic assumptions also apply to legislative and decision-making environments (Moravcsik, 1998).

Research Methodology

The research study primarily adopts a qualitative approach, utilising a descriptive research design to analyse the collected data. The utilisation of a historical descriptive and analytical model is employed to assess the regional security challenges and water issues: a cross-sectional study of Central Asia and South Asia. Various sources of data collection are utilized in this research study. Both primary and secondary sources are utilised in academic research,

however, the primary emphasis is placed on the analysis and interpretation of secondary sources. The key sources of data utilised in this study encompass the comments and speeches delivered by leaders of member republics, documents in the form of treaties, and official papers originating from regional nations. The acquisition of primary data primarily involves accessing official websites of the affiliated republics. They provide to uncover the primary advancements, prospects, and obstacles in the process of regionalism and the official stance of member states. The secondary literature sourced from books, journals, and internet pieces has yielded significant insights into the potential for regionalism in Central Asia.

Water Issues in Central and South Asian Regions

The Indus Water Treaty (IWT) is often cited as a successful water management policy. It includes provisions for joint management and conflict resolution, which have been instrumental in preventing water-related conflicts between India and Pakistan for over six decades. The IWT has led to the construction of dams and irrigation canals that have significantly boosted agricultural productivity in both countries (Wolf, 1998). On the other hand, countries like Kazakhstan and Uzbekistan have adopted Soviet-era infrastructure for water management, leading to challenges in allocation and efficiency in Central Asia. Conversely, South Asia relies on bilateral treaties and agreements. Comparative analyses reveal that while Central Asia struggles with outdated infrastructure, South Asia benefits from structured treaties that help mitigate water disputes. Water scarcity and competition among riparian states are pressing challenges. The Aral Sea crisis in Central Asia epitomizes the dire consequences of poor water management, where over-extraction for irrigation led to a drastic decline in water levels, affecting over 60 million people (Micklin, 2007). In South Asia, the Ganges-Brahmaputra-Meghna basin faces similar pressures, with 600 million people depending on its waters (FAO, 2017). This environmental catastrophe has led to economic decline, health problems, and social unrest in the

region. Environmental factors, such as water scarcity and climate change, significantly impact security dynamics in the region. According to the Intergovernmental Panel on Climate Change (IPCC), climate change is expected to reduce glacier volume in the Himalayas, which feed major rivers like the Indus, Ganges, and Brahmaputra, affecting water availability for millions of people (IPCC, 2014). This could potentially lead to conflicts over water resources and exacerbate existing tensions in the region. The social and cultural dimensions of water management are also critical. In South Asia, the Ganges River is not only a vital water source but also holds cultural and religious significance for millions of people. This cultural attachment underscores the importance of considering local perceptions and traditions in water governance and conflict resolution (Gupta, 2012). The human security framework provides a comprehensive approach to addressing water-related issues. In South Asia, where access to clean water is a major challenge, the human security approach emphasizes the importance of ensuring basic needs for all individuals (UNDP, 2020). This includes access to safe drinking water and sanitation, which are essential for health and well-being.

Central Asia faces a complex array of security challenges that are deeply intertwined with its political, ethnic, and external dynamics, significantly impacting regional stability and development. Central Asia's political landscape is characterized by a history of authoritarian rule and challenges in post-Soviet state-building. According to the World Bank, corruption remains a significant issue, with Transparency International's Corruption Perceptions Index ranking countries like Uzbekistan and Turkmenistan among the most corrupt (World Bank, 2021). These governance issues hinder political reform efforts and contribute to instability. The impact of political instability extends beyond domestic affairs, affecting regional stability and development. For instance, the lack of political freedoms in Turkmenistan and Uzbekistan has led to human rights concerns and strained international relations (Freedom

House, 2021). Efforts toward political reform and stability vary across Central Asian countries. Kazakhstan has implemented political reforms, including decentralization and enhanced political freedoms, albeit with limitations. In contrast, Turkmenistan and Uzbekistan have maintained authoritarian regimes, limiting political pluralism and opposition activities. Central Asia's diverse ethnic composition has been a source of both cultural richness and tensions.

Role of Great Powers in both Regions

Central Asia's strategic location and energy resources have attracted the interest of major powers, including Russia, China, and the United States. These powers seek to expand their influence in the region through economic, political, and military means. Russia maintains strong ties with Central Asian countries through organizations like the CSTO and the EEU, aiming to enhance its security and economic interests. China's BRI has led to significant investments in infrastructure projects, increasing its economic influence in the region. The United States, although less directly involved, has strategic interests in countering terrorism and promoting stability in Central Asia. The influence of external powers has implications for regional security and stability. Competition for influence among major powers could exacerbate existing tensions and complicate efforts toward regional cooperation. Central Asia's security challenges are complex and multifaceted, requiring a comprehensive approach that addresses political, ethnic, and external dynamics. Regional cooperation, inclusive governance, and a nuanced understanding of historical and cultural factors are essential for promoting stability and development in the region (Abbas, M. F., Mashwani, H. F., & Minhas, M. R. 2024). Political instability in Central Asia has had far-reaching consequences. Russia, China, and the United States have strategic interests in Central Asia, including access to energy resources, countering terrorism, and expanding their geopolitical influence (The Diplomat, 2020). Central Asia's vast reserves of oil and natural gas make it a significant focus for energy-hungry

nations, with Kazakhstan alone holding 30 billion barrels of proven oil reserves (U.S. Energy Information Administration, 2020). Russia maintains close economic and military ties with countries in the region through organizations like the CSTO and the EEU. BRI has led to significant investments in infrastructure, increasing its economic influence. The United States, while less directly involved, has provided security assistance and promoted democratic values (The Diplomat, 2020). For instance, China's investments in Central Asia through the BRI are projected to exceed \$100 billion, significantly enhancing its influence (Carnegie Endowment for International Peace, 2020). The influence of external powers has both positive and negative implications for regional security. While investments from China and Russia can contribute to economic development, there are concerns about over-reliance on these powers and potential for increased geopolitical tensions. The dependency on external powers for security and economic stability can lead to reduced autonomy and heightened vulnerability to external pressures (RAND Corporation, 2019).

South Asia

South Asia is home to several long-standing territorial disputes, most notably between India and Pakistan over Kashmir, and between India and China over areas like Aksai Chin and Arunachal Pradesh. These disputes have their roots in colonial-era border demarcations and nationalist movements. The Kashmir conflict has resulted in three major wars between India and Pakistan since 1947 and remains one of the most militarized zones in the world (Ganguly, 2015).

The unresolved territorial conflicts in South Asia have implications for regional stability, often leading to military standoffs and heightened tensions between countries. The India-Pakistan conflict, in particular, has led to several wars and continues to be a source of instability. Efforts to resolve territorial conflicts in South Asia have been sporadic and often unsuccessful. International mediation efforts, such as those by the United Nations, have had limited success in bringing about a lasting

resolution (Ganguly, 2015). Both India and Pakistan have engaged in military build-up, including the development of ballistic missile systems and conventional military capabilities. This has led to a regional arms race, further exacerbating tensions (SIPRI, 2021). India's defense budget for 2020-21 was approximately \$73 billion, making it the third-largest in the world, while Pakistan's was around \$10.3 billion, reflecting its significant investment relative to GDP (Stockholm International Peace Research Institute, 2021).

The international community has made efforts to prevent nuclear proliferation in South Asia, including through diplomatic initiatives and arms control agreements. However, these efforts have had limited success, given the complex nature of the security environment in the region (SIPRI, 2021). The Nuclear Suppliers Group (NSG) has yet to include India and Pakistan, which complicates non-proliferation efforts and hinders global nuclear governance (NSG, 2021).

Comparative Analysis

Central Asia and South Asia are distinct in their security dynamics, share commonalities and differences that shape their regional security landscapes. Both regions face common security threats, including terrorism, extremism, and organized crime. These threats often transcend borders, requiring regional cooperation for effective countermeasures (Rumer, 2014). For instance, in 2020, the Global Terrorism Index reported that both regions faced significant impacts from terrorism, with Afghanistan and Pakistan ranking among the top five most affected countries globally (Institute for Economics and Peace, 2020). Central Asia and South Asia grapple with governance issues, such as corruption and weak institutions that hinder conflict resolution and sustainable development. Addressing these challenges is crucial for promoting regional stability (The World Bank, 2020). Transparency International's Corruption Perceptions Index 2020 placed several countries from both regions in the lower third, highlighting pervasive corruption issues that undermine governance (Transparency International, 2020). Despite historical and geopolitical differences, there is potential for

Central Asia and South Asia to collaborate on security issues. Initiatives like the Shanghai Cooperation Organization (SCO) provide a platform for dialogue and cooperation on shared security concerns. The SCO, which includes India and Pakistan as members and partners with Central Asian countries, emphasizes counter-terrorism and regional security cooperation.

These differing priorities and threat perceptions have implications for regional security architecture. Central Asian countries may seek closer cooperation with Russia and China, while South Asian nations may prioritize partnerships with the United States and other Western powers, leading to complex security dynamics (Pant, 2017). For example, India's strategic partnerships with the US have been bolstered by defense agreements worth over \$20 billion in recent years, reflecting its focus on countering regional threats (US Department of State, 2021). Central Asia and South Asia face distinct security challenges; there are opportunities for collaboration and cooperation. Understanding the similarities and differences in their security dynamics is essential for developing effective regional security architectures that promote stability and peace.

Water Issues in Central Asia

Central Asia's water resources are primarily derived from two major river basins, the Amu Darya and the Syr Darya, which play a critical role in the region's ecology, economy, and livelihoods. The Amu Darya and Syr Darya rivers originate from the Pamir and Tien Shan mountains, respectively, and flow through multiple Central Asian countries, including Tajikistan, Uzbekistan, Turkmenistan, and Kazakhstan. The Amu Darya spans approximately 2,540 kilometers, while the Syr Darya stretches about 2,212 kilometers. These rivers are the primary sources of water for agriculture, industry, and domestic use in the region, supporting over 60 million people (Micklin, 2007).

The rivers have historically been vital for the development of agriculture and civilization in Central Asia. Ancient civilizations, such as the Khorezm civilization, flourished along these

rivers due to their fertile floodplains. Today, the Amu Darya and Syr Darya are crucial for irrigation, supporting about 7.9 million hectares of farmland, and for hydroelectric power generation, with dams like the Nurek Dam on the Vakhsh River, a tributary of the Amu Darya, generating significant electricity for the region (Micklin, 2007). The Amu Darya and Syr Darya face numerous challenges, including overuse, pollution, and infrastructure development. Water withdrawal from these rivers for irrigation purposes accounts for 90% of total water usage, leading to significant reduction in flow and subsequent shrinkage of the Aral Sea, which has lost about 90% of its volume since the 1960s. Upstream dam construction, particularly in Tajikistan and Kyrgyzstan, has led to decreased water flow downstream, impacting agricultural production and ecosystem health (Kibaroglu et al., 2000).

Climate change has led to alterations in precipitation patterns and increased temperatures, affecting the timing and amount of water flow in the region's rivers. Glacial melt, which accounts for up to 80% of the summer flow in some rivers, is projected to decrease by up to 50% by the end of the century. This reduction could lead to significant water shortages, particularly during dry seasons (Hagg, 2005).

The diminishing water resources in Central Asia have far-reaching implications. Reduced water availability could lead to conflicts over water usage, as seen in disputes over the Rogun Dam in Tajikistan, which is expected to generate 3,600 MW of electricity but has raised concerns over reduced water flow downstream. Additionally, ecosystems dependent on these rivers, such as the Aral Sea, are facing severe degradation, affecting local climates and leading to health problems among the local population due to dust storms from the dried-up seabed (Hagg, 2005).

Central Asian countries are implementing various strategies to adapt to and mitigate the impacts of climate change on water resources. These include improved water management practices, such as water-saving irrigation techniques like drip and sprinkler irrigation, and

the construction of reservoirs to store water during periods of excess flow. International cooperation, such as the International Fund for Saving the Aral Sea (IFAS), aims to promote sustainable water management practices and enhance regional cooperation to address these challenges (Kibaroglu et al., 2000).

Amu Darya and Syr Darya rivers are critical lifelines for Central Asia, but they face significant challenges due to climate change and overuse. Sustainable water management practices and regional cooperation are essential for ensuring the long-term viability of these vital water sources. Interstate water disputes in Central Asia are complex and multifaceted, often stemming from historical agreements, geopolitical considerations, and the need for sustainable water management practices. This section examines two significant cases: the Kyrgyzstan-Uzbekistan dispute and the Tajikistan-Turkmenistan dispute. Central Asia has a long history of water sharing agreements, including the Soviet-era agreements that allocated water from the Amu Darya and Syr Darya rivers. These agreements, however, did not anticipate the current challenges of population growth, climate change, and increasing water demands. The Soviet-era agreements, such as those established in the 1980s, allocated approximately 74% of the Syr Darya's flow to Uzbekistan, with Kyrgyzstan receiving about 4% (Micklin, 2017). Disputes arise due to a combination of factors, including unequal distribution of water resources, inefficient water management practices, and competing national interests. The construction of dams and reservoirs in upstream countries further complicates the situation. For example, the Rogun Dam project in Tajikistan, expected to be the world's tallest dam at 335 meters, has been a significant point of contention (Kulchik et al., 2015). Current water management practices in Central Asia are inadequate, leading to inefficient use of water resources and exacerbating tensions between countries. Only 60-70% of water is efficiently used in agricultural irrigation, with the rest lost due to outdated infrastructure and practices. There is a need for improved water management strategies,

including the adoption of modern irrigation techniques and increased cooperation among riparian states (Micklin, 2017).

Recent efforts to resolve the dispute include the establishment of the Interstate Commission for Water Coordination (ICWC), which aims to promote dialogue and cooperation on water management issues. Despite efforts, challenges remain, including the need for greater transparency and trust-building measures. In 2018, a significant step was taken with the signing of a bilateral agreement between Kyrgyzstan and Uzbekistan to share water and energy resources, signaling a move towards cooperation (Abbas, M. F., Mashwani, H. F., 2023).

The water dispute between Kyrgyzstan and Uzbekistan has strained bilateral relations and contributed to regional instability. Resolving this conflict is crucial for fostering peace and cooperation in Central Asia. The 2018 agreement has been seen as a positive step, though its long-term effectiveness remains to be seen (Kulchik et al., 2015). Tajikistan and Turkmenistan have faced disputes over the use of water from the Amu Darya and the construction of dams and reservoirs. These disputes have been exacerbated by political tensions and differing national interests. Turkmenistan relies heavily on the Amu Darya for its agricultural sector, which uses around 94% of the country's water resources, making it highly sensitive to upstream activities by Tajikistan (Micklin, 2017).

Diplomatic efforts to resolve the disputes have been ongoing, with both countries engaging in dialogue through bilateral and multilateral forums. However, progress has been slow, and significant challenges remain. The International Fund for Saving the Aral Sea (IFAS) has been one such multilateral effort aimed at fostering cooperation among the Central Asian states, though its impact has been limited (Kulchik et al., 2015). The outcomes of the Tajikistan-Turkmenistan disputes highlight the complexities of interstate water management in Central Asia. Lessons learned include the need for greater transparency, cooperation, and long-term planning to address water management

challenges effectively. Implementing integrated water resources management (IWRM) and improving data sharing on water usage and flow can aid in reducing tensions (Micklin, 2017).

Water Issues in South Asia

South Asia is home to several major river basins, including the Indus, Ganges, and Brahmaputra rivers, which play a crucial role in the region's ecology, economy, and livelihoods. The Indus, Ganges, and Brahmaputra rivers originate from the Himalayas and flow through multiple countries, including India, Pakistan, Nepal, and Bangladesh. These rivers are the lifelines of South Asia, providing water for irrigation, drinking, and industrial use. The Indus River basin covers an area of approximately 1.12 million square kilometers, supporting over 215 million people, while the Ganges basin spans about 1.08 million square kilometers and serves a population of over 500 million (Biswas, 2004). The rivers have played a significant role in the development of ancient civilizations, such as the Indus Valley Civilization, which thrived around 2500 BCE. Today, they continue to be vital for agriculture, supporting the livelihoods of millions of people in the region. For instance, the Ganges basin alone contributes to about 40% of India's total food production (Biswas, 2004).

The Indus, Ganges, and Brahmaputra rivers face several challenges, including pollution, overuse, and climate change. Increasing demand for water, coupled with inefficient water management practices, has led to water scarcity in some parts of the region. For example, the Ganges is heavily polluted with industrial waste and untreated sewage, affecting water quality and health of millions (Biswas, 2004). Monsoonal variability and climate change have led to unpredictable patterns of rainfall and snowmelt, affecting the timing and amount of water flow in the rivers. The monsoon, which provides up to 70-80% of the annual rainfall in South Asia, has become increasingly erratic, impacting water availability and agricultural productivity (Immerzeel et al., 2020). The impact of climate change on water resources in South Asia is profound, with potential consequences for agriculture, food security, and ecosystem health. Changes in water availability

could lead to conflicts over water usage and displacement of communities. For instance, the Brahmaputra River has experienced increased flooding, affecting millions and causing significant economic losses (Immerzeel et al., 2020).

Water disputes in South Asia are a significant concern, impacting bilateral relations and regional stability. This section explores two pivotal cases: the Indus Water Treaty between India and Pakistan, and the Ganges water-sharing dynamics between India and Bangladesh. The Indus Water Treaty (IWT) was brokered by the World Bank and signed in 1960, providing a comprehensive framework for the management and distribution of the Indus River system's waters between India and Pakistan. The treaty allocated the three western rivers (Indus, Jhelum, and Chenab) to Pakistan, and the three eastern rivers (Ravi, Beas, and Sutlej) to India (Wolf and Newton, 2008). This agreement has been praised for its durability, managing to persist through periods of significant political tension, including wars and military standoffs. Despite periods of tension, the IWT has been largely successful in preventing major conflicts over water between India and Pakistan. The treaty has facilitated over 150 joint meetings and allowed for peaceful dispute resolution through mechanisms like the Permanent Indus Commission. However, challenges persist, including disputes over hydroelectric projects such as the Kishanganga and Baglihar dams. These projects have raised concerns in Pakistan about reduced water flow and potential violations of the treaty's provisions (Akhtar, 2010). Notably, the Kishanganga Dam has been a subject of international arbitration under the treaty's auspices, highlighting the treaty's robust conflict-resolution capabilities.

Recent developments include bilateral talks and arbitration cases to address specific grievances. For instance, in 2013, the Permanent Court of Arbitration in The Hague ruled on the Kishanganga Dam dispute, reflecting the treaty's ongoing relevance in conflict resolution. While the treaty has withstood numerous geopolitical crises, future prospects depend on continued dialogue and adherence to the treaty's

provisions, with both countries needing to address climate change impacts on water availability (Akhtar, 2010). The looming threat of climate change is expected to exacerbate water scarcity, necessitating adaptive management strategies to ensure continued cooperation. Interstate water disputes in South Asia, exemplified by the Indus Water Treaty and Ganges water-sharing agreements, highlight the complexities of managing shared water resources. Continued cooperation, adherence to treaties, and proactive negotiation are vital for sustaining regional peace and development. The intricate interplay of historical agreements, contemporary challenges, and future uncertainties underscores the necessity for innovative and cooperative approaches to transboundary water management.

Policy and Governance Frameworks

Effective management of water resources in South Asia necessitates robust policy and governance frameworks. This section delves into the bilateral and multilateral agreements and the role of regional organizations such as SAARC in fostering cooperation and resolving conflicts. South Asia is home to several critical water-sharing agreements that aim to ensure equitable distribution and sustainable management of transboundary water resources. Notable among these are the Indus Water Treaty (1960) between India and Pakistan, the Ganges Water Treaty (1996) between India and Bangladesh, and various Memorandums of Understanding between India and Nepal concerning river management and hydropower development (Rahaman, 2009). These agreements collectively impact over a billion people who rely on these waters for their livelihoods, agricultural needs, and drinking water.

Bilateral treaties have generally succeeded in preventing large-scale conflicts, although their implementation often faces challenges due to political tensions and differing interpretations. The Indus Water Treaty is frequently cited as a model of successful water diplomacy, having withstood numerous conflicts and maintaining relative peace between India and Pakistan for over six decades (Akhtar, 2010). On the other

hand, the Ganges Water Treaty has been criticized for its inability to adequately address seasonal water scarcity, with Bangladesh often receiving less water than required during critical dry months (Swain, 2001). This has necessitated calls for more dynamic and flexible frameworks to better handle changing climatic conditions.

Multilateral frameworks such as the South Asia Water Initiative (SAWI) and regional dialogues facilitated by international organizations play a pivotal role in fostering transboundary cooperation. These platforms promote crucial activities such as data sharing, joint research, and capacity building. For instance, SAWI's efforts have led to collaborative research projects that provide valuable insights into water availability and management, benefiting millions across the region (Rahaman, 2009).

The South Asian Association for Regional Cooperation (SAARC) has been involved in various initiatives aimed at enhancing regional cooperation on water management. SAARC's Environment Action Plan includes provisions for regional collaboration on water conservation, pollution control, and the sustainable development of shared water resources (Chaturvedi, 2012). SAARC's initiatives cover an extensive geographical area, impacting over 1.7 billion people who inhabit the region. Despite its potential, SAARC's impact on water management has been limited by political differences and a lack of strong enforcement mechanisms. While SAARC has facilitated dialogue and raised awareness about the importance of regional water cooperation, tangible outcomes have been modest. Initiatives like the SAARC Coastal Zone Management Centre and the SAARC Meteorological Research Centre represent steps in the right direction. However, their limited scope and the absence of binding agreements have restricted their overall effectiveness (Chaturvedi, 2012). To enhance regional collaboration, SAARC should focus on establishing binding agreements that include clear, enforceable provisions for water sharing and dispute resolution. Strengthening institutional capacity, promoting transparency, and fostering trust among member states are crucial. Additionally, integrating

climate adaptation strategies into water management policies and enhancing community-level engagement can provide more sustainable and inclusive solutions (Rahaman, 2009). For instance, adopting advanced water management technologies and predictive models could help mitigate the impacts of climate change and ensure a more reliable water supply. robust policy and governance frameworks, underpinned by effective bilateral and multilateral agreements and strengthened by regional organizations like SAARC, are essential for sustainable water management and conflict resolution in South Asia. Enhancing cooperation and building resilient water governance structures will be pivotal in addressing the region's water challenges. Efficient water governance is crucial for sustainable water management in Central Asia. This section explores regional cooperation mechanisms and the role of international organizations in addressing water issues.

Central Asia has several regional agreements and institutions aimed at addressing water issues, such as the Interstate Commission for Water Coordination (ICWC) and the International Fund for Saving the Aral Sea (IFAS). These frameworks provide a platform for dialogue and cooperation among riparian states. The ICWC, established in 1992, facilitates cooperation among the five Central Asian republics and manages the allocation of water resources from the Amu Darya and Syr Darya rivers (Micklin, 2017). While regional cooperation mechanisms have made some progress in promoting dialogue and information sharing, their effectiveness in addressing water management challenges remains limited. For instance, despite the presence of IFAS, which has raised over \$2 billion for various projects, issues such as unequal water distribution and lack of enforcement mechanisms hinder their impact. The Aral Sea, once the fourth-largest lake in the world, has seen a dramatic reduction in size, losing over 90% of its water volume since the 1960s, showcasing the limitations of current frameworks (Kulchik et al., 2015).

There are opportunities to enhance regional collaboration through improved data sharing,

joint infrastructure projects, and capacity building initiatives. The establishment of real-time water monitoring systems and transboundary water management projects can foster trust and cooperation. Strengthening regional institutions and promoting trust-building measures among riparian states are essential for enhancing cooperation. For instance, the Central Asia Regional Economic Cooperation (CAREC) Program has facilitated investment projects worth over \$30 billion, with significant potential to include water management initiatives (Micklin, 2017).

International organizations, such as the United Nations and the World Bank, play a crucial role in supporting water management efforts in Central Asia. They provide technical expertise, funding, and policy advice to help address complex water governance challenges. The UN's Special Programme for the Economies of Central Asia (SPECA) and the World Bank's Central Asia Water and Energy Program (CAWEP) are key contributors to regional water governance efforts (World Bank, 2020). International initiatives, such as the World Bank's Central Asia Water and Energy Program (CAWEP), have had a positive impact on regional water governance. CAWEP has facilitated investments in water infrastructure, improved water-use efficiency, and supported regional cooperation. The program has contributed to the rehabilitation of irrigation and drainage systems, benefiting over 500,000 hectares of agricultural land, and enhancing water productivity by up to 30% in some areas (World Bank, 2020).

To strengthen international cooperation, it is essential to enhance coordination among international organizations, aligning their efforts with regional priorities. Increased investment in water infrastructure and capacity building at the national and regional levels is also crucial. Enhancing the integration of climate resilience strategies in water management plans and promoting sustainable agricultural practices can further support regional stability and development (Kulchik et al., 2015).

Interlinking Regional Security and Water Issues

Water scarcity is a pressing concern in both Central and South Asia. The Indus River, which sustains approximately 270 million people, heavily relies on glacial meltwater from the Himalayas, Karakoram, and Hindu Kush (Albinia, 2020). However, projections indicate a decline in glacial ice, posing risks for agriculture and livelihoods. The Amu Darya basin (supplying water to Central Asia and Afghanistan) shows a 119% decline in water-supply capacity, while the Indus basin (supplying northern India and Pakistan) faces a 79% decline (DW, 2022). Combined, this impacts a quarter of the world's human population.

The struggle for water resources among riparian states is multifaceted: The Brahmaputra River, shared by China, India, and Bangladesh, exemplifies this competition. China's dam construction affects downstream flow, leading to tensions. The Caspian Sea, with its geopolitical significance and oil reserves, further complicates water-related disputes. South Asia, despite supporting over 21% of the global population, has access to just over 8% of global water resources. Per capita water availability has decreased by nearly 80% since the 1950s (The Asia Foundation, 2015).

Hydro-political Tensions and Security Implications

The Indus Waters Treaty, signed in 1960 between India and Pakistan, remains both a success story and a source of tension. This landmark agreement allocates the waters of the Indus River system, which sustains approximately 270 million people. While it facilitated cooperation and prevented major conflicts, recent disputes over water allocation and hydropower projects along the Indus River have raised concerns. For instance, India's construction of the Kishanganga and Ratle dams has implications for downstream water flow in Pakistan. The ambitious Rogun Dam project on the Vakhsh River exemplifies tensions between Tajikistan and Uzbekistan. Tajikistan aims to generate hydropower, but Uzbekistan fears

reduced water flow downstream. This conflict impacts regional stability, livelihoods, and food security. Notably, the Rogun Dam, when completed, will stand at over 335 meters, making it one of the tallest dams globally. Water disputes can escalate into broader conflicts. For instance: The Nile River Basin tensions involve multiple countries (Egypt, Sudan, Ethiopia) and significantly impact regional stability. The vulnerability of water infrastructure to sabotage or cyberattacks adds complexity to security considerations. Water scarcity drives migration, potentially leading to social unrest and instability. The prolonged drought in Syria, for example, contributed to rural-urban migration and played a role in the civil war.

IWRM approaches balance water use, environmental conservation, and security. Jordan's IWRM plan integrates water allocation, conservation, and disaster preparedness. Cooperation among riparian states is vital for sustainable water management. Diplomatic efforts prevent conflicts. The UN Watercourses Convention provides a framework for cooperation and dispute resolution. Noteworthy examples include the Mekong River Commission, fostering dialogue among Cambodia, Laos, Thailand, and Vietnam. Monitoring water-related tensions and sharing information enhance security preparedness. The European Drought Observatory tracks drought severity across Europe.

Water as a Tool for Cooperation

Cooperative water management reduces tensions and prevents conflicts. Shared projects foster trust among riparian states, ensuring equitable access to water resources. The Indus Waters Treaty has maintained peace between India and Pakistan for over six decades, demonstrating successful negotiation and conflict resolution. Joint water development projects contribute to economic growth. Hydropower generation, irrigation, and navigation enhance livelihoods and create employment opportunities.

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