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RESEARCH PAPER

Navigating Water Security in South Asia: Towards Regional Cooperatic and Sustainable Solutions

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ABSTRACT

The research examines the costs of non-cooperation and the potential for regional cooperation among South Asian countries considering the intricate water dynamics. South Asia hosts multiple transboundary river basins, including the Indus, Ganges, and Brahmaputra, making water a crucial asset for the socioeconomic growth of the region. The intensifying water scarcity, amplified by extreme climate change phenomena, has heightened competition and tensions among countries sharing these river systems. The study employed qualitative and quantitative methods that used majorly content and discourse analysis. The results of the paper show that the states of South Asia would be more inclined toward collaborating if they could acknowledge their shared interest and understand that the advantages of working together outweigh the conceivable disadvantages. It suggests that the riparian nations of the basin should depoliticize the water and require measures for effective cross-border water management, inclusive policies, and adequate institutional mechanisms while prioritizing sustainable solutions.

Keywords: Depoliticize, Institutional Mechanisms, Non-Cooperation, Shared Interest, Transboundary River Basins

Introduction

The Himalayas are the source of some of the world's most important rivers, including the Indus-Ganges-Brahmaputra (IGB). Many South Asian riparian countries of the basin (Pakistan, India, Afghanistan, Bangladesh, Nepal, Bhutan, and a portion of China), rely heavily on these rivers and their tributaries for water supplies. Table 1 depicts the basin area division among the included countries. The Indus, Ganges, and Brahmaputra river basins sustain 700 million people in Asia. Water resources are used for agriculture, drinking, industry, navigation, and hydropower generation (Afzal, et. al., 2020; Nepal & Shrestha, 2015).

The IGB is critical to the lives and livelihoods of more than a billion people. While the area is home to one-quarter of the world's population, it only makes up for 4% of worldwide renewable water resources. It is projected that by 2050, 1.5 to 1.7 billion people in the region will face water scarcity (World Bank, 2023).

Table 1
Indus, Ganges, Brahmaputra Basins Area Share

Basin	Area	Countries	As % of total area of basin
Indus	1.12 million km^2	Pakistan India	47% 39%

		China	8%
		Afghanistan	6%
Ganges	1.086 million km^2	India	79%
		Nepal	14%
		Bangladesh	4%
		China	3%
Brahmaputra	5,80,000 km^2	China	50%
		India	36%
		Bangladesh	7%
		Bhutan	7%

Source: Food and Agriculture Organization (FAO)

Water security is a crucial non-traditional security threat. In 2001, then-UN Secretary-General Kofi Annan warned that "fierce competition for fresh water may well become a source of conflict and wars in the future." Water distribution among co-riparian nations is a contentious issue. The decade-long confrontations over transboundary rivers and environmental destruction have harmed bilateral relations in South Asia, slowed economic progress, and caused controversy.

Such behavior in South Asian water-sharing and issues associated with water have political and geographic roots. First, there is the water stress that is widespread in South Asia and contributes to human insecurity in impoverished areas. Since 1950, there has been a 70% annual decrease in the amount of water available due to expanding populations and climate change (Ranjan, 2015).

According to projections, the overall population of South Asia was 1.68 billion in 2010, and if current trends continue, it would expand by 32% to 2.22 billion by 2040 (Gareth, 2014). A population rise of this magnitude will need more water for cultivation, food production, and hydroelectric power generation. In addition, urbanization, industry, and lifestyle changes have all contributed to rising water consumption. Such a demand-supply imbalance has resulted in water crises throughout South Asia.

The second physical factor is climate change-induced floods and droughts. The Himalayan glaciers and monsoon rainfall are the major sources of water for these rivers. Because of climate change, the Himalayan glaciers are melting away at an alarming pace. Many are thinning at a rate of 70-100 meters each year. The Intergovernmental Panel on Climate Change predicts that one-third of Himalayan glaciers will disappear by 2050 and two-thirds by the following century as a result of the Himalayas' swift warming (Ray, 2011, p. 46).

Climatologists have additionally demonstrated that global warming has a significant impact on the monsoon pattern. Instead of being distributed across four months (June to September), the rainfall has been reduced to forty days. Heavy rains within the aforementioned brief period lead to floods, with enormous amounts of water escaping the established reservoirs and wreaking devastation downstream.

South Asian water concerns get more problematic when conservative leaders use them for political gain. For decades, the presence of corruption, faulty planning, and the hostility of political leaders in South Asian countries has hampered efforts to expand water sector cooperation. Different parties obstruct any collaboration that might resolve the deep struggle over water allocation and incite nationalism.

Multinational strategies have been implemented for river basin development in several regions of the world. Nevertheless, there is not a similar effective cooperative agreement about linked water resources in South Asia, which has led to a sense of

superiority amongst the region's countries, who believe they are the sole owners of shared rivers (Khalid, 2011).

South Asian governments have a unique chance to work together to resolve their problems, particularly those involving water, which might lead to regional stability and development. The need for water diplomacy, desecuritization of water, and capacity building for shared resources in South Asia is greater than ever.

Literature Review

When water began to impact a nation's political, economic, social, and ecological well-being, it shifted from being a highly politicized topic to one that fell under the purview of security. Because no one is ready to share the known secure water data with other countries, South Asia's extreme water securitization has become a recipe for catastrophic weather occurrences (Imran et al., 2021).

There is no multilateral or regional framework for transboundary rivers, and bilateral treaties are ineffective in addressing water concerns owing to uncertain wording. South Asian states' accords to address water conflicts are erroneous and they ignore the underlying challenges of water management.

The Indus River and its tributaries are already disputed by India and Pakistan. Pakistan has accused India of storing and diverting western rivers that it is entitled to under the Indus Waters Treaty (IWT) to attain hydro-hegemony over downstream arch-foe Pakistan. Adnan (2018) sees the IWT as a geographical representation of the water divide. It did not promote cooperative water-sharing (Khan, et. al., 2022)

To address the Farraka barrage conflict, India and Bangladesh signed the Ganges Treaty. However, the pact is under pressure owing to environmental and political concerns. Differences have arisen as a result of the barrage's water management and the management of the Teesta River waters shared by India and Bangladesh. Furthermore, the treaty had no provision for resolving disputes if the two countries were unable to reach an agreement.

A number of beneficial agreements regarding the use of natural water resources have also been reached between Nepal and India; these include the Sarada Agreement concluded in 1920, the Kosi Agreement of 1954, the Gandak Agreement signed in 1959, and the 1996 Mahakali Treaty. Many Nepalese people, however, feel that these agreements have denied them their fair share of water supplies.

Afghanistan is building twelve dams along the Kabul River with Indian aid (Bakshi et al., 2011). These dams, as Pakistan worries, would store and divert water from the Kabul River, which flows into Pakistan. Above all, Indian media and think tanks have expressed substantial concerns over Chinese potential buildings on the headwaters of the Indus, Brahmaputra, and Ganges rivers in Tibet (Holslag, 2011).

The IGB basin's vast resources can direct the socio-economic growth of South Asia, improving the standard of life for millions of its poverty-stricken citizens while simultaneously providing for their requirements in terms of food, energy, and water and protecting the environment. Riverbanks nations will collaborate only if it serves their national objective as well as their greatest interests, according to Sadoff and Grey (2005). Cooperation is encouraged by the alignment of national objectives and the shared interests of the riparian countries.

Theoretical Framework

The Indus River emerges in the Himalayan glaciers on China's Tibetan plateau. It flows into India, then into Pakistan before emptying into the Arabian Ocean. One of its tributaries, the Kabul, originates in Pakistan's Chitral area and flows across Afghanistan before joining the Indus at Attock. The Brahmaputra and Ganges rivers, which start in Himalayan glaciers in the Chinese territory of Tibet, flow through India before joining Bangladesh and emptying into the Bay of Bengal. These three rivers are jointly known as the Indus-Ganga-Brahmaputra (IGB) system.

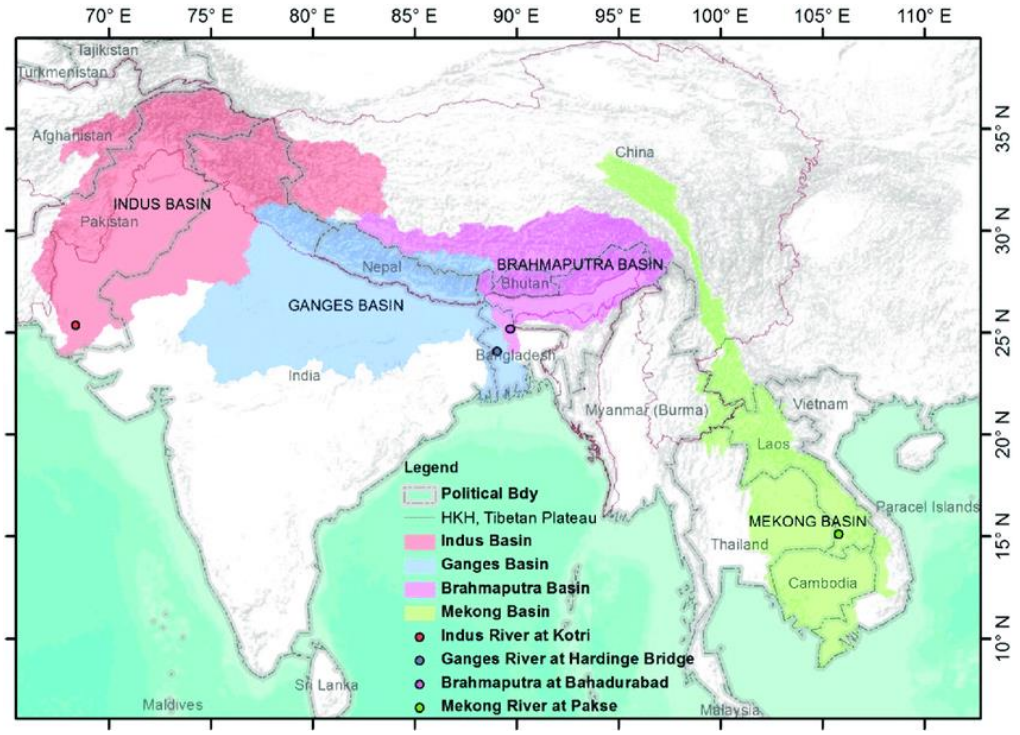

Figure. 1. Study area (left to right), Indus, Ganges, and Brahmaputra basins.

Source:https://www.researchgate.net/publication/271855715_Seasonal_cycle_of_Precipitation_over_Major_River_Basins_in_South_and_Southeast_Asia_A_Review_of_the_CMIP5_climate_models_data_for_present_climate_and_future_climate_projections

Upper riparian nations send unwanted, harsh, and unseasonal water to lower riparian states, and they occasionally obstruct the free flow of water to meet their own needs. China is India's upper riparian. As previously noted, Indian media and think tanks have highlighted concerns over lower riparian areas and accused China of pursuing hydro domination. Similarly, India is a higher riparian to Pakistan and Bangladesh on the mentioned rivers. The two lower riparians, Pakistan and Bangladesh, have voiced dissatisfaction with India's upstream hydro conduct.

According to the concept of limited territorial sovereignty and limited territorial integrity, each co-riparian nation owns the water, and each state is required to fairly use the water of an international river in a manner that does not negatively impact the other co-riparian country. This assumption essentially acknowledges each co- riparian's rights to an international river.

It is a particularly rational approach to allocating and controlling the global river's water. The idea of "equitable and reasonable utilization" in customary international law is derived from this principle (Bogdanovic, 2001). On an international river, it brings together co-riparian nations with conflicting interests. It guarantees that every state receives an equitable and appropriate portion of water from an international river while also

acknowledging the rights and interests of each riparian nation. These shares provide enough water for their area without displacing water from the other riparian states.

Therefore, the fundamental tenet of the present international regulations governing the distribution and use of water is the idea of "equitable and reasonable utilization." Nonetheless, this principle's roots are found in the ideas of limited territorial integrity and territorial sovereignty. Even though this idea safeguards the rights of all riparians, South Asia has not yet adopted it.

Material and Methods

The data for the research is collected from secondary sources i.e., various publications including books, and research institutional reports published on the topic under consideration. Journal articles along with e-news articles have also been used to form a constructive argument.

By employing a mixed-methods approach, this study aims to provide a comprehensive outlook of South Asia's current water security dynamics and proposed measures for facilitating increased regional cooperation.

The data used was majorly qualitative, but certain quantitative and factual data (e.g., The World Bank, United Nations agencies such as FAO, UNEP, UNESCO, etc.,) are used to form a solid basis for this paper.

Results and Discussion

Prevailing tensions among riparian states and the already pressing problem of water security are made worse by delays in dealing with the reasons for refusing to collaborate. Neglecting to acknowledge overlooked opportunities for cooperation might endanger the region's potential for development as well as its ecological and social sustainability. Hence, in South Asia, riparian nations need to understand the consequences of not cooperating.

To improve all aspects of water management, the research aims to drive officials in the riparian countries of the IGB basin as well as water management practitioners to create a scenario for valuable and significant transnational water cooperation at the basin-wide level through assessing the implications of non-cooperation and alternative options.

The Price of Not Cooperating

In addition to providing water, rivers are necessary for the production of food, the generation of electricity, navigation, and other ecosystem-related activities. The biodiversity of the area around the basin is significantly impacted by the resources in the basin. In light of this, to maximize advantages and minimize disagreements, a basin's freshwater resources must be used in a variety of ways that overlap and need indispensable coordination and compromises.

Furthermore, a thorough analysis of the interconnections between these distinct domains is essential to guaranteeing the sustained viability of joint efforts on cross-border river water resources (Nilsson et al., 2014). Understanding the wider implications of cooperation and the way non-cooperation in one field affects others is vital for expanding the scope of actions. This may be achieved by seeing cooperation regarding water through the perspective of the water-energy-food-environment.

The Transboundary Rivers of South Asia (TROSA) program commissioned the paper, which was written by Uppsala University's UNESCO Chair on International Water

Cooperation. It identified six main categories of costs that arise from a lack of cooperation in each of the sectors mentioned above:

- Negative Effects on River Flow Regime and Water Availability
- Declining Water Quality and Related Health Risks
- Greater Transportation Expenses Owing to a Shortage of Water Connections
- Decreased Agriculture Output and Efficiency
- Detrimental Impacts of Climate Change
- Unrealized Hydropower Potential, More Expensive Electricity, and Energy Shortages

Negative Effects on River Flow Regime and Water Availability

The demand for water for a range of purposes, including household, commercial, and environmental, has risen significantly and will continue to do so in the riparian republics of South Asia due to demographic shifts. China is just behind India in being in a water-stressed condition.

It is anticipated that by 2025 and 2050, respectively, India's per capita water availability will drop even further to 1,465 m^3 and 1,235 m^3 (The Hindu Business Line, 2019). A country is classed as "water-scarce" if it's per capita water availability is less than 1,000 m^3, and as "water-stressed" if it is less than 1,700 m^3. This is based on the Water Stress Index.

According to a 2014 UN Food and Agriculture Organization (FAO) assessment, Pakistan hit the water stress threshold at the turn of the century, while Afghanistan did so in 2012.

Declining Water Quality and Related Health Risks

The low quality of the water in the area is a further concern. The main causes of the basin's enormous wastewater volumes and depletion of freshwater resources are unsustainable water usage, rapid industry, unplanned urbanization, and other socioeconomic activities.

The state of affairs is becoming distressing every day due to the absence of an all-encompassing approach to monitoring water quality and cooperative efforts to solve the issue of water pollution. The absence of cooperation agreements aimed at maintaining water quality raises several grave health issues about the use of untreated sewage, waste from industries, low-quality water, and toxic pesticides and herbicides from agricultural zones.

For instance, the Ganges River in India receives the daily flow of over 1.3 billion gallons of untreated sewage (Babel and Wahid, 2008). Diseases transmitted by water become more common due to pollution, which drives up treatment costs and forces riparian countries to pay higher healthcare expenditures.

Greater Transportation Expenses Owing to a Shortage of Water Connections

The IGB river system and its main tributaries have been vital routes for commerce, transportation, and business since the dawn of civilization. These rivers have been crucial

to the socioeconomic growth of the area by providing 100-year-old, natural shipping routes that connect various parts of the basin.

However, an array of factors, including an inadequate level of partnership among regional states, multiple upstream water redirection projects and unjust constructed water structures, a decrease in river flow, and so on, have severely limited the range of inland transport and water conveyance in the basin in recent years. Bangladesh's inland watercourses used to stretch 5,968 km, but during the past several decades, they have lost almost 15, 6000 km (Hasan et al., 2018).

Furthermore, because their landlocked situation severely hinders their ability to expand economically, Bhutan, Nepal, and Northeast India depend heavily on inland waterways for transport. Road transit, which is costly and time-consuming, is a major source of movement of goods for these landlocked countries and areas (Rasul et al., 2019). Through the rivers of the IGB basin, they may have direct access to the sea, facilitating import-export and dealings. Moreover, traveling by water is less costly than using other forms of transportation.

Decreased Agriculture Output and Efficiency

With agriculture making up between 12 and 24 percent of the gross domestic product of the riparian countries, it is a major contributor to food security in South Asia. They cultivate food not just for their own use but also for export, which brings in a sizable sum of income. The primary staple crops in the area, wheat and rice, need excessive amounts of water—up to 1000 tons for every ton of grain produced—and rely significantly on irrigation in the dry period (Rasul, 2015).

Since the bulk of water expulsion in most riparian states occurs in the agricultural sector, a decrease in the amount of water available in the river system, especially during the dry season, could put the nation's efforts to simultaneously achieve food and economic self-sufficiency in jeopardy.

Reduced river water availability for agriculture is implied by the water industry's increased competitiveness and diminished cooperation. As a result, agricultural production would be limited by a lack of irrigation water, soil moisture depletion, groundwater table lowering, and salty water intrusion, all of which are already present in many sections of the IGB basin.

Detrimental Impacts of Climate Change

South Asia is one of the world's catastrophe hotspots. Each year, the riparian countries in the basin have to withstand the most devastating possible hydrological calamities, especially moderate-to-severe floods. One of the main causes of death in the area and the key reason of economic loss from catastrophes is flooding.

Maqbool (2023) claimed that since mid-June 2022, Pakistan has seen tremendous floods driven by unprecedented monsoon rains and glacier retreating, costing the economy more than $30 billion. Over 33 million people have been impacted out of a total population of 222 million, with approximately 1,400 people having died. An estimated US dollars 54.65 million, US dollars 7,471.82 million, and US dollars 143.34 million are being lost to flooding in Bhutan, India, and Nepal, respectively (Swain & Karim, 2022).

While floods cannot be prevented, the harm they cause can be mitigated by concerted actions by IGB riparian states. One viable approach is to manage floods on a basin-wide scale. One riparian state's unilateral flood control, which ignores the needs of the entire region, is ineffective and detrimental to the hydromorphodynamics of the river.

Unrealized Hydropower Potential, More Expensive Electricity, and Energy Shortages

Many of South Asia's riparian governments are failing to reassure their energy demands and face a power crisis. Many people in the basin still lack access to power, and many have to count on non-renewable energy sources to satisfy their requirements.

For example, Pakistan's energy problem is a long-standing and complex issue that has hampered the country's economic growth and development. Pakistan experienced a major energy crisis during the summer months of May to August 2023. The electricity gap increased to 7,000 megawatts as demand rose to 28,200 megawatts, while power supply was 21,200 megawatts (Salik, 2023).

With its tributaries and distribution channels, the IGB river system has a vast hydropower-producing potential. Pakistan has 59% potential for hydropower generation but has only exploited 6.6%. For India, 84% feasibility is available, but she has installed just 39.5%. Both states waste abundant water for electricity purposes (Adnan, 2018).

When hydropower potential is not shared, opportunities to achieve several goals are lost, including assuring a carbon-neutral energy supply, fostering the transition to renewable energy, reducing carbon footprints, stimulating economic development, and reducing poverty. When compared to other alternative energy sources, hydroelectricity still has lower costs while taking into account the worldwide average.

Facilitating Cooperation in the IGB Basin

The water, energy, and food stability of South Asian countries, as well as the prospects for socioeconomic progress and preservation of the environment in the area, hinge largely on ensuring the availability of freshwater resources. To optimize the resources of the basin and reap its benefits, the riparian nations must cooperate with one another.

1) Promoting a Multilateral Water Management Approach

Previous attempts, mostly bilateral in nature, demonstrated a limited ability to address issues linked to water and sometimes resulted in suspicion and distrust among countries in South Asia that share the water. To improve the situation and handle the complicated water concerns, a basin-wide multinational water management approach involving co-riparian states is necessary.

2) Revisiting the Indus Waters Treaty

According to Mehsud and Khan (2019), the Indus Waters Treaty is under stress, and there is enough demand and room for a new treaty dubbed the Grand Indus Treaty (GIT). GIT will not only include all riparian countries, including Afghanistan and China, as well as environmental, climate change, and Kashmiri objectives, but it may also provide a win-win situation for both India and Pakistan. Under the treaty's terms, India could moderate upstream Chinese hydro conduct, while Pakistan might assure its desire for water security by balancing potential Indian hydro hegemony with Chinese participation in the GIT.

3) Involving the Private Sector and Third Parties

The contribution of the business sector is essential to the advancement of transboundary water governance. It has the potential to attract significant investment in the water sector. Engaging a third party will ease the transfer of technology while also raising awareness.

Private sector involvement is crucial for the energy industry. As it might facilitate electrical grid unification throughout South Asia. The governments of riparian nations need to work together to set up participation initiatives like public-private partnerships (PPPs). This will assist in funding hydroelectricity projects and distribution of power.

4) Developing Adequate Data and Information Exchange Mechanisms

Riparian governments should be able to exchange an extensive range of data and information through the establishment of a comprehensive data-sharing mechanism. Hydrological information should be made available all year round, without being limited to the monsoon period. To reduce misunderstandings and boost confidence among the downstream nations in the basin, the higher riparian states must likewise improve their availability of data about their water development initiatives.

5) Introducing a Strong River Basin Organisation

According to Swain and Karim (2022), having a self-governing river basin organization that includes all co-riparian countries is imperative for effective and competent administration of the IGB river basin, which promotes collaboration. The organization must have the competence and proper authority to make autonomous judgments and operate without being influenced by political regimes.

6) Strengthening Transboundary Diplomacy

There is a vacuum in comprehending the delicate interaction between water and climate since transboundary river basin treaties lack a strong climate focus. At now, none of the existing water-sharing agreements and accords address climate factors, apart from the 2023 Bhutan-India flood forecasting program. Climate dialogue might pave the door for South Asia to join in conversations about integrated water management, which is often a divisive and complex problem. To solve these critical issues and shift from bilateral to regional water management, collaborative measures are required to create a more unified, cooperative, and equitable region.

7) Technological Developments

Technological advancements are considerably more likely to produce unexpected benefits in a variety of facets of water production and management. Biotechnological advancements will have a considerable influence on water use habits. These advancements will aid in the production of pest-resistant and drought-tolerant crops, as well as crops that can be cultivated in low-quality water, such as salty. The cumulative effect of these anticipated advancements could mean that more crops may be produced with less water, as well as with average-quality water (Biswas & Seetharam, 2008).

8) Benefit Sharing Method

It is imperative that riparian states reorient their priorities from the volumetric allocation of water to the partaking of multiple benefits arising from the diverse uses of freshwater resources. This will create new opportunities and a conducive environment for enhanced collaboration, including the construction of multipurpose storage dams, navigation, and other cooperative projects based on the benefit sharing idea, all of which will yield mutually favorable results for all parties involved.

Conclusion

To reduce adverse consequences and increase efficiencies in the food, energy, water, and environment sectors, riparian countries' policy approach and decision-making

processes must undergo a significant transformation. Furthermore, to strengthen the collaborative architecture and stimulate interaction, present institutional structures must be improved.

Regretfully, the current cross-border water interactions between the countries of South Asia are hindered by a deficit of cooperation, splintered approaches, and unilateral actions that are marked by political realism and a shortcoming of commitments, often leading to a "negative-sum outcome".

If nothing is done, the already exorbitant cost of unwillingness to collaborate in the IGB will continue to deteriorate. Maintaining the status quo will only heighten the present vulnerabilities and growing threats caused by population increase, unsustainable economic growth, uncontrolled building of infrastructure, and the destructive effects of climatic change phenomena. If continued disregarded, the existing lack of cooperation would seriously harm the basin's capacity for economic growth as well as the security of its food, energy, water, and environment, thereby endangering the peace and stability of the region.

Recommendations

The results of the research lead to the following suggestions being made:

- A potential first step in implementing an extensive multilateral strategy for water management across the IGB basin would be to review the national policies regarding the water of the concerned riparian nations.
- To supplement the formal diplomacy, the states must promote diplomatic efforts via Track 2 and 3. Think tanks, research institutions, academicians, non-governmental and civil society organizations can all be very important in this area.
- Countries must direct their focus to acquire technological solutions that could guarantee effective supply and demand handling in the water sector and significantly contribute to water regulation.
- The riparian nations must support multifaceted development of capacities incorporating human capital in addition to national and other institutions responsible for transnational water administration to fortify the institutional framework.
- To lessen the negative effects and guarantee an optimal situation for all parties involved, South Asian countries must thoroughly evaluate the environmental and sociological risk of any construction project.

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