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RESEARCH PAPER

Climate Change and the Indus Basin: Prospects of Cooperation between India and Pakistan

[1] Sarah Saeed* **[2] Prof. Dr. Rana Eijaz Ahmad**

1. Ph. D Scholar, Department of Political Science University of the Punjab, Lahore, Punjab, Pakistan
2. Professor, Department of Political Science, University of the Punjab, Lahore, Punjab, Pakistan

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***Corresponding Author:**
sarah.saeed@comsats.edu.pk

ABSTRACT

Climate change is transforming the global societies. The shift in average temperature is putting negative impacts on human health, food production and the natural resources. In the wake of the altered climate, water flow in the river systems is experiencing variability and uncertainty. This paper aims at studying the negative impacts of climate change on the water resources of the Indus Basin and investigate the prospects of cooperation between India and Pakistan; two major riparian nations sharing the basin. Adopting the case study approach, a theoretical framework has been built on the 'Theory of the International Regimes'. It has been argued that institutional capacity and the dispute resolution mechanism provided in any water sharing agreement determine the extent of cooperation among the member states. Since India and Pakistan are bound by the provisions of the Indus Waters Treaty, this study tries to assess the effectiveness of this agreement in managing the negative consequences of the climate change.

Introduction

Global politics has traditionally focused on the matters of power struggles, arms race, strategic alliances and territorial or resource-based disputes. Little attention was given to the environmental aspects of political interactions. This changed by the end of the 20th Century. Firstly, the end of Cold War removed the focus from the major powers' rivalry, secondly with the advancement in the climate change science, the transnational and the non-governmental organizations stirred up discussions on the threats posed to the environment and their role in the world politics. The celebration of Earth Day in 1970 was an official recognition of the environment as part of the international political discourse. Since then, the World has come a long way. Today organizations like IPCC periodically produce reports on climate change, its potential impacts and options for mitigation and adaptation. This is done by taking vast body of scientists and area experts on board.

To date IPCC has published five assessment reports along with Special Reports, Technical Papers, Methodology Reports, and many other publications. In its fifth assessment report, focusing on the South Asian region, IPCC warns that climate change could cause water scarcity due to increase in water demand and poor water management.

The report claims that due to the altered climate there has been an expansion of warmer seasons in Asia over the past century. This has been accompanied by extreme variability in precipitation. The report also projects disruption in food production thus threatening the food security of the region (Hijioka et al., 2014).

For freshwater, India and Pakistan rely on the Indus River and its tributaries. Indus River System is among the largest river systems and originates from the Himalayan Mountain Ranges in the north, passes through the Kashmir, along the length of Pakistan before falling into the Arabian Sea. It has five major tributaries named Ravi Sutlej, Beas, Chenab, and Jhelum. The sharing of this river system between India and Pakistan is determined by the Indus Water Treaty that was signed in 1960 with the help of the World Bank.

Table 1
Overview of the Indus River Basin

Total Area Covered	1.12 million Km^2 (approximately)
Basin countries and their drainage area	Pakistan 65% India 14% Afghanistan 11% China 1%
Territorial Extent	Pakistan 47% India 39% China 8% Afghanistan 6%
Rivers	**Total Length**
Indus	3200 Kms
Jhelum	725 Kms
Chenab	974 Kms
Ravi	725 Kms
Sutlej	1400 Kms
Beas	470 Kms

Source: Generated by Author based on information (Augustyn et al., 2019) and (Lodrick & Ahmad, 2019)

The agreement instead of allocating certain volumes of water to co riparian, allocates the eastern tributaries to India and the two western tributaries along with Indus River to Pakistan. This is a unique arrangement made such because of the deep-rooted animosity and lack of trust, these nations shared for each other. The negotiation process went on for almost a decade and multiple attempts were made to make them cooperate on shared river system. When all other plans failed the bifurcation of the river system was decided.

The reasons for their poor bilateral relations lie in shared history. Up till 1947, India and Pakistan were part of the same political entity being ruled by the British government. In 1947 when Britishers liberated this region they transferred power to two nations: India and Pakistan. The territory was divided, and a boundary commission was setup to draw

borders between Hindus majority and Muslim majority regions. The territorial division also resulted in the division of an extensive and one of its kind canal irrigation systems of Punjab.

The troubles began when the partition of the Sub-continent left the headworks of the canal system that irrigated the Pakistan's part of Punjab, back in India. In 1948 following the expiration of the Partition Tribunal, India stopped the waters from flowing into the Pakistan's canals thus beginning a long-lasting dispute over waters.

Other than sharing the violent experience of partition, the two nations were already embroiled in conflicts over Kashmir. When several bilateral attempts at dispute resolution failed, the World Bank offered its good offices, and the IWT was signed that instead of establishing cooperation between these nations favored a compromise. It has been almost sixty years since they reached the agreement. Since then, India and Pakistan have fought several wars and indulged in multiple standoffs. The two nations have turned nuclear in competition to each other and there exist a constant threat of breakdown of relations. Despite their sour relations the co riparian have to date preferred to abide by the provisions of the treaty. Frequent disputes do erupt, mostly on the issues of India constructing electricity generating plants on rivers allocated to Pakistan. But none of the signatory has ever tried to abrogate the pact.

The agreement has been hailed as a success for keeping the conflict in check and making these traditional rivals peacefully share the waters of the Indus. This might change in future. The treaty did manage to settle long-standing water sharing issue between India and Pakistan but ignored many environmental aspects while designing the provisions of the treaty. Indus River system is nurtured by the glaciers of the Himalayas. Climate change would cause rapid melting of these glaciers which would subsequently reduce the water supply. This would be accompanied by extreme events due to altered precipitation patterns. Moreover storms and hurricanes could also threaten human settlements and water infrastructures.(Parry et al., 2007)

Reduced water supply and increased temperatures would have negative consequences for crops, vegetation, livestock and even hydropower generation. Reduced water supplies and pollution because of extreme events would result in frequent incidents of infectious and water borne diseases with dire consequences for water management on both sides of the border. Given their dependency on water resources for economic development and sustainability of their people, India and Pakistan might indulge in fierce competition to secure their share of water supply.

This study aims at investigating the efficacy of IWT in managing threats to fresh water supplies caused by climate change.

How efficient is IWT in managing variability and alteration in water availability in the Indus Rivers?

What are the prospects of cooperation between India and Pakistan in case of climate induced water scarcity?

Material and Methods

To write this article, qualitative research methods were utilized by focusing on the Case Study approach. Primary sources include text of the Indus Waters Treaty (1960). For extensive information on variability due to climate change, various documents including the Assessment Reports of Intergovernmental Panel on Climate Change, reports by United Nations Framework Convention on Climate Change have been consulted. Secondary sources include books and published articles.

Theoretical Framework

Water is crucial and states tend to secure their share for economic development. Once these resources cross the international borders, they acquire political status leading to increased competition. States sometimes indulge in conflicts or cooperation to establish their control over water. As of 2017 around 37 incidents of acute conflicts over water were reported since 1948 and during same period around 295 international agreements were negotiated.(UN-Water, 2017)

The existing water sharing agreements might face challenges due to contemporary issues including climate change which can be defined as "the transformation in the climate that is noticed when a statistically substantial variation in the mean climate or its variability, continues for a prolonged period, typically thirty years*"(Fluet et al., 2009)*

This study assesses how effectively the co riparian would manage the damaging effects of climate change on shared water supplies by drawing a theoretical framework based on the "Theory of International Regimes".

This approach presses on the international regimes as principal elements in enabling cooperation among nations and restricting their actions to established rules and principles. The word regime denotes to *"a set of principles, norms, rules and decision making procedures around which actors' expectations converge in a given area of international relations"(Krasner, 1982)*

Regimes' effectiveness is reflected in their ability to expedite international commitments by institutionalizing cooperation, and by providing information for the facilitation of the cooperation. States sometimes fail to collect information on their own regarding the outcomes of cooperation, risks involved and the priorities of other states. Therefore regimes have the ability to remove uncertainty and increase the possibility of cooperation.(Bradford, 2007)

How effectively the international agreements can adapt to the altered circumstances resulting from climate change, would depend on various features of these agreements. Works like Cooley et al. (2009), Cooley and Gleick (2011), Tir and Stinnet (2012), and Stefano et al. (2012) focus, among others, on the institutional capacity and the

dispute resolution mechanisms set down in the agreements related to the sharing of the transboundary water resources.

This framework would focus on two major features of a climate effective transboundary water agreement: joint institutions and conflict resolution mechanisms.

Conflict Resolution Mechanism

The conflict resolution mechanism is important because despite the presence of mutually agreed provisions for cooperation, co riparian are bound to disagree over certain matters. The probability of conflicts is further increased due to climate change and the resulting variability and the disastrous events, especially if they were not envisioned in the agreement in the first place. Despite the existence of the agreements, these disputes coupled with other factors could get violent and disrupt the existing cooperation therefore effective conflict resolution mechanism becomes more important than ever.

To make the dispute resolution mechanism more efficient, a commission could be set up with clearly set down principles and mention of the circumstances under which the provisions of the mechanism could be evoked. This should also include regular meetings and frequent data sharing for effective communication and third-party participation with binding arbitration. A formal mechanism with established rules and principles would enable more transparency. This is important since reduced water flow due to climate change may compel one state to cheat the other signatory state. Such disputes could be managed by increasing the costs of such violations.(Abbott & Snidal, 1998)

The involvement of the third party in the form of some legal or technical/scientific expert or some international institution could be more beneficial if there exist provisions related to the unforeseen challenges (like variations resulting from climate change) that could come up in the future. The conflict resolution mechanism including all the above features could limit the inadvertent violations because of the changed circumstances.(Tir & Stinnett, 2012)

Joint Institutions

Joint institutions could accelerate communication and enable more transparency in the wake of uncertainty and fluctuations resulting from the climate change. They create a favorable and binding environment for the concerned parties to negotiate with ease, stick to the rules with the confidence that the other party would do the same. In case the violation does occur, these institutions could become the medium of communication and diplomacy and develop an environment which is conducive for cooperation.(Keohane, 1984)

As much these institutional setups are effective, their significance is not recognized globally. Around 106 international river basins have some form of institutional arrangements, of which only 20% could be regarded as multilateral and their scope varies with respect to responsibility and authority. Preferably they should include all river basin sharing nations and should have management and enforcement authority. In reality

however states are usually reluctant to let go their authority with the fear of losing control over resources as vital as fresh water.(Fischhendler, 2004)

Within the scope of joint institutions, a committee could be formed to develop common hydrological models and climate change scenarios could be created. For instance, the "The International Commission for the Protection of the Rhine" carried out the assessment of the climate change and its projected impacts on the water regime of the Rhine. The assessment suggested an increase in the winter and decrease in the summer runoff. In response to this study the commission created a climate change expert committee to develop a plan for adaptation which was expected to be finalized in 2010.(Gerlinger, 2009) It could be concluded that the existence of joint institution facilitated the creation of awareness about the potential impacts of climate change and helped creating possibilities of cooperation and adaptation throughout the basin.

Climate Change and the Resilience of the Indus Waters Treaty

As already established, climate change could pose a huge challenge to the hydrology of the Indus, this work aims to evaluate the effectiveness of the bilateral agreement between India and Pakistan in coping with climate change. The focus is on joint institutions and the presence of conflict resolution mechanisms. The reason for putting emphasis on these features despite the presence of many others is the nature of the climate change induced challenges. Since climate change results in fluctuation and variability in the water flow, this would mean that states would have to compete for the dwindling resources. Hence effective institutional setup and conflict resolution mechanisms are key for making the transboundary water sharing agreements more resilient in the face of the altered climate.

IWT is the official agreement between India and Pakistan that was signed in 1960. Although this agreement survived several wars and political standoffs, its capability to cope with the challenges induced by the climate change is still unclear. Hence to seek answers to the questions posed in the beginning, the theoretical framework developed above would be applied on the transboundary management of the Indus River System. The framework lays down two major features of an agreement that is resilient and robust enough to survive factors like increase in demand and decrease in water quality, increase in extreme events like floods and droughts and increased variability in water flow.

Indus Waters Treaty and the Conflict Resolution Mechanism

Climate change induces variability in the water flow which is deemed to increase the possibility of conflicts among the water sharing communities, regions and even the nations. The irregular precipitation pattern would either cause floods or reduced freshwater availability for the basin communities. Given its crucial nature, there are ample chances that concerned nations would desperately compete for control over dwindling resources. At the same time there are minimal chances that well worded clauses would already exist in the water sharing agreement to deal with innately unpredictable issues. Even if there do exist such clauses, their interpretation might cause further differences and

disputes. The South Asian nations already have the tendency to take freshwater as a component of their national interests and its shortage as a threat to their security.

India and Pakistan already share a history of long-drawn-out negotiation process to settle the issue of water sharing back in 1950's. Even after the agreement was signed, frequent differences mostly related to the construction of the Indian projects on Pakistan's share of the rivers, came to the forefront. Even though both nuclear powers have not fought a single war over the shared water resources yet, there exists a volatile balance of water sharing between them. Besides both states drag the shared water resources into every bilateral political dispute they indulge in. Pakistan being a lower riparian has a constant fear that India would manipulate its upper riparian position to threat Pakistan's vital interests. Pakistan's fears hold strong ground since India has in recent times, frequently voiced their capability to divert the waters of the Indus Basin and run Pakistan dry. A clear indication of this is India's recent political rhetoric that 'blood and water cannot flow together'. There is already a general perception among the people of Pakistan that the reason of systematic reduction in water availability is due to the Indian projects on Pakistan's rivers.

There are several political parties in Pakistan along with personalities like Hafiz Saeed who support the idea that India intends to use water as a strategic tool to destabilize Pakistan. They carried out massive rallies in 2010 against Indian projects on the western rivers and propagated terms like 'jihad for water', 'water terrorism' and 'India's water bomb'(PTI, 2010). Thus clearly reflecting the volatile nature of water sharing balance. The situation could get explosive incase the water availability is negatively affected by reasons including climate change thus making the conflict resolution mechanism crucial.

IWT contains a multi-tier dispute resolution process. Various kinds of disputes are addressed at different levels. At first level, dispute termed as a "Question" would be resolved by the Indus Commission. In case the Commission fails to settle the 'question', it would gain the status of a 'dispute'. Once the dispute is established it would wither be dealt by the 'Neutral Expert' or by the 'Court of Arbitration'. Which way this dispute would go for the resolution, would be decided by the Indus Commission. The categories of issues that fall under the ambit of dispute and the process for the appointment of the 'Neutral Expert' are provided in the Annexure F of the Treaty. The selection of the Neutral Expert must be made by both the parties. In case they fail to reach a consensus regarding the appointment of the NE, World Bank would step in and make the decision. Even this decision must be approved by both parties.(*Indus Waters Treaty*, 1960)

The third tier of the resolution process is termed as negotiation. If the Neutral Expert declares the issue beyond its jurisdiction, Governments of India and Pakistan can indulge in the negotiation process and could even get the help of a mediator. In case the negotiations remain unsuccessful, the arbitration clause could be provoked. This would be the fourth tier of the resolution process. The arbitration is a complex process including the circumstances under which it could be provoked and the composition of the 'Court of

Arbitration'. The decision of the court which is known as the 'Award' is final and binding upon the parties.(*Indus Waters Treaty*, 1960)

Table 2
A Glimpse at IWT

Scope	Preamble Article 1: Definitions Article XI: General Provisions Annexure A: Exchange of Notes Between Government of India and Government of Pakistan
Substantive Rules	Article II: Provisions Regarding Eastern Rivers Article III: Provisions Regarding Western Rivers Aericle IV: Provisions Regarding Eastern Rivers and Western Rivers Annexure B: Agricultural Use by Pakistan from Certain Tributaries of the Ravi Annexure H: Transitional Arrangements Annexure D: Generation of Hydroelectric Power by India on the Western Rivers Annexure E: Storage of Waters by India on the Western Rivers
Procedural Rules	Article V: Financial Provisions Article VI: Exchange of Data Article VII: Future Cooperation Article X: Emergency Provisions Article XII: Final Provisions
Provisions Regarding Institutional Arrangements	Article VIII: Permanent Indus Commission
Provisions Regarding Dispute Resolution	Article IX: Settlement of Differences and Disputes Annexure F: Neutral Expert Annexure G: Court of Arbitration

Source: Generated by the Author based on information from (*Indus Waters Treaty*, 1960)

The multi-tier dispute resolution mechanism seems capable to resolve the conflicts which are inevitably going to rise in frequency due to variability and unpredictability caused by the shift in the environment. Several disagreements have already been resolved by the Indus Commission like Baglihar Dam recently the Kishanganga Hydro-Electric Project(Koh, 2014) but these disputes were of technical nature and related to the engineering of the hydro-electric projects. Provisions related to these have already been established in the Article III and Annexure D of the official document.(*Indus Waters Treaty*, 1960). In contrast to this variability and other factors associated with the altered climate are not addressed explicitly in the agreement. Hence disputes resulting from decreased

water flow in the western rivers or the flooding in the eastern rivers could soar up the bilateral tensions and make the disputes more complex.

The multi-tier nature of the dispute resolution mechanism could be counted as its strength but since the consent of both parties is extremely important and given the unfriendly terms between the signatories these conditions make the resolution process extremely long and tiring. Salal dam issue for instance started in 1970 and was resolved eight long years later. Similarly, it took more than fifteen years before the final verdict of Baglihar Dam was announced. Same happened to Kishanganga Hydro-electric project, dispute over which started in 2004 but was finally settled at the end of 2013.

The lengthy process not only raises the cost of the projects under discussion but also increases the anxiety of the policy makers and misunderstanding among the masses. The political opposition grasps the opportunity for exploitation by mobilizing the masses and creating frenzy against the other co riparian. Water scarcity and extreme events resulting from the climate change cannot afford extensive delays in the resolution of the disputes since this could accelerate tensions and even violence.

Other than the extended nature of the resolution process, its scope is also limited to the interpretation of the provisions of the treaty. At the time of signing of the agreement the facilitators prioritized bringing both the parties to the negotiation table and were willing to make big compromises. The future concerns of climate variability and the resultant alterations in hydrology were already being anticipated by the scientific community but were ignored in the agreement.

Effective management of variability and extreme events also require frequent and updated data sharing among the basin states. IWT does bind India and Pakistan to share prescribed data on monthly basis.(*Indus Waters Treaty*, 1960) In reality frequent disagreements are observed between these countries over data sharing. Pakistan complains that India adopts delaying tactics when it comes to data sharing whereas India disregards these objections as mere nationalist sentiments or strategic methods to create impediments for India.(Kokab & Nawaz, 2013)

Lack of trust and politically motivated approaches on both sides limit the effective utilization of the dispute resolution mechanism provided by the treaty. The conflict resolution mechanism is mostly concerned with the precise interpretations of the provisions. In addition, the apportioning principle embedded in the treaty also restricts the possibility of any cooperative interaction between these nations. Therefore, despite the presence of an elaborated multi-tier system in place, the dispute resolution mechanism falls short of a perfect tool to manage more complex issues linked with climate change.

Institutional Mechanism

Liberal institutionalism maintains that the institutionalization of the agreements enhances cooperation among the states. These institutions provide forum to the states for frequent communication and add transparency, accountability, and credibility to the commitments of the signatories. The success of the dispute resolution mechanisms also depends on the institutional setups, if provided by the agreement. The efficacy of the joint institutions would depend on frequency and mode of communication, information sharing and monitoring mechanisms.

IWT has warranted the establishment of Indus Waters Commission, which is made up of two Indus Water Commissioners, one from India and Pakistan each. The Commissioners are the channel for communication between the two governments and must be high ranking engineers and expert in hydrology and water use. They are bound to meet once every year and could schedule more than one meeting if required. The Commissioners also act as the first base to resolve bilateral disputes. Their tasks are enabled by frequent data sharing which is also evaluated by the Commissioners to ensure the smooth functioning of the agreement.(*Indus Waters Treaty*, 1960)

The Indus Commission could be regarded as an effective setup since both the Commissioners have met on regular basis even during violent conflicts and serious standoffs. In recent past even when India blamed Pakistan for Pulwama and Uri attacks and threatened to abrogate the agreement, the Commissioners held the due meeting in Pakistan.(PTI, 2017)

This could be because the Indus Commission is only concerned with the technical aspects of the treaty and political matters do not fall in its ambit. This very aspect of the Commission limits it from turning into a robust joint institution capable of dealing with new challenges associated with the climate change.

Indus Water Commission has a limited scope with responsibilities including reporting on the execution of the provisions of the treaty, exchange and evaluation of data and inspection of the hydrological sites. The Commission also has a limited autonomy with respect to the resolution of the disputes raised at its forum. In brief the functions of the Commission are specific and of technical nature. Moreover, lack of a neutral member in the Commission also restricts its capability to efficiently solve the issues. Hence expecting that the Commission would be entrusted by India and Pakistan, the responsibility of policy making is a farfetched idea. Similarly, to adjust the water variability, some modifications by the Commission might be required in water allocation principles which seems impossible under the present setup of the Commission.

The Indus Commission is also unable to collect accurate data or make precise assessments due to the complex hydrology of the Indus hence incapable to manage the resulting disputes. In short, the lack of advance technology, neutral and non-political experts and relevant skills make the Indus Commission short of an effective institution in the face of climate change.

Conclusion

The IWT is considered successful in managing water sharing between India and Pakistan and keeping the disputes from erupting into violent conflicts. It took excruciatingly long tenure, material incentives and the good offices by World bank to convince the two rivals into signing this treaty. Since the agreement has signed, these nations have continued to follow its provisions, and have resolved their disputes by utilizing the dispute resolution mechanism provided in the agreement. Regardless the mere existence of the agreement does not ensure its capability in the face of climate variability that effects the water resources the most.

In this study, a theoretical framework based on the 'Theory of International Regimes' was developed. It was established that the conflict resolution mechanism and the presence of joint institutions in any water sharing agreement would determine its fitness to manage the challenges posed by the climate change. After a detailed comparison it could be concluded that the IWT is the creation of circumstances. A decade long negotiation process reflected the incapability of these South Asian nations to collectively manage their vital natural resources. Hence instead of cooperation over the Indus, the apportionment of the rivers was decided ensuring minimal interaction between them.

Climate Change is already resulting in a shift in the hydrology of the Indus Basin. Soon this would have negative consequences for available water resources for both India and Pakistan. The capability of these nations in managing variability and the resultant conflicts would depend on the structural features of the Indus Waters Treaty. The conflict resolution mechanism provided in the agreement is extensive and utilizes various tools on different levels to resolve the conflicts. However, the lack of provisions for the disputes related to variability and extreme events prevents it from becoming an effective mechanism for dispute resolution. Similarly, the urgent nature of the climate related disputes requires a system that could deliver instantly which is not possible through lengthy and nerve wrecking process provided by the treaty.

As for the Indus Commission, it lacks institutional strength and autonomy to manage the challenges posed by climate change. A good institution must be equipped with advance apparatus for data collection, scientific community for effective estimations regarding shifts in hydrology of the basin, broad membership including field specialists and policy makers with some degree of autonomy. All these features are missing in the Indus Commission. The structural flaws of the IWT prevent the nuclear states from managing the consequences of climate change on the Indus River Basin.

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