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RESEARCH PAPER

Exploring the Pakistan-India Water Dispute in the Context of Climate Change: An Environmental Security Perspective

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ABSTRACT

This study delves into the intricate history and pivotal junctures of the Pakistan-India water dispute, examining its environmental dimensions through the lenses of environmental security and the Theory of Environmentalism in International Relations (TEIR). Amid the shared vulnerability of Pakistan and India to climate change threats impacting their shared river waters, collaborative efforts become imperative. Projections indicate climate-related losses could cost South Asia $518 billion by 2050, a substantial portion of the region's GDP. This underscores the urgency for swift cooperation to foster sustainable water management in response to climate change. A descriptive and analytical research methodology has been used in which diplomatic discussions evaluates successes, failures, and ongoing peace-building efforts. The interplay of environmental security is emphasized in fostering sustainable transboundary water management for a resilient South Asia. Conclusively, proactive measures, innovative diplomacy, and sustainable water management are advocated for building a more resilient and interconnected South Asia.

KEYWORDS: Climate Change, Conflict Resolution, Environmental Security, Geopolitics, Pakistan-India Water Dispute

Introduction

Pakistan, a nation spanning 796,000 square kilometers, exhibits significant regional variations in temperature and precipitation, but India comes in at number 7th on the Global Climate Performance Index (CPI) (Jun et al., 2023; Mohan, 2023). The core of the dispute between Pakistan and India is rooted in significant operational, historical, and ideological disparities. These two neighboring states have engaged in conflict through four major wars, occurring in the years 1947–1948, 1965–1971, and 1999. Despite the challenges posed by the Indo-Pak wars in 1948, 1965, and 1971, Pakistan has consistently aimed at maintaining peace with India. Both nations have accused each other of disrupting the peace process, but they find themselves constrained by the historical context. Consequently, they have engaged in bilateral talks to address unresolved issues from the partition agenda, including matters related to Kashmir, Siachen, Sir Creek (Ban Ganga, a tidal estuary between India and Pakistan in the uninhabited marshlands of the Indus River Delta), river water distribution disputes, and other mutual issues. The path of bilateralism has witnessed various fluctuations over time, particularly before the start of the 21st century.

Since the partition of British India in 1947, the unresolved dispute over the region of Jammu and Kashmir has been a primary source of contention. India possesses around 55% of the total land area within the region, encompassing territories such as Jammu, the Kashmir Valley, and a significant part of Ladakh, including the Siachen Glacier. This portion also comprises about 70% of the total population residing in the region. Pakistan governs approximately 30% of the land area, which includes Azad Kashmir and Gilgit-Baltistan. Both nations lay claim to the entirety of Kashmir, leading to multiple wars and

ongoing skirmishes, fueling mistrust and animosity between the two nuclear-armed neighbors (Khan et al., 2021).

The conflict manifests in diverse forms, involving political rhetoric, military standoffs, cross-border terrorism, and diplomatic tensions. Some attempts at peace negotiations, such as the Shimla Agreement (1972), Lahore Declaration (1999), Agra Summit (2001), Tashkent Agreement (1966), Indus Waters Treaty (1960), and Kartarpur Corridor Agreement (2019), have been made to ease pressures and find a determination, yet the central issues remain unanswered (Ullah et al., 2022; Mumtaz et al., 2023; Khan et al., 2021; Waheed et al., 2020). Environmental security has arisen as a critical factor to take into account while analyzing conflicts worldwide. It comprises grasping the convergence of ecological issues, the normal assets of the executives, and their recommendations for territorial strength and compromise. Environmental security is gaining significance as the consequences of climate change intersect with the Pakistan-India water dispute. Fluctuations in the accessibility and quality of shared water resources hold the potential to change regional environmental security dynamics, intensifying current tensions and causing conflicts.

The TEIR asserts that impartial distribution of transboundary water resources can contribute to regional peace and agreement. TEIR encourages a collaborative method that goes beyond geographical borders, including various stakeholders like policymakers, water managers, and civil society members. This approach recognizes the fundamental connection among environmental health, national security, and international relations. Studies specify that 1.9 billion individuals currently reside in regions highly vulnerable to the impacts of climate change. According to World Health Organization (WHO) approximations, the effects of climate change will cause an additional 250,000 deaths annually between 2030 and 2050 (Sarkar et al., 2023). According to Jon Barnett, a series of interconnected events that began in the 1960s elevated environmental security's profile in the security studies community (McDonald, 2021). The Environmental Justice Atlas states that, as of April 2020, 3,100 environmental cases had been reported globally. The atlas made a great deal of these battles that had not before been documented in public (Khumalo, 2022).

Since the South Asian region contains an ecosystem and complex mechanism of shared river water resources, a weak institutional framework for river water sharing, and is in danger from the implications of climate change, environmental security is now vital in the larger context of the military conflict between Pakistan and India. The strategy takes into account human activities, climate change, and the rapid depletion of natural resources as possible conflict triggers. This viewpoint highlights how environmental stressors, such as deforestation, water scarcity, and natural disasters, can intensify already-existing tensions and serve as catalysts for bilateral relations between two countries.

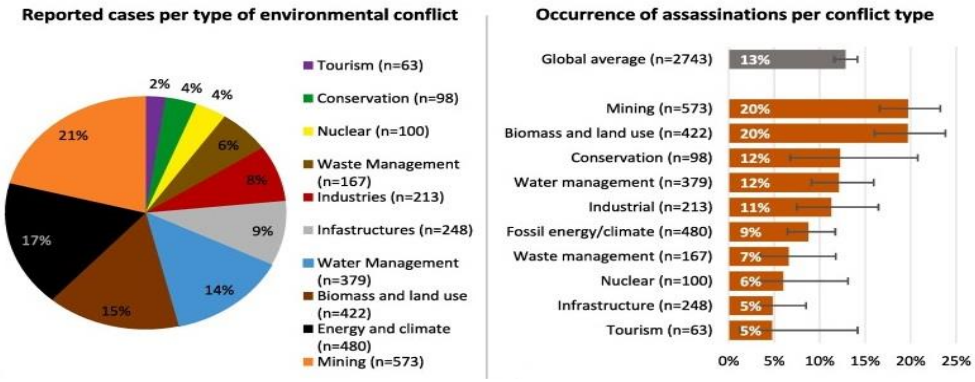

Figure 1: Environmental Conflicts (Scheidel et al., 2020)

An all-encompassing lens through which to examine the complex relationships between environmental factors and international politics is provided by the Theory of Environmentalism in International Relations (TEIR) (Eckersley, 2023). As indicated by TEIR, ecological worries fundamentally affect state conduct, global joint effort, and compromise. TEIR features how ecological issues are connected to targets connected with legislative issues, economy, and security. It examines what highway relations can be significantly meant for by natural changes, like asset consumption, biological calamities, and environment unsettling influences. These progressions might bring about participation or struggle in light of normal natural difficulties. Applying TEIR to the Pakistan-India struggle assists with explaining how ecological elements associate with asset rivalry, international pressures, and provincial security worries to shape the elements of the extended clash.

So, after seeing all the scenario; problem statement of research is defined in the following way:

Numerous violent wars have arisen from the long-standing geographical and political conflicts between Pakistan and India, and the possibility of further confrontations remains high. The region is facing a new set of difficulties that combine environmental issues with security concerns in light of the growing effects of climate change. The already delicate ecosystems in the contested areas are directly threatened by the rising temperatures, shifting precipitation patterns, pressing river waters resources and an increase in the frequency and intensity of extreme weather events.

This research aims to investigate the complicated association between the Pakistan-India water dispute and the rising climate change disaster, studying the environmental security implications inherent in the geopolitical war. The aggravation of resource insufficiency, displacement of populations, and discriminating competition for vital natural resources in the region have the potential to intensify tensions and amplify the risk of armed conflict. Moreover, the role of environmental degradation as a potential catalyst for conflict escalation demands thorough examination to develop informed strategies for conflict prevention and resolution. Through an interdisciplinary lens that includes political science, environmental researches, and security researches, this research seeks to discover the multifaceted interaction between the historical conflict and the developing climate patterns. By studying the environmental security dimensions of the Pakistan-India water dispute, this study aims to contribute to the growth of practical policies and interventions that address the fundamental environmental factors, lessen possible conflicts, and develop regional solidity in the face of a fluctuating climate that is directly disturbing the river water resources.

India-Pakistan Water Dispute: Environmental and Climate Change Dimensions

South Asia, including Pakistan and India, is especially powerless against the effects of environmental change. Pakistan experiences heatwaves, droughts, water scarcity, flash floods, landslides, and storms, including cyclones. The consequences of climate change carry the potential to trigger widespread and impactful negative feedback loops, significantly impacting both livelihoods, river water resources, economic activities, agricultural practices, hydropower generation, and public health. Furthermore, despite notable factors intensifying the impacts of climate change in Pakistan, such as an insufficient sewage system, air pollution from industrial waste, and deforestation, the nation faces financial constraints that hinder proactive solutions or preparedness measures for potential flooding, sustainable water management, and heavy rains. Pakistan is the 8th most vulnerable country in the world to long-term, persistent climate change hazards, according to the Global Climate Risk Index (2021) (Bano et al., 2023).

An overwhelming 80% of the population in Pakistan expresses deep concern about the increasing impacts of climate change. Notably, this apprehension appears to be more pronounced among women and the educated segment of the population (Ansari, 2023). Starting investigations demonstrate that around 22.8% of Pakistan's geological region and around 49.6% of its populace are exposed to the dangers presented by the impacts of environmental change (Sheer et al., 2023). Increasing temperatures, changing precipitation designs, outrageous climate occasions, and ocean level ascent present critical difficulties to the locale's natural dependability. These environmental shifts influence agribusiness, water accessibility, general wellbeing, and occupations, fueling weaknesses and making fertile ground for financial and political pressures. In 2007, the tropical hurricane Yemyin made landfall in Pakistan's Balochistan and Sindh provinces, displacing over 2.5 million people and cruelly taking 529 lives. Cyclone Amphan's severe effects in 2020 left thousands of people homeless and resulted in at least 80 deaths in India (Najeeb et al., 2023).

Glacial melt in the Himalayas, a crucial source of water for both countries, has serious implications for water security, with potential repercussions on river flows, irrigation, and hydropower generation. The International Center for Integrated Mountain Development (ICIMOD) states that Himalayan glaciers are projected to undergo a significant loss, potentially reaching up to 75 percent of their ice by the end of the century, attributed to the impacts of global warming . Between 1990 and 2000, three prominent glaciers in Pakistan encountered substantial volume reduction, with the most significant being an 11.09 percent volume loss documented in the Siachen Glacier (Haider & Sultan, 2022). A study published in the scientific journal Nature Communications in February highlighted that globally, 15 million people face the risk of glacial lake flooding, and among them, 2 million are in Pakistan (Taylor et al., 2023). Between 2018 and 2021, Pakistan experienced around 14 Glacial Lake Outburst Floods (GLOFs), but this number surged to 75 in 2022, as reported by the United Nations Development Programme (UNDP).

Resource scarcity, particularly water stress, stands as a critical environmental stressor in the region. Pakistan is currently grappling with the ramifications of a severe water crisis, affecting roughly 30 million individuals who lack access to clean water across the country. Within 24 major cities, around 80% of the population faces challenges in accessing clean water. Notably, Karachi, Pakistan's largest city, harbors nearly 16 million residents living in slums who also endure the deprivation of access to clean and safe water resources. (Afzal, et. al. 2020) Due to insufficient water management techniques and population growth, Pakistan and India already have high levels of tension, which are exacerbated by their competing claims for water resources. The "basic human right to access water" lies at the center of the conflict between Pakistan and India over water (Qureshi, 2017). Of the 1.9 billion people living in India, almost 163 million do not have easy access to drinking water where they live.

One of both countries' key sources of reliance is the Indus River Basin, which worsens war and causes problems with the division and usage of mutual water resources. The 26 million arable acres that make up the section known as the Indus River Basin (IRB), which is found in India and Pakistan, are the major area of irrigation produced globally by a single river. The fact that this area produces 80% of Pakistan's agricultural output makes it more significant to the state's economy. The IRB is also central for maintaining livelihoods and supplying water in the northwest region of India, which comprises the states of Haryana, Rajasthan, and Punjab, and the officially governed areas of Kashmir, Jammu, and Ladakh. One of the more challenging issues is the distribution of water between the states. Furthermore, meeting both countries' energy needs depends on the IRB's hydropower developments, with an emphasis on Pakistan in particular (Shidore, 2020).

The 2010 devastating floods, which affected almost 20 million people in Pakistan, were caused by the Indus River's enlargement (Aslam et al., 2020). The flood of 2010 significantly affected almost one-tenth of Pakistan's populace. About 9.5 billion USD, or 765 billion PKR, was estimated to have been lost financially as a result of this disastrous catastrophe. This amounts to over 25% of the nation's 2010–2011 budget (Ashraf et al., 2023). Pakistan has gained some achievements in disaster mitigation through its National Disaster Management Authority (NDMA) agenda. Though the huge scale of tragedies frequently overwhelms state efforts, leading to extensive destruction, In contrast, India has shifted its reliance to domestic organizations such as the Indian National Disaster Response Force (NDRF) on a national level and Humanitarian Assistance and Disaster Relief (HADR) internationally. The NDRF (National Disaster Response Force) deploys skilled and systematically organized personnel to handle disaster response operations in India. The NDRF is tasked with the responsibility of conducting rescue and relief efforts during both natural and man-made disasters.

Table 1: Environmental Issues and Conflict Factors in Pakistan-India Relations

Environmental Issue	Pakistan	India	Factors of Conflict
Air Pollution	World Bank: 22,000 deaths/year	India: 1.67 million deaths (2019)	Historical territorial disputes, competition for resources, cross-border tensions
Water Scarcity	IMF: 2.1 million Pakistanis lack safe water.	India: 163M lack safe drinking water.	Indus Water Treaty disputes, accusations of water manipulation and control
Deforestation Rate	1.63%per year	9.45% in 2019	Border disputes affecting forested areas, conflicting land use policies
Renewable Energy	4.8% (2019)	17.5% (2019)	Energy-related disputes, competition for energy resources
Waste Generation	48.5 million tons per year	277 million tons per year	Cross-border waste disposal issues, accusations of environmental negligence
Plastic Waste Production	1.87 million tons per year	4.49 million tons per year	Transboundary pollution concerns, accusations of environmental harm
Protected Areas	12.1%	5.02%	Border disputes impacting conservation efforts, accusations of ecological damage
CO2 Emissions	0.83 metric tons per capita	1.89 metric tons per capita	Disputes over emissions reduction commitments, accusations of environmental negligence
Indus River	Vital shared river resource	Significant impact on	Indus Water Treaty disputes, accusations

		agriculture and economy	of water manipulation and control
Himalayan Glaciers	Significant source of freshwater	Critical for water supply and agriculture	Climate change impacts, potential for disputes over water resources
Transboundary Rivers	Chenab, Jhelum, Ravi, Sutlej - Shared rivers	Critical for water supply and agriculture	Disputes over water usage, dam construction, and management challenges

Source: (Anjum et al., 2021; Pandey et al., 2021)

Air pollution, land degradation, and deforestation also put additional pressure on the region's environmental resilience, making sustainable development more challenging and aggravating social inequality that already exists. Pakistan possesses the smallest forested area in comparison to other South Asian countries such as Sri Lanka (30%), Bhutan (68%), India (22.8%), Nepal (25.4%), and Bangladesh (6.7%) (ULLAH et al., 2022). Nearly half of Pakistan's population relies on agriculture as their sole means of subsistence and income. With 45 % of the country's labor force engaged in agriculture, any damage to this sector directly impacts the lives of these individuals. The well-being, living standards, employment, and access to essentials such as healthcare, food, water, and sanitation for Pakistan's citizens are all profoundly affected. Furthermore, approximately 70 % of the region's agricultural land is situated in Punjab. Therefore, any pursuit by India to construct dams or barrages with the intent to restrict river water access in Pakistani Punjab would result in significant harm to the fundamental rights — including access to water, food, sanitation, employment, and healthcare — of the people dependent on the river water in Punjab (Qureshi, 2017). Environmental factors intertwine with the dynamics of the Pakistan-India conflict. War over limited resources, particularly water, intensifies uncertainties and adds difficulty to current clashes. Admittance to water resources, control over river classifications, and the administration of natural resources become decisive fundamentals in the geopolitical strategies of both countries.

Pakistan's Foreign Policy: Traversing Geopolitical Challenges through Environmental Security in Relations with India

Pakistan's foreign policy is meaningfully shaped by environmental security, particularly when it comes to its networks with India and other states in larger geopolitical circumstances. This following is a summary of its situation:

The Theory of Environmentalism in International Relations (TEIR) offers Pakistan's lookout on environmental conflict and agreement. It proposes a plan for understanding the associates among security difficulties, resource constraints, water issues, and the effects of climate change. Understanding the varying features of the environment and how they impact attempts at settling wars between India and Pakistan requires the implementation of TEIR. The geopolitical conditions of Pakistan and India are such that environmental issues meaningfully affect security. Concerning mutual resources, water coming from river basins like the Indus has been really argumentative. Geopolitical problems combined with these environmental issues are aggravating conflicts between the two countries. Disputes over transboundary water associated with environmental issues represent a key aspect of the broader security discourse between Pakistan and India.

Environmental changes pose tangible security threats to both Pakistan and India; for example; over the last two decades, Pakistan has consistently found itself within the

top 10 most vulnerable countries on the Climate Risk Index. During this period, the nation has experienced the tragic loss of 10,000 lives attributable to climate-related disasters. Additionally, the economic toll from 173 extreme weather events has amounted to approximately $4 billion (Siddiqui, 2022). Factors such as water scarcity, exacerbated by climate change impacts, have the potential to escalate tensions between the two countries such as the World Bank has issued a warning, predicting a substantial 18 to 20 percent decline in Pakistan's GDP by the year 2050 (Ansari, 2023). This anticipated economic downturn is attributed to the increasing influence of severe weather-related events, environmental degradation, and pervasive air pollution. The correlation between security challenges and migration brought on by climate change, competition for resources, and natural disasters emphasizes the need for collaborative efforts in addressing these shared environmental issues to minimize potential risks to the security of both nations. A report claims that given Pakistan's and India's rapid economic growth and population expansion, climate-related loss and damage—which is predicted to reach $518 billion in South Asia by 2050—could force them to endure intolerable social and economic conditions (Khan, 2023). Despite India and Pakistan collectively representing a significant 20% of the global population, there is a lack of emphasis on developing a joint response to climate change in the region. While both countries individually signed the 2015 Paris Agreement on Climate Change, collaborative efforts on climate action are constrained as both nations hesitate on matters related to integrated climate initiatives. There exists substantial common ground between the two nations regarding climate-related challenges, and they have the potential to address these vulnerabilities through a shared approach, avoiding entanglement in their conventional issues that typically lead to a deadlock and hinder cooperation.

India-Pakistan Relations: Balancing Environmental Challenges, Diplomacy and Peace building

For international environmental diplomacy as well as peace building initiatives, the constantly changing connection between India and Pakistan—marked by international tensions and past disputes—creates a challenging environment. Despite their long-standing differences, there have occasionally been international environmental deals or initiatives between the two nations. One such significant agreement is the Indus Waters Treaty signed in 1960, primarily regulating the sharing of waters from the Indus River basin (Mehsud, 2021). The treaty assigns authority over the waters of the three "eastern rivers"—the Beas, Ravi, and Sutlej—situated in India with an average annual flow of 41 billion m2 (33 million acre-feet)—to India. Simultaneously, control over the waters of the three "western rivers"—the Indus, Chenab, and Jhelum, also located in India with an average annual flow of 99 billion m3—is designated for Pakistan. Under the auspices of the World Bank, the treaty, despite enduring three wars, rapid decolonization, and uneven geographical development, has managed to persist. However, the delicate balance is being disrupted by the swift onset of climate change. The Indus River flow data from 1962 to 2014 shows a 5% decline in flow magnitudes (Khan, et. al. 2022)Threats associated with climate change are predicted to significantly reduce Indus River flows in the future by as much as 30–40%. The reality that the population of the area is growing continuously adds to the worrisome scenario's troubling aspects. The population growth tendency will put more stress on the basin's water supplies, which could have serious consequences for regional peace (QAMAR et al., 2019). Despite being primarily concerned with water sharing, this treaty also covers environmental issues that are connected to water management. Concerns about air quality in neighboring areas have also been discussed, indicating an attempt to address transboundary environmental issues.

Despite the current tensions, there are still opportunities for India and Pakistan to work together on environmental issues. Building mutual confidence and cooperation can start with working together to mitigate natural disasters like floods and cyclones. In

the past, India and Pakistan have cooperated to fight climate change and offer assistance in the event of a natural disaster. One example of mutual cooperation is Pakistan's support to India following the 2002 Gujarat disasters. Following the 2005 earthquake in Kashmir, both countries took part in reciprocally beneficial relief activities. They also pooled their funds in 2010 to decrease the effects of floods, particularly in Pakistan's Punjab and Sindh provinces. During a time of flooding in 2014, India gave aid to Pakistan. Another possibility for collaboration is to look into cooperative projects for the environmentally friendly management of common resources, including transboundary rivers. Though, there are blockades to longstanding peacebuilding and environmental cooperation.

Historical hostility and deep-rooted political tensions continue to be main problems to encouraging inclusive cooperation, particularly on environmental matters. The battle between the two nations over shared resources, particularly water from rivers like the Indus, remains a reason of argument. By integrating environmental cooperation into peacebuilding activities, there are scenarios to augment trust and cooperation between Pakistan and India. However, political difficulties must be removed, a truthful assurance to common environmental stewardship in the midst of lasting disagreements must be encouraged to make sustainable peace through environmental programs. The incorporation of environmental factors into peacebuilding activities could serve as a key measure towards all-inclusive cooperation and, finally, sustainable peace between the two nations.

Conclusion

In conclusion, the water clash between Pakistan and India has a profound historical foundation that has been shaped by historical actions, notable turning points in the connection, and geographical arguments. The Theory of Environmentalism in International Relations (TEIR), which examines the complex associations between water shortages, climate change, and security challenges in the area, was applied to the environmental features of the conflict. The complex structure of their associations is further proved by the constancy of alliances and conflicts as well as the geographic distribution of control over land areas. The study discovers South Asia's multi-layered environmental issues and shows how vulnerable the region is to the effects of climate change, particularly in Pakistan and India. Given the rapidly changing climate, the numbers and patterns that have been discovered highlight the critical need for collaborative efforts and environmental diplomacy. Also, a summary of the most significant diplomatic interactions between the two countries shows a patchwork of achievements, setbacks, and ambiguous results. The diplomatic environment shows a determined push for settlement and cooperation, from past treaties like the Indus River Waters Treaty to present-day developments like the Kartarpur Corridor.

The identical difficulties that both countries encounter are highlighted by a study of the data related to the environment, which reveals the relationship between their respective environmental destinies. Because South Asia is so vulnerable, as the Global Climate Risk Index illustrates, collaborative efforts toward environmentally friendly growth and resistance to climate change are imperative. It becomes evident that addressing common ecological concerns calls for a paradigm shift and that environmental security plays a critical role in international relations. Understanding TEIR provides a theoretical framework for negotiating the complicated interplay between security concerns and environmental changes. It also gives insights for long-term peacebuilding and conflict resolution. Given that the loss and damage brought on by climate change are predicted to cost South Asia billions of dollars, proactive action is imperative. To address the shared problems that Pakistan and India encounter, the conclusion emphasizes the significance of increased cooperation, innovative environmental diplomacy, and a commitment to sustainable practices in river water management.

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