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Hydro-diplomacy and Waterscapes: A Case Study of Ravi River

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ABSTRACT

In the 21st century, Hydro-diplomacy is emerging as one of the most pressing issues in regards to statecraft and conflict resolution. This case is emphasized greatly in the South Asian region, where transboundary rivers form the backbone of survival and the locus of conflict. Asymmetrical power relations, territorial claims, and meta-narratives are impacting national security at every level, daily. While doing so, they overlook the failure of frameworks in incorporating the socio-political and ecological realities of shared rivers. Studying waterscapes departs from traditional state-centric paradigms that exist beyond meta-narratives, highlighting the vulnerabilities at the local level. The Ravi River, flowing across the Indian and Pakistani Punjab is an example of a shared waterscape, where both sides face similar challenges due to infrastructural projects and extreme climate change, contamination of soil, depletion of ground water, and untreated industrial effluents. The Ravi River is often overshadowed by the larger discourse centered around the Indus Water Treaty, proving that negotiation frameworks need to account for ecological sustainability and local well-being. The study argues that the India-Pakistan relationship over the issue of water is like that of cooperative antagonists. While treaties exist to formulate engagement frameworks, they are undermined by the threat of unilateral actions and securitization, such as India's calls for withdrawal from the Indus Water Treaty, fueled by nationalist rhetoric. The methodology draws on the postmodern emphasis on local narratives, the study design is grounded in qualitative analysis of secondary sources, while ensuring the diversity of perspectives. The postmodernist framework prioritizes micro and meso level dialogue rather than the state-level meta-narratives often associated with the term 'Hydro-diplomacy.' The study further emphasizes recalibrating the nature of hydro-diplomacy with the lens of shared waterscapes, allowing for an epistemological evolution of the term. The potential emerges for a collaborative approach to better governance, flood control, and resource sharing. Embracing the waterscapes approach allows for a future where management and ecological development directly prevent any 'water wars.'

Keywords: *Hydro Diplomacy, Waterscapes, Ravi River, South Asia, India –Pakistan, Punjab.*

1.1 Introduction

Hydro diplomacy, global in general and South Asia in particular, revolves around transboundary water conflicts. To understand the socio-political reality of water diplomacy, there is a need to analyze narratives at "meta, meso, and micro" levels. Water has always been a source of contention between states, one such example can be found in the Arab-Egyptian War 1967 (Aamer, 2022). South Asia has long served as a hotspot for hydro-political tensions. Major transboundary water disputes involve China and India; Pakistan and India; and India and Bangladesh. There are multiple narratives involved especially in the context of the Indo-Pak water dispute. The water dispute between Pakistan and India primarily owes to asymmetrical power distribution, territorial sovereignty, strategic culture, and national interests. Besides regional and international level conflicts (Arab War 1967), water disputes have the potential to exacerbate tensions at national and local levels as well. This is primarily due to the socio-economic significance of water. In the Indian states of Rajasthan, Haryana, and Punjab, water distribution is often used as a political weapon, restraining federal-province relations. Similarly, In Pakistan, the water dispute between Sindh and Punjab is a result of intra-hydro politics. However, this paper focuses on the Ravi River, a minor transboundary river shared by Pakistan and India. The conceptual framework of "Waterscapes" would be efficiently gauged to understand hydro politics and growing water scarcity. This concept of waterscape is provided by integrated water resource management focusing on water diplomacy that includes the river's supporting ecosystem as well. Unlike traditional paradigms, this framework would focus on local narratives that are often overshadowed by meta-narratives.

1.2 -Research Questions

1- Can the perspective of "shared waterscapes" provide a better understanding of transboundary water issues between Pakistan and India?
2- How does understanding local discourses on water help contribute to water diplomacy?
3- Is there a need to revise the meta-narratives on water diplomacy between Pakistan and India?

1.3- Methodology

It is explanatory research based on qualitative data. This research has taken data from research articles and books. Secondary data is collected and cross-checked from multiple perspectives. Qualitative research is extensively utilized in academic settings, as noted by Hussain (2025). Theoretical perspective that is used in this research is Postmodernism. Post-modernism focuses on mini-local narratives and discredits the meta-narratives. In the case of Pakistan-India transboundary conflicts, the prevalent narratives are all meta-narratives only focusing on the state and do not take into account the local narratives. This research study tends to fill that gap.

2.1 – Waterscape Perspective

The waterscape perspective is grounded in political ecology which focuses on the linkage between society and nature. This paradigm does not consider state-centric Westphalian boundaries. Contrastingly, hydro diplomacy, rooted in realist power politics, considers boundaries as paramount to sovereignty and inter-relations. However, the concept of "waterscapes" gives importance to the political and socioeconomic perspectives, aligning with constructivist thought that relates to any landscape. This also differs from the perspective of integrated water resource management, which only considers ecological factors while ignoring political factors. The waterscape perspective takes into consideration the environmental,

political, and social factors related to the water; this perspective signifies different connotations. Thus, the waterscape narrative is different from all the metanarratives which only incorporate power competition between states, meanwhile the waterscape narrative is dynamic and continuously evolves with changing perspectives in societies.

2.2- Narratives and Negotiation Approaches

Hydro diplomacy is distinct from the waterscape. Hydro diplomacy is defined as a practical process involving the negotiation between the relevant actors over the shared water resources. It is often opted to resolve the conflicts. These negotiations are held at the international and regional level. Different tactics and strategies are used by the actors to influence the perception and interest of other actors. Different approaches are used in water diplomacy; one such approach is the negotiation approach. The negotiation approach emerges from cognitive psychology and rational choice theory. It is more concerned with achieving cooperation between riparian states through problem-solving methods. In this approach, some states only work at the state level to solve water-related issues, whereas other states frequently consider non-state actors. Another approach is related to the scales and the level of governance. This approach takes into consideration the issue of water at multiple levels, including international and local, and hence the actors from all these levels are taken into consideration. The last approach is the ecological approach, which is derived from the concept of integrated water resource management and is more focused on river basins (Jarvis, 2012).

There are multifarious narratives used in these approaches. In the negotiation approach, for example, states are important actors, contrastingly in the scalar approach, communities are important stakeholders. Whereas, the ecological approach takes into consideration the ecosystems and the rivers, and in such discourse, the role of the nation-states often diminishes. Furthermore, there are governance and diplomacy issues in the context of water in South Asia, therefore, the integrated water resource management approach can bridge the existing gap between diplomacy and water governance. This approach takes into consideration the complexity related to the water challenges in South Asia at multiple scales. The dynamism that emerges at the local level is important to understanding water diplomacy in South Asia. This concept also incorporates the political and conflictual narratives that are important in understanding the transboundary conflicts over water in South Asia.

The concept of "waterscapes" is paramount in water diplomacy discourse as it challenges the traditional term "Transboundary rivers". This term refers to state-centric narratives and neglects the concerns and demands of communities and individuals (Karpouzoglou & Vij, 2017). On the other hand, the concept of waterscapes is fluid and focused on dynamic local-level narratives. It focuses on the dynamic relationship that exists between society and water resources. This relationship continuously evolves as a result of myriad challenges including water distribution, pollution, and scarcity. This concept focuses on power asymmetries and can significantly impact water usage. Additionally, the concept of the "waterscapes" perspective integrates different levels of analysis: domestic, national, and international. It further incorporates micro and macro-level policies. Hence, the concept of shared waterscapes is an important tool for analysis, especially in understanding the issues related to Transboundary Rivers.

3.1 Waterscapes: Case Study of Ravi River

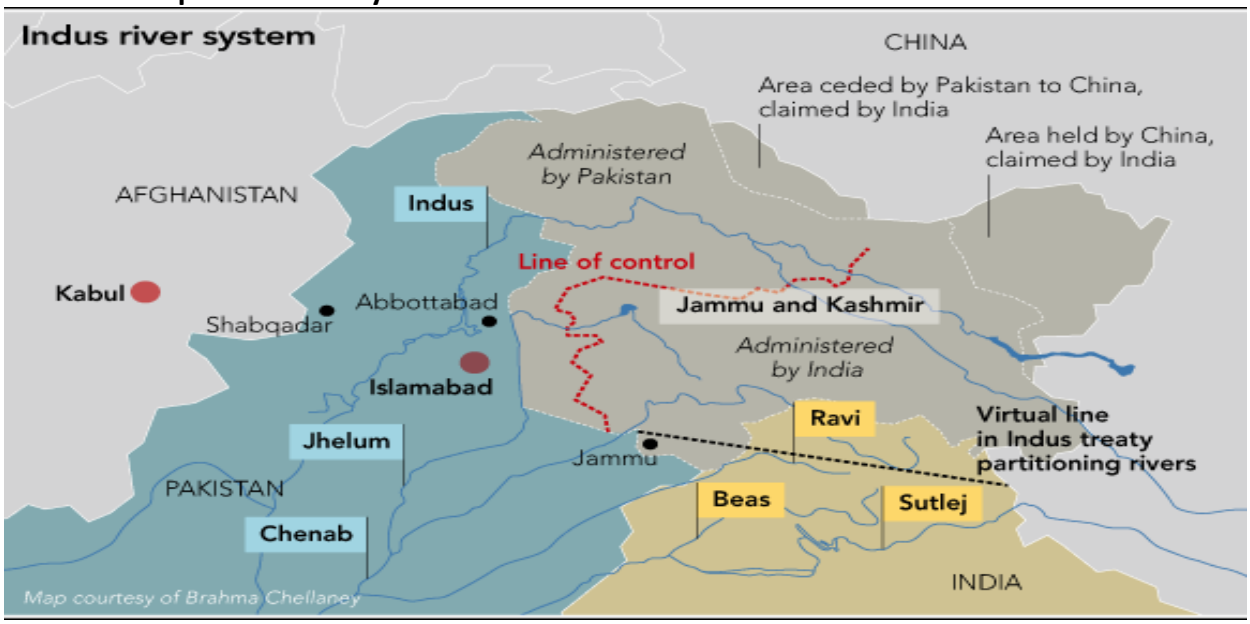

Figure **1** Map of Ravi River (Chellaney, 2016)

In this study, the Ravi River is taken as a case study to understand a wide spectrum of narratives that exist between Pakistan and India. The Ravi River lies in a temperate zone of climate where summers are hot and winters are mild to cold. In Pakistan, the land features near the river are mostly central plateau regions with flat terrain and suitable soil for farming (Dinar, 2014).

As part of the Indus Basin, the Ravi River is an example of a shared waterscape. The total length of this river is 720 kilometers; 320 km is the total length within Indian territory, and half of this is located in the Indian Punjab. Furthermore, the potential capacity of power generation in the Ravi Basin is 3237 megawatts, August and July are the peak flow months for the Ravi River. The river enters Pakistan at Shakargarh.

The Ravi River has five natural tributaries in Pakistan:

1. Basantar
2. Ujh
3. Hudiara
4. Nullah
5. Deg
6. Bein

In Indian Punjab and Pakistan Punjab, four districts in each country are important to understand the waterscapes associated with the Ravi River. The four districts in Indian Punjab are Gurdaspur, Amritsar, Pathankot, and Taran-Taran. The four districts of the Pakistani Punjab include Sialkot, Kasur, Lahore, and Narowal.

3.2- Strategic Relevance of Ravi River

The Ravi River is important to understand the waterscapes in Pakistan's Punjab and Indian Punjab; primarily due to Kashmir's significance, and therefore, the discourse on western rivers is based on conflictual narratives. The conflictual narratives and competitive claims on the construction of barrages and dams from both sides further politicize the discourses related to the western rivers. Furthermore, the Ravi River represents a "border creator" river where there

is a symmetrical relationship between states. In the case of the "border creator river," if one of the state's engages in harmful activities, it will cause harm to both: its neighbor and itself. However, this symmetric relationship does not exist in a "cross-border configuration," as the upper riparian country has significant leverage to harm the lower riparian states.

The analysis of issues faced by the people in the border districts of both Pakistan and India indicates many similar problems. Both the Indian and Pakistani sides are dealing with two major water-related issues: water quality and availability.

3.3 - Water quality and quantity on the Indian side of Punjab

Ground and surface water resources are critical on the Indian Punjab side. To understand the water cycle in the Indian Punjab, hydrology is an important variable. The Ravi River is considered a snow-fed river that is impacted by climate change, and some reports indicate that the Indian Punjab is being affected by climate change due to unusual trends in rainfall and temperatures. The impact of this change in climate patterns has resulted in damage to crops such as cotton on the Indian side. Although some studies claim that the Ravi River will not be significantly affected by climate change because of fewer glacial basins, the availability of water in the Indian Punjab will face serious issues related to the availability and quality of the groundwater. In the future, clean drinking water will become a major concern for the Indian Punjab. Therefore, the availability of safe and clean water is now contrasted with the water's quantity. This is one of the reasons that the pattern of rice and wheat cropping is increasing on the Indian Punjab side because it is also favored by the government.

The demand for such crops is high due to the assured support price set by the government for wheat and rice. The Indian government is also providing fertilizer and electricity subsidies to encourage farmers to use fertilizers to increase crop yield. Due to food security concerns, the government is also promoting these subsidized irrigation practices, which is raising concerns about groundwater depletion. Groundwater depletion is increasing at an unsustainable pace. Even though the sown area in Indian Punjab is 94% of the national average, in Punjab, the tube wells and canals form an extensive network that is a significant source of education. In the Amritsar district, "the ratio of gross irrigated area to gross cropped area is 100 percent, while in the district of Gurdaspur, this is around 86 percent." There is a high number of wells in Punjab, which indicates that there is a reliance on underground water. This demand will further increase in the upcoming years due to the increase in population and, hence, the increase in demand for gross crop production. In multiple districts of the Punjab, reports indicate that groundwater is continuously declining. This is mostly because the Punjab relies on groundwater instead of surface water. The waterscape of the eastern Punjab thus signifies the importance of politics because it is related to the groundwater, which must be taken into consideration for analysis (Pandey, 2016).

Aside from usage, another significant issue confronting the eastern Punjab is water quality. The water quality is contaminated due to chemical fertilizers, industrial effluence, domestic waste, and pesticides. All these contaminants are damaging the quality of underground water. The groundwater tables are decreasing along with the increase in the use of pesticides and chemical fertilizers, which are impacting the groundwater quality on the eastern side of Eastern Punjab. This also contributes to the rise in diseases caused by contaminated water. Sir had the highest number of cancer patients in Amritsar in 2014, with 914 patients, while Pathankot and Gurdaspur had 649 cancer patients (Dinar, 2014). There is a rural water supply in all these districts, but

despite the presence of such a scheme of water supply, the water quality in these districts is continuously declining. The farmers and the laborers are indebted due to health problems because a large amount of money is being used for health-related issues.

3.4- Water Quality and Quantity in the Pakistani Punjab

As the water quality in the Indian Punjab deteriorates, so does the water quality on the Pakistani Punjab side. The industrial, agricultural, and domestic needs are fulfilled by the use of groundwater and surface water. On the Pakistan side, the Ravi basin covers a total area of 4.1 million hectares and includes 14 districts. These districts include Sheikhupura, Kasur, Sialkot, Narowal, Toba Tek Singh, Khanewal, Sahiwal, Okara, Chiniot, etc. The land features of districts indicate that 65% of the land is used for cultivation and grazing purposes, while 30 to 40% of the area is used for settlements, which indicates that agricultural practices are dominant in this area (Dinar, 2014). Due to massive urbanization, concretization is increasing, which is diminishing the resources of groundwater recharge.

The Ravi River in Pakistan is facing a decline in flow, which was 7 million acre-feet in the 1960s but now is 1.2 million acre-feet. This is mostly due to the infrastructural development in these areas especially on the river's course. The Indus Water Treaty is also an important reason for this diminishing flow of water in the Ravi River because the treaty grants some usage rights to India. From an ecological perspective, the reduction in the flow of the Ravi River has impacted the biodiversity of the river Ravi in Pakistan, and thus the capacity of the river to recover from the dumping of waste and pollution in the river has also diminished. Moreover, the freshwater availability is being reduced by the waste discharges from industrial and municipal communities into the runoff of the Ravi River. This impacts a population of 38 million people, living along the Ravi River, who are facing the severe threat of a water crisis in addition to the deprivation of safe and clean drinking water.

The groundwater level is declining in Pakistan by 1.5m per year. The farmers on the Pakistani side are using deep wells to access water, which also increases the operational cost but damages the water quality. In Pakistan's Punjab province, cotton and rice are extensively cultivated. Both of these crops are water-intensive, which will have an additional impact on water availability in the region. Pollution has increased with the increase in industrialization and urbanization in Pakistan. Only 2% of industries have treatment plants for wastewater in Pakistan. If the pollution contribution of multiple industries along the Ravi River is calculated, then 34% of the waste is added by the textile, basic metal, fertilizer, leather, and food industries (Pandey, 2016).

This deterioration in water quality is increasing health risks in Pakistan's Punjab due to waste disposal and discharge into river streams. The urban areas are heavily polluted, and this trend is expected to continue. The presence of metals in water is highly toxic, which is impacting fisheries as well as animal life. Due to the loss of fisheries, there is a direct economic impact on the incomes of many households that are dependent on fisheries. Pollution has caused the extinction of 31 species of fish in the Ravi River over the last two decades. The irrigation water drawn from the Ravi River, which contains contaminated metals, is also affecting human health. For example, in Lahore, diseases such as hepatitis, cholera, and typhoid are increasing because of contaminated water being used by farmers for vegetable production. Hence, the overall situation of water quality and quantity is alarming.

3.5- Local Discourses in Punjab

Local discourses are critical in highlighting these issues because Pakistan and Indian Punjab face similar issues. These discourses are taken from the discussions of focus groups that were held in Pakistan and India in 2017, which included technocrats, bureaucrats, academics, farmers, and water professionals who are working with national governmental organizations both at the local and international levels.

When the discourses on the Pakistani side of the Punjab are examined, the most pressing issues are revealed to be water quality and availability. To solve these problems, the use of technology is often discussed. The idea of building the infrastructure for water, including link canals and a balanced use of surface and groundwater, is often recommended. In the Pakistani discourse, there are the following things that are often mentioned:

It is argued that Lahore, being a hydrological city, is dependent on the Ravi River. The reliance on groundwater is increasing as a result of the growing population and migration from different cities, and as a result, the availability of water is decreasing. Water conservation methods are recommended to increase the availability of fresh water. It is frequently advised to use groundwater recharge, regulate water usage, price water, and practice proper metering. The laws for wastewater regulation are present, however, in the case of Pakistan, the issue is with the implementation of these rules. There is a nexus between the bureaucracy and the agricultural sector, which is one of the major causes of the lack of regulation in Pakistan. The local public, which receives water, is confronted with the problem of deteriorating water quality. There is a need for a holistic approach to solve the issues of water availability and quality for rejuvenation, especially the underground water issues, which require political will on both sides of the border. The issues on both sides of the border revealed that the problems are intertwined, which makes the borders less important.

The main discourse on the Indian side of Punjab is regarding the availability of clean water, so water security in Indian Punjab is linked with the availability of water. Food security in the Indian Punjab is also linked with water security. Following is a discourse on the Indian side, which includes all the water professionals, technocrats, bureaucrats, and farmers.

Water is posing a civilizational challenge in the Indian Punjab, affecting all species, including animals and humans. The main sources of the contamination of water are fertilizers, urea, and coal-based power plants, which use excessive groundwater, but the government is not willing to talk about these issues. This is affecting the immunity and lifestyle of the people in Indian Punjab, which is leading to many diseases including hypertension, diabetes, and allergies. Punjab is on the verge of ecocide, and organic farming is on the rise. The water is not regulated, and water depths in the Indian Punjab are common. Politicians put pressure on the officers tasked with protecting the water supply to avoid penalizing farmers and transgressors. This issue needs to be solved. All of the laws in Indian Punjab concern water infrastructure, but they do not address water consumption or sharing. The perspective on water use and the water user is lacking.

In Indian Punjab, the discourse of the Punjabi civilization and its slow death is linked with water security. In the Indian Punjab, as in Pakistan's Punjab, societal privileges and hierarchies exist, but the main reason is the implementation of effective policies.

The Ravi River has some common issues that make it a unique waterscape. In all governments, there are social, hydrological, and social concerns. Water security is not only linked to availability; water quality is also important. Other perspectives and meta-narratives are not discussed at the

state level between India and Pakistan, but these issues have different impacts and can lead to negative impacts on marginalized sections and women in society.

- There is a continuous deterioration of the groundwater quality due to the industrial effluents that are disposed of in the Ravi River without any treatment.
- There are climate change impacts, and the floods that are caused by the heavy rainfall in both India and Pakistan are further threatening food security.
- The over-abstraction of water It's disrupting the nutritional value and quality of water.
- The heterogeneous development is further leading to migration to urban areas, which is creating the issue of overpopulation and further stress on the water resources that are already scarce in the Ravi basin.
- Water-borne diseases are increasing and further destroying the quality of life due to poor water quality.

4.1- Hydro diplomacy

There is bilateral water diplomacy between Pakistan and India, but these smaller rivers are usually overshadowed by the Indus River basin, and all the geopolitical discourses are about the Indus basin. The behavior of Pakistan and India related to water is termed "cooperative antagonist". Pakistan and India have reached some agreements but continue to focus on contentious issues.

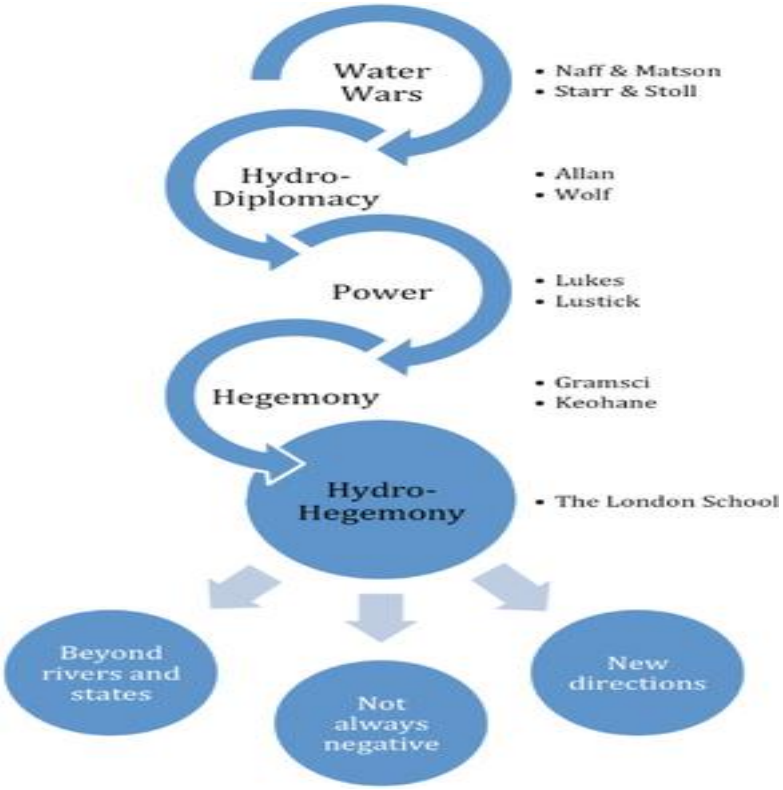

Figure **2** Absence of Hydro Diplomacy Leads to Hydro Hegemony (Warner, et al., 2017)

Hydro diplomacy between Pakistan and India can be improved through the mutually agreed framework for cooperative water management. This is a holistic approach that takes into account the entire ecosystem of the river. The case of the Ravi River provides trade-offs that can be used in negotiations between Pakistan and India. The zone of possible agreement can be taken into account, which will help in strategic cooperation. At the bilateral level, Pakistan and India can

further develop mitigating mechanisms for water governance and diplomacy that will be more informed because of the inclusion of all communities.

4.2- Indus Water Treaty: A Negotiation Perspective and Way Forward

The Indus water treaty is a prime example of a maximum and minimum approach in which Pakistan and India have tried to maximize their gains and minimize their losses. This is an example of distributive bargaining (Raiffa, Richardson, & Metcalfe, 2003). The structure of the Indus Water Treaty was made possible due to the mediation provided by the World Bank, which helped soften the positions of both countries and finally brought both parties to the negotiating table. If the treaty is analyzed, then it offers some solutions to environmental issues such as water contamination, water logging, flood management problems, groundwater issues, and siltation.

There are clauses in the Indus Water Treaty that highlight the importance of cooperation. The articles of the Indus Water Treaty from 4 to 8 discuss the governance perspective. Article 4 of the Indus Water Treaty is related to the provisions on western and eastern rivers, and it emphasizes using communication to solve problems and avoiding any action that entails potential to directly or indirectly harm the other party. Similarly, Article 7 of the Indus Water Treaty is related to the issue of drainage. It also highlights the importance of sharing data related to the water. Article 8 of the Indus Water Treaty can be used for dispute resolution. This article is crucial as it emphasises on the creation of the permanent post of commissioner (from both sides) which are to serve as the representative of the both countries unless they want to take the matters directly with each other.

As it was mentioned above, some issues exist both in Eastern Punjab and western Punjab, and the similarity of these issues means that the convergence of interests between both parties is possible, which can solve the issues of vulnerable communities.

In Pakistan, the narratives of the stakeholders of these metanarratives include flood management, groundwater extraction, and water quality, but no regulatory mechanism is present. On the Indian side, the narratives include the cropping patterns, river course, groundwater exploitation, and water quality. The construction of hydrological structures on the western rivers concerns India, but both countries can focus on the issues that are emerging and will impact the security of people on both sides, which will further broaden the scope of strategic cooperation under the Indus Water Treaty. Both countries can focus on the issues of water governance, and these policies related to water governance do not need to be strengthened.

According to Article 7 of the Treaty, bilateral cooperation between both countries and this corporation on flood control, flood protection, and drainage systems is permitted. Industrial water and river protection would be included in articles 4 and 5 of the Indus Water Treaty, and such issues can increase cooperation under the Indus Water Treaty.

Water quality issues exist on both sides of Punjab, and cooperation on the domestic level will increase transboundary cooperation because Pakistani concerns about water quality and water flow can only be addressed through cooperation between India and Pakistan. This can only be possible if both countries divert their attention to eastern rivers from western rivers, where governance and problems of development need the focus of both states. These issues, if not addressed, have the potential to escalate the cross-national conflict. The Ravi basin's problems serve as a reminder of how metanarratives and geopolitical discourse ignore problems in small rivers. Water diplomacy in smaller rivers must be disaggregated, taking local discourses into account. Until local discourses are included in the water diplomacy, the whole water conflict and

the discourses between India and Pakistan are cosmetic, and these conflicts are further exacerbated by the hyper-nationalist narratives on both sides.

All the narratives and the data regarding the Ravi River have shown that problems on both sides are cross-cutting and require bilateral cooperation. The hydrological constraints are further increasing the water issues as these are linked to each other. The issues of water management and their socio-economic impacts are affecting people on both sides. The narratives that are common on both sides need to be taken into consideration because the meta-narratives related to water diplomacy are further exacerbating the issue. The diplomacy must be localized by including the "shared waterscapes." Such an approach is needed to address the problems of both Pakistan and India.

If such localized diplomacy is not done to solve the water problems between Pakistan and India, then there's a high chance that both countries will go to war over water in the near future, as both countries are continuously developing infrastructure that can limit the flow of water. Under the BJP government, India has committed $90 billion to different river-linking projects that will further decrease the flow of water toward Pakistan.

Recently in India, there have been calls for unilateral withdrawal from the treaty, which will further increase the chances of conflict between two nuclear-armed nations. The Indian Prime Minister argued in 2016 that "Water and blood cannot flow together." Such narratives and discourses will further decrease the chances of the strategic cooperation that is necessary to solve problems related to water governance and water quality on both sides. Both sides are suffering from water scarcity, and a report by the national institution for transforming India in 2018 suggested that millions of people are under threat due to the water crisis, and by 2030, 600 million Indians will face the issue of water scarcity. Similar is the case with Pakistan, which is facing issues with floods as well as water scarcity. Hence, there is a need for strategic cooperation because if both countries securitize the issue, it will further lead to the militarization of the issue. Climate change militarization, as argued by Neta C. Crawford in her recent book on the subject, will exacerbate the problem because wars are harmful to the environment.

5- Conclusion

To conclude, the flow of the Ravi River is diminishing primarily due to climate change and infrastructural developments. The Indus Water Treaty has further contributed to reducing the flow and affecting bilateral relations between India and Pakistan. Pakistan is at odds in the current scenario with a rising population and increasing pollution. The hostility and animosity between them would continue to rise and it is foreseen that the next war would be a water war. However, the silver lining lies in a holistic approach. Integrating water diplomacy is the gateway to such an approach.

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