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FROM CONFLICT TO CODE: HOW AI IS RESHAPING SOUTH ASIA'S WATER DIPLOMACY

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Water, the elixir of life has been and is the foundation of our very existence, supporting every dimension of our life. However, in the contemporary era, the issue of scarcity of water and access to freshwater resources has emerged as a significant issue, especially in politically sensitive and conflict-prone zones. The post-colonial era treaties, which were signed way back after 1950s seem to be insufficient in coping with the present era demands and mechanisms. The transboundary river which traverses through multiple national borders pose a crucial set of challenges where issues related to sovereignty, environmental protection and human rights intersect.[1]

The right to water, which has been recognized as a fundamental right in internation law as well as in most of countries, is fraught with political and geographical difficulties in the conflict-ridden areas, i.e., the countries which share water resources and frequently face disputes over their allocation, usage rights, and environmental concerns. The Indus Water Treaty signed between India and Pakistan in 1960, the Kalapani river dispute between India and Nepal and the Brahmaputra river issue between India and China highlight the geopolitical intricacies associated with transboundary water disputes in South Asia.

In the modern era, Artificial Intelligence (AI) and Big Data have emerged as potential tools to handle these challenges. They can predict water flow, floods, droughts, and optimize water allocation.

However, the deployment of AI in politically sensitive regions raises legal, ethical, and diplomatic concerns. This blog explores whether AI-based approaches can effectively resolve transboundary water disputes while safeguarding the human right to water.

[1] UN-Water, 'Transboundary Waters' (UN-Water, 2021)< https://www.unwater.org/water-facts/transboundary-waters> accessed 4 April 2025

LEGAL FRAMEWORK-RIGHT TO WATER

The right to water is well established within the framework of international humanitarian law. There are several key legal documents safeguarding this right which include, UN General Assembly Resolution 64/292 (2010)[2], International Covenant on Economic, Social, and Cultural Rights (ICESCR)[3], Articles 11 and 12, Helsinki Rules (1966),[4] and Berlin Rules on Water Resources (2004)[5]. All these recognise clean water as a fundamental right to life.

However, in spite of these established international standards, the right to water remains challenging in politically sensitive areas in light of issues related to historical conflicts and sovereignty.

SOUTH-ASIAN TRANSBOUNDARY WATER DISPUTES AFFECTING RIGHT TO WATER

South-Asian transboundary water disputes, especially concerning rivers such as the Indus, Ganges, and Brahmaputra, pose a serious problem to the right to access water, intensifying water scarcity and heightening existing geopolitical tensions, leading to conflicts.[6]These disputes not only worsen regional conflicts but also pose* critical humanitarian challenges, badly affecting those who depend on these water resources foe their survival.[7]

The following case studies reveal how the challenges posed by transboundary water disputes in south Asia threaten the fundamental right to water, further deteriorating regional stability and endangering lives of millions who depend on these for their livelihood.

The *Indus Water Treaty*[8] signed between India and Pakistan and brokered by the World Bank in 1960 bifurcates the control of the Indus River system between the two countries. Although

[2] United Nations General Assembly, 'The human right to water and sanitation' (28 July 2010) UNGA Res 64/292, UN Doc A/RES/64/292.

[3] *International Covenant on Economic, Social and Cultural Rights* (adopted 16 December 1966, entered into force 3 January 1976) 993 UNTS 3

[4] *Helsinki Rules* 1966, art 11,12

[5] International Law Association, *'Berlin Rules on Water Resources'* (adopted 21 August 2004) https://www.internationalwaterlaw.org/documents/intldocs/ILA/ILA_Berlin_Rules-2004.pdf accessed 7 April 2025.

[6] Amit Ranjan(ed),*Water Issues In Himalayan South Asia*,2019.

[7] Asit Biswas, *Asian Perspectives on Water Policy*,1st edn, 2012.

regarded as successful, the treaty faces renewed tensions due to hydropower projects and the territorial dispute over Kashmir.

The *Kalapani River* forms a segment of India-Nepal's boundary. Both nations assert their sovereignty over it. This dispute has become a major bone of contention between the two countries affecting humanitarian aspects. The dispute is further complicated by maps from the colonial period and differing historical narratives, fuelled by recent developments in revision of political maps by both countries, showing the contentious area as part of their territory.[9]

The *Brahmaputra* River is a vital source of water for China, India, and Bangladesh. It originates from Tibet and traverses through India before entering Bangladesh. But the river's significance combined with border issues and ongoing rivalry between India and China have intensified geopolitical strains, leading to Chinese dominance over the river, also due to the absence of any formal treaty for resolving the issue.

Thus, political instability, security issues, and lack of transparency complicate water governance, leading to an international humanitarian water crisis.

ROLE OF AI AND BIG DATA

As water scarcity deepens and transboundary disputes increase, Artificial Intelligence(AI) and big data have emerged as transformative agents in water management. AI makes big data analytics simple by automating and improving data preparation, data visualization, predictive modelling, and other complex data analytical operations that would be otherwise labour-intensive and further time-consuming. Big data is the fuel on which AI runs. A huge amount of varied data is what enables machine learning programs to accomplish what they were designed to do: learn and master a skill. The more the data provided to AI, the more it learns and enhances its pattern recognition ability. [10]Through AI, governments can develop and implement more equitable and sustainable solutions in water allocation, reducing conflicts and upholding the

[8] Indus Waters Treaty (signed 19 September 1960, entered into force 1 April 1960) <https://treaties.un.org/doc/Publication/UNTS/Volume%20419/volume-419-I-6032-English.pdf>accessed 7 April 2025.

[9] Alok Gupta, *Kalapani: A Bone of Contention Between India and Nepal*(Institute of Peace and Conflict Studies,17 Sept 2000)<*https://www.ipcs.org/comm_select.php?articleNo=422*> accessed 4 April 2025

[10] Clara Bochino, *Using Big Data Analytics for Transboundary Water Management*(July 28,2020) <https://www.newsecuritybeat.org/2020/07/big-data-analytics-transboundary-water-management/> accessed 4 April 2025

right to water. The following approaches can be employed by the government and policymakers-

AI for real-time monitoring and data collection

Lack of transparent and verified data worsens transboundary disputes. Given that upstream nations are often accused of withholding information(eg, China), AI-powered satellite monitoring and remote sensing can –

- Detect water diversions and dam management
- Monitor glacier melting
- Measure seasonal flow and changes in river morphology.

CASE IMPLICATION

In the Indus basin, Pakistan disagrees on India's "run-of-the-river" projects. The AI system can systematically observe discharge rate and dam operations to ensure compliance with the signed treaty between the two countries.

PREDICYTIVE ANALYSIS AND RISK FORECASTING

AI can analyse multi-variable datasets, from climate patterns to crop profiles, and predict natural calamities such as floods and droughts critical in regions prone to them.

CASE IMPLICATION

For instance, if India and Nepal have a joint AI-based forecast system for the Kalapani basin, they can coordinate and develop hydropower plans, avoiding unilateral moves and political outrage.

AI FOR DATA-DRIVEN DISPUTE RESOLUTION

Diplomatic negotiations on water resources are rooted in factors such as politics, history and nationalism. AI-powered hydrological modelling offers a neutral and scientific baseline to consider

- What is Fair and reasonable in water-sharing
- Whether a nation's dam project will harm others

- Allocation of water under various stress scenarios

CASE IMPLICATION

For disputes where there is no formal treaty, like India and China over Brahmaputra river, AI-systems can simulate the effect of the Chinese dams on Indian flow and ecology , which creates a data-based foundation for future negotiations.

STRENGTHENING THE RIGHT TO WATER THROUGH TECHNOLOGICAL JUSTICE

Though there are ethical and legal concerns[11] regarding AI and Big Data in water management, AI ensures that decisions are made ina rational way on the basis of need and availability, not geopolitics alone.

The human right to water is not just about its access but informed knowledge-based decision making, equitable participation and accountability in governance. AI facilitates this by

Democratizing data- Citizens and other stakeholders can access open-source data to ensure accountability.

Bridging the knowledge symmetry- Even smaller nations can negotiate with more information parity.

Identifying crucial areas- AI apps can map areas of water contamination, stress and inequitable distribution.

Thus, to harness and leverage AI and Big Data for resolution of transboundary water disputes, countries and international bodies need to

Update treaties- for instance the Indus water treaty should be revised to include the provision of AI-powered monitoring system, data-sharing protocols and guidelines related to emergency frameworks

Establish shared AI infrastructure and collaborate on a regional water intelligence platform

[11] Ibrahim, I.A. Legal Implications of the Use of Big Data in the Transboundary Water Context. *Water Resour Manage* **34**, 1139–1153 (2020). <https://doi.org/10.1007/s11269-020-02491-x> accessed 4 April 2025

Develop legal and ethical guidelines to encompass the AI regulation mechanism, especially for transboundary environmental data

Algorithm transparency, data justice, and fair and equitable access to digital infrastructure must be ensured.

CONCLUSION

AI and Big Data cannot remove past historical grievances or negate political ambitions, but can bring transparency, objectivity, and predictability into the space of distrust and rivalry. Through the integration of technological innovation and regional coordination, coupled with legal reform, South Asia can venture towards a future where the right to water is secured rather than politicised. AI cannot solve water conflicts on its own but it can serve as a catalyst for initiating transformative water diplomacy in the 21st century.