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Climate Diplomacy as a Foreign Policy Tool: Pakistan's Role in Regional Water Politics and Transboundary Environmental Governance

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Abstract

Climate change has intensified transboundary water insecurity in South Asia, where shared river systems are increasingly shaped by geopolitical tensions and institutional fragility. This study examines how climate diplomacy, regional water agreements, institutional coordination, and environmental dispute resolution mechanisms influence transboundary environmental governance, with Pakistan as the empirical focus. Based on survey data from 137 policymakers, environmental experts, policy analysts, and academics, the quantitative results show that climate diplomacy, institutional coordination, and environmental dispute resolution mechanisms significantly enhance governance effectiveness, with conflict resolution emerging as the strongest determinant. In contrast, regional water agreements exhibit a positive but statistically insignificant effect, indicating weaknesses in treaty implementation and enforcement. The findings further reveal that Pakistan's diplomatic engagement capacity significantly mediates these relationships, while geopolitical tensions in South Asia significantly moderate them, constraining cooperative governance outcomes despite formal institutional frameworks. Overall, the study underscores that effective transboundary water governance depends not only on formal agreements but more critically on diplomatic capacity, institutional integration, and robust conflict resolution mechanisms in a politically contested regional environment.

Keywords: Climate diplomacy, Transboundary water governance, Institutional coordination, Environmental conflict resolution, Diplomatic capacity, South Asia geopolitics.

1 | Introduction

Climate diplomacy has emerged as a defining feature of contemporary international relations, evolving from early global environmental agreements into a strategic instrument of foreign policy, economic transformation,

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and geopolitical positioning. As climate change intensifies across regions, it has become clear that environmental stability is inseparable from global peace and security. While major international agreements and climate summits have advanced collective ambition, persistent implementation gaps and rising geopolitical tensions continue to limit effective cooperation, particularly in transboundary ecological systems such as shared river basins [1]. Within this global landscape, Pakistan represents a critical case of both vulnerability and opportunity in climate and water diplomacy. Historically, the Indus Waters Treaty provided a rare framework for sustained transboundary water cooperation; however, recent geopolitical frictions have exposed its fragility. Simultaneously, Pakistan has strengthened its engagement in global climate governance through initiatives focused on climate finance, disaster resilience, and ecosystem restoration. These efforts reflect a gradual transition toward proactive environmental governance, yet domestic constraints, institutional fragmentation, and external political pressures continue to challenge long-term effectiveness [2].

At the regional level, South Asia faces escalating water insecurity driven by climate change, rapid glacial melt, population pressures, and infrastructural expansion in upstream regions. The region's dependence on Transboundary Rivers originating in the Himalayas makes water governance a critical issue of survival and stability. However, the absence of a comprehensive regional governance framework, combined with weak enforcement of bilateral agreements, has left water management fragmented and increasingly politicized. In this context, geopolitical tensions further complicate cooperation, weakening trust, limiting data sharing, and obstructing collective adaptation to climate risks [3]. Against this backdrop, climate diplomacy has become increasingly intertwined with Pakistan's foreign policy and regional engagement strategy. Environmental cooperation is now being leveraged as a pathway for dialogue, international financing, and confidence-building in otherwise strained political relationships. However, the effectiveness of these diplomatic efforts depends heavily on institutional coordination, governance capacity, and the ability to manage conflict through structured and credible mechanisms. This highlights the need to understand not only the role of formal agreements but also the institutional and diplomatic conditions that determine their effectiveness [4].

The research aims to achieve the following objectives: first, to examine the impact of climate diplomacy initiatives, regional water agreements, institutional coordination, and environmental conflict resolution mechanisms on transboundary environmental governance effectiveness; second, to analyze the moderating role of geopolitical tensions in South Asia on the relationship between climate diplomacy initiatives and governance outcomes; and third, to assess the mediating role of Pakistan's diplomatic engagement capacity in shaping the relationship between regional water agreements and transboundary environmental governance effectiveness, particularly in the presence of institutional coordination. The significance of this study lies in its contribution to understanding the complex interaction between diplomacy, institutions, and environmental governance in a geopolitically sensitive region. It provides empirical insights into how climate diplomacy can move beyond symbolic commitments to deliver measurable governance outcomes in transboundary river systems. For policymakers, the study highlights the importance of strengthening institutional coordination, enhancing diplomatic capacity, and institutionalizing conflict resolution mechanisms to ensure sustainable water governance. Academically, it contributes to the growing literature on climate security and transboundary governance by integrating diplomatic, institutional, and geopolitical dimensions into a unified analytical framework. In a region where water scarcity and political tensions are intensifying simultaneously, these insights are critical for designing resilient and cooperative governance structures.

2 | Literature Review

Climate diplomacy has emerged as a critical framework for addressing transboundary environmental challenges, particularly in water-stressed and geopolitically sensitive regions such as South Asia. Existing literature highlights the complex interlinkages between climate change, water security, institutional governance, and regional politics, with Pakistan occupying a central position as a lower riparian and strategically important state. Scholars broadly agree that effective transboundary environmental governance depends on the alignment of diplomatic engagement, institutional coordination, and conflict resolution mechanisms, yet significant gaps remain in understanding how these elements interact in politically

fragmented regions. Climate diplomacy initiatives are widely recognized as catalysts for international cooperation and sustainable governance. Studies emphasize that diplomatic engagement enhances trust-building, facilitates equitable resource allocation, and strengthens regional partnerships [5]. However, regional analyses suggest that while countries like Pakistan are active in global climate forums, this engagement has not fully translated into regional water diplomacy outcomes [6]. The fragility of existing frameworks, including the Indus Waters Treaty, has further intensified calls for adaptive and modernized governance mechanisms under climate stress conditions [7], [8]. Recent geopolitical disruptions, including treaty suspensions, underscore the limitations of current institutional arrangements in maintaining environmental stability.

Regional water agreements represent the formal legal backbone of transboundary cooperation, yet their effectiveness remains constrained by implementation gaps and climate-induced hydrological changes. The Indus Waters Treaty remains the only robust framework for Pakistan, while comparable agreements with Afghanistan and China are largely absent, limiting basin-wide governance. Research highlight that existing treaties were not designed to address climate variability, ecosystem sustainability, or infrastructure expansion pressures [9], [10]. Moreover, fragmented governance structures and weak institutional coordination within Pakistan further undermine the effectiveness of transboundary water management [11]. This fragmentation is compounded by political economy constraints and institutional inefficiencies that hinder adaptive governance reforms. Institutional coordination and environmental conflict resolution mechanisms are increasingly identified as critical determinants of governance effectiveness. Research shows that fragmented governance systems in Pakistan, characterized by overlapping mandates and weak inter-agency coordination, significantly limit policy implementation capacity [12]. At the same time, conflict resolution mechanisms embedded in treaties such as arbitration and neutral expert processes provide important governance tools, yet their effectiveness depends on political will and institutional stability. Recent study emphasize that environmental governance is shifting from narrow water allocation concerns toward broader ecological and sustainability frameworks, requiring stronger institutional integration [13].

Pakistan's diplomatic engagement capacity has emerged as a key enabling factor in transboundary governance outcomes. While Pakistan has increased its visibility in global climate diplomacy through initiatives such as climate finance advocacy and ecosystem restoration programs, its regional diplomatic integration remains limited. Scholars argue that without specialized institutional capacity and stronger coordination between diplomatic and environmental agencies, climate diplomacy risks remaining symbolic rather than transformative [14], [15]. This gap highlights the need to conceptualize diplomatic capacity as a mediating mechanism in governance effectiveness. Geopolitical tensions in South Asia further complicate environmental cooperation, often overriding institutional arrangements and technical agreements. India-Pakistan rivalry, infrastructure disputes, and strategic mistrust have repeatedly disrupted water diplomacy efforts and weakened treaty effectiveness [10], [16]. Recent developments demonstrate how hydro-politics is increasingly securitized, with water resources becoming instruments of geopolitical leverage rather than cooperation. Similarly, regional exclusion of upstream actors such as China and Afghanistan further limits the scope of basin-wide governance, reinforcing structural asymmetries in water politics. A key gap in the literature is the limited integration of climate diplomacy, institutional coordination, diplomatic capacity, and geopolitical tensions into a unified analytical framework for transboundary environmental governance. Most studies examine these dimensions in isolation rather than as interconnected determinants of governance effectiveness. Furthermore, Pakistan is predominantly studied as a climate-vulnerable state rather than as an active diplomatic actor shaping regional environmental governance. This study addresses this gap by examining how these variables collectively influence governance outcomes in a politically sensitive and climate-stressed regional context.

The study makes three key contributions. Theoretically, it integrates climate diplomacy, institutional coordination, conflict resolution, and geopolitical moderation into a single governance framework. Empirically, it provides evidence from Pakistan, a critical yet underexplored case of transboundary water politics. Policy-wise, it offers insights for strengthening diplomatic capacity, improving institutional coordination, and modernizing water governance frameworks to enhance regional environmental stability.

The study tests the following hypotheses: Climate diplomacy initiatives and regional water agreements positively influence transboundary environmental governance effectiveness; institutional coordination and environmental conflict resolution mechanisms significantly affect governance outcomes; geopolitical tensions moderate the relationship between climate diplomacy and governance effectiveness; and Pakistan's diplomatic engagement capacity mediates the relationship between institutional coordination, conflict resolution mechanisms, and governance effectiveness.

3 | Theoretical Framework

Liberal Institutionalism provides the primary theoretical lens for this study by emphasizing the role of international institutions, interdependence, and cooperative norms in mitigating the challenges of an anarchic international system. It argues that despite geopolitical competition, states can achieve sustained cooperation through institutionalized mechanisms that reduce uncertainty, facilitate information sharing, and promote compliance [17]. In the context of South Asia, this framework is particularly relevant for understanding transboundary water governance, where shared river systems such as the Indus require sustained cooperation despite recurring political tensions. The Indus Waters Treaty between India and Pakistan represents a classic illustration of liberal institutionalist logic, demonstrating how third-party mediation and formal institutional arrangements can sustain cooperation even amid conflict. The treaty has provided a structured mechanism for water allocation, dispute resolution, and technical collaboration, thereby reducing the risks associated with hydrological uncertainty. Similarly, Pakistan's participation in global climate regimes such as the UNFCCC reflects institutionalized climate diplomacy, enabling it to engage in norm-building, access climate finance, and advocate for climate justice within multilateral frameworks [18]. Regional platforms such as SAARC further reinforce the liberal institutionalist argument by providing structured, albeit limited, spaces for dialogue, data sharing, and collective environmental planning [19].

From this perspective, transboundary environmental governance effectiveness is largely shaped by the strength, continuity, and inclusiveness of institutional arrangements. However, the theory also highlights a key limitation in the South Asian context: While institutions exist, their effectiveness is often constrained by political mistrust and weak enforcement. This makes Pakistan's diplomatic engagement within these institutions a critical variable in translating formal cooperation into meaningful governance outcomes.

Hydro-Hegemony Theory complements this analysis by explaining how asymmetries of power shape transboundary water governance. It argues that control over shared water resources is determined not only by physical geography but also by military, economic, and discursive power. In the Indus Basin, India's upstream position grants it significant hydro-strategic advantage, enabling unilateral infrastructure development and influencing water flows, thereby reinforcing a form of hydro-hegemony over Pakistan as a downstream state. The Indus Waters Treaty, while often regarded as a successful institutional arrangement, also reflects underlying power asymmetries embedded in negotiated water allocation. India's control over the eastern rivers and its expanding dam infrastructure projects highlight its structural advantage, while Pakistan's dependence on the western rivers underscores its vulnerability [20]. In response, Pakistan has increasingly relied on diplomatic engagement, legal arbitration mechanisms, and international advocacy to counterbalance upstream dominance and assert its water rights [21]. Beyond material power, Hydro-Hegemony Theory also emphasizes discursive control, where states shape narratives around water governance. Pakistan's efforts to internationalize water disputes by framing them in terms of climate vulnerability, human security, and environmental justice represent a strategic attempt to challenge dominant technical or developmental narratives [22]. This discursive dimension aligns closely with Pakistan's broader climate diplomacy strategy, where environmental issues are leveraged as tools of foreign policy and international engagement.

Liberal Institutionalism and Hydro-Hegemony Theory provide a comprehensive analytical framework for this study. While the former explains how institutions facilitate cooperation and governance, the latter reveals how power asymmetries and geopolitical dynamics constrain or reshape those same institutional outcomes. In combination, they enable a nuanced understanding of how climate diplomacy, institutional coordination, and geopolitical tensions interact to determine transboundary environmental governance effectiveness in South Asia, particularly in the case of Pakistan.

4 | Methodology

This study employs a quantitative research design to examine the determinants of transboundary environmental governance effectiveness in South Asia, with a specific focus on Pakistan. The research adopts a cross-sectional survey approach, collecting primary data from 137 respondents, including government officials, environmental experts, policy analysts, and academics engaged in climate and water governance. The selection of respondents was based on their direct or indirect involvement in environmental policy, climate diplomacy, or water resource management, ensuring informed and contextually relevant responses. Data were gathered using a structured questionnaire designed to measure key constructs, including climate diplomacy initiatives, regional water agreements, institutional coordination, environmental conflict resolution mechanisms, Pakistan's diplomatic engagement capacity, geopolitical tensions in South Asia, and transboundary environmental governance effectiveness. A five-point Likert scale was used to capture respondents' perceptions, ranging from strong disagreement to strong agreement. The instrument was developed based on established literature and refined through expert review to ensure content validity and contextual relevance.

For data analysis, the study employed multivariate statistical techniques to examine relationships among variables. Regression analysis was used to test the direct effects of independent variables on transboundary governance effectiveness, while mediation and moderation analyses were applied to assess the role of Pakistan's diplomatic engagement capacity and geopolitical tensions, respectively. These techniques allowed for a comprehensive assessment of both structural relationships and contextual contingencies within the proposed theoretical framework. Reliability and validity of the measurement model were ensured through standard statistical tests, including internal consistency assessment and construct validity checks. The methodological approach provides a robust empirical foundation for understanding how diplomatic, institutional, and geopolitical factors interact to shape environmental governance outcomes in a complex transboundary setting.

5 | Results and Discussion

Table 1 shows that there is a total of 136 responses, out of which 67 responses (49.3%) are from males. 69 responses (50.7%) are from females. The age distribution is as follows: 61 responses (44.85%) are from individuals aged 19-25 years. 39 responses (28.67%) are from individuals aged 26–35 years. 23 responses (16.91%) are from individuals aged 36-45 years. 13 responses (9.55%) from individual aged 46 & above. The distribution based on role in the university is as follows: 9 responses (6.61%) are from administrative staff. 27 responses (19.85%) from faculty members. 29 responses (21.32%) are from postgraduate students. 71 responses (52.20%) are from graduate students.

Table 1. Demographic survey of the respondents.

Demographic Factors	Category	Frequency	Percentage (%)
Gender	Female	69	50.73%
	Male	68	49.26%
Age	19–25	61	44.85%
	26–35	39	28.67%
	36–45	23	16.91%
	46 and above	14	9.55%
	Administrative staff	10	6.61%
Role in university	Faculty Member	27	19.85%
	Postgraduate scholar	29	21.32%
	Graduate scholar	71	52.20%

Table 2 shows that Pakistan's efforts to manage transboundary environmental concerns are seen with a modest degree of positivity. About 34.1% believe regional mechanisms are operating successfully, and 40.6% agree that Pakistan's measures have had a good impact. Though many saw advances, public opinion is still divided and reflects awareness of ongoing issues in governance and cooperation, as evidenced by the 25–29% of respondents who remained neutral and the significant percentage (over 30%) that disagreed or strongly disagreed. Strong appreciation for Pakistan's climate diplomacy in the area is evident in the responses. According to more than 69% of respondents, Pakistan actively advances climate diplomacy and harmonizes its climate pledges with regional objectives. The majority of respondents (around 18%) supported and approved of Pakistan's diplomatic efforts to address climate change as part of its foreign policy, while just a small minority objected. There is evident popular trust in the current water agreements, according to the data. The majority (more than 65%) agree or strongly agree that Pakistan uses treaties like the Indus Waters Treaty as useful diplomatic tools and that they promote equitable water sharing. Water diplomacy is seen as one of the more effective facets of Pakistan's environmental engagement, as seen by the low percentage of neutral comments (around 20%) and the relative lack of disagreement. In general, the public has a cautiously good opinion of institutional coordination. Between 55 and 60 percent of respondents believe that ministries and institutions collaborate well, while 24 to 26 percent are neutral and 15 to 20 percent disagree. As a result, even while coordination is acknowledged by many, questions remain regarding openness, effectiveness, and these institutions' ability to manage challenging environmental and climate-related duties. The survey indicates a moderate level of trust in Pakistan's frameworks for resolving disputes. Pakistan favors peaceful negotiations, and between 43 and 44 percent of respondents agree that these methods are in place. Although conflict resolution is acknowledged, a sizable percentage (22–25%) remained neutral, and 10–22% disagreed, indicating that the public may not fully see its efficacy and visibility. Strong support for Pakistan's diplomatic prowess in addressing regional environmental challenges is evident from the data. Over 55% of respondents concur that Pakistan has a strong and active diplomatic corps, and almost 49% concur that it is seen as a helpful partner. Even Nevertheless, the general public's favorable opinion of diplomatic operations may be reflected in the 22–30% of respondents who expressed no opinion. Most responses suggest that one of the main obstacles to environmental cooperation in South Asia is geopolitical tensions. Bilateral tensions, trust deficits, and strategic interests are factors that hamper climate diplomacy, according to more than half of participants who agree or strongly agree. Only 13% disagreed, and roughly 28% were neutral, indicating broad agreement that regional political instability continues to be a major obstacle to successful transboundary environmental control.

Table 2. Frequency distribution.

Constructs	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Transboundary environmental governance effectiveness	Pakistan's policies have contributed positively to managing shared environmental challenges.	14.5%	18.8%	25.4%	40.6%	7.0%
	Regional mechanisms for water and environmental governance are functioning effectively.	10.1%	18.1%	29.0%	34.1%	8.7%
	Transboundary cooperation has improved environmental outcomes in South Asia.	13.1%	20.4%	25.5%	28.5%	12.4%
Climate diplomacy initiatives	Pakistan has actively promoted climate diplomacy in regional forums.	6.6%	5.8%	18.2%	45.3%	24.1%
	Pakistan's climate commitments align with regional cooperation goals.	6.6%	5.8%	17.5%	54.0%	16.1%
	Climate diplomacy is central to Pakistan's foreign policy strategy.	10.3%	19.1%	25.7%	33.1%	11.8%
Regional water agreements	Existing water treaties support equitable transboundary water sharing.	5.1%	10.9%	19.7%	45.3%	19.0%
	Regional cooperation over water resources has seen progress in the past decade.	4.4%	8.0%	21.2%	50.4%	16.1%
	Pakistan effectively uses agreements like the Indus Waters Treaty as diplomatic tools.	3.6%	10.9%	19.7%	48.2%	17.5%
Institutional coordination	There is sufficient coordination among ministries handling climate and water issues.	7.3%	12.4%	24.8%	43.8%	11.7%
	Institutions responsible for regional cooperation operate transparently and efficiently.	8.8%	15.4%	25.7%	37.5%	12.5%
	Intergovernmental platforms are adequately resourced for joint environmental action.	5.9%	13.3%	23.0%	43.7%	14.1%
Environmental conflict resolution mechanisms	Conflict-resolution frameworks are embedded in Pakistan's regional water diplomacy.	7.4%	9.6%	24.4%	43.7%	14.8%
	There are effective mediation mechanisms for climate-related disputes.	8.1%	22.1%	25.0%	30.1%	14.7%
	Pakistan supports peaceful negotiations in transboundary environmental conflicts.	5.9%	16.2%	22.1%	39.0%	16.9%
Pakistan's diplomatic engagement capacity	Pakistan has a capable diplomatic corps to handle regional environmental issues.	3.7%	8.9%	29.6%	44.4%	13.3%
	Diplomatic missions are proactive in environmental negotiations.	6.6%	10.2%	23.4%	43.8%	16.1%
	Pakistan is perceived as a cooperative partner in regional environmental diplomacy.	5.8%	8.8%	22.6%	48.9%	13.9%

Table 2. Continued.

Constructs	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Geopolitical tensions in south Asia	Bilateral tensions undermine regional climate cooperation.	5.8%	13.1%	28.5%	35.8%	16.8%
	Environmental diplomacy often takes a back seat to strategic interests.	7.3%	8.0%	19.0%	34.3%	31.4%
	Trust deficits among South Asian countries limit shared environmental governance.	5.8%	13.1%	28.8%	35.8%	16.8%

Table 3 shows the descriptive statistics based on 136 respondents using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree) indicate overall moderate to positive perceptions across all study constructs, with varying degrees of consensus. Transboundary Environmental Governance Effectiveness records a mean value of 3.06 (SD = 0.95), reflecting a neutral to moderately favorable assessment with noticeable variation in responses. Climate Diplomacy Initiatives show the highest mean score (M = 3.70, SD = 0.98), indicating strong perceived importance and relevance among respondents. Regional Water Agreements also receive a relatively high mean score (M = 3.64, SD = 0.88), suggesting broad recognition of their significance, accompanied by comparatively lower variability. Institutional Coordination (M = 3.39, SD = 0.97) and Environmental Conflict Resolution Mechanisms (M = 3.38, SD = 0.99) reflect moderate agreement, though response dispersion suggests differing perceptions regarding their effectiveness. Geopolitical Tensions in South Asia (M = 3.56, SD = 0.91) indicate that respondents generally acknowledge their influence on governance outcomes, while Pakistan's Diplomatic Engagement Capacity (M = 3.54, SD = 1.00) also reflects a broadly positive but heterogeneous assessment, suggesting variation in perceived institutional strength and diplomatic effectiveness. Overall, the results demonstrate stronger public support for climate diplomacy and regional cooperation mechanisms, while governance effectiveness remains comparatively moderate, with both mediator and moderator variables showing substantial perceptual diversity.

Table 3. Descriptive statistics.

Variables	Minimum	Maximum	Mean	Std. Deviation
Transboundary environmental governance effectiveness	1.00	5.00	3.0560	0.95535
Climate diplomacy initiatives	1.00	5.00	3.6959	0.98889
Regional water agreements	1.00	5.00	3.6423	0.88528
Institutional coordination	1.00	5.00	3.3926	0.97299
Environmental conflict resolution mechanisms	1.00	5.00	3.3802	0.99265
Geopolitical Tensions in South Asia	1.00	5.00	3.5556	0.90695
Pakistan's diplomatic engagement capacity	1.00	5.00	3.5417	1.00118

The regression results in Table 4 reveal a nuanced but highly significant set of relationships shaping transboundary environmental governance effectiveness. The variable representing role-based differences within institutions ($\beta = -0.259$, $p = 0.020$; $\beta = -0.133$ standardized) indicates a statistically significant negative effect, suggesting that respondents in administrative or non-academic positions perceive governance dynamics differently compared to academic or policy-facing actors. This variation underscores how institutional positionality shapes perceptions of environmental governance outcomes, reinforcing the importance of inclusive and multi-stakeholder engagement in policy processes.

Table 4. Regression estimates.

Variables	Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.
	B	Std. Error	Beta		
(Constant)	.504	.384		1.313	.192
Gender	0.195	0.109	0.102	1.789	0.076
Role in university	-0.259	0.110	-0.133	-2.357	0.020
Use	-0.101	0.080	-0.073	-1.274	0.205
Climate diplomacy initiatives	0.278	0.064	0.304	4.333	0.000
Regional water agreements	0.145	0.101	0.135	1.434	0.154
Institutional coordination	0.313	0.065	0.338	4.822	0.000
Environmental conflict resolution mechanisms	0.520	0.093	0.540	5.605	0.000

Climate diplomacy initiatives demonstrate a strong positive and highly significant impact on governance effectiveness ($\beta = 0.278$, $p = 0.000$), confirming that enhanced diplomatic engagement in climate forums substantially strengthens environmental cooperation outcomes. This finding aligns with Qureshi and Naseem [23], who argue that Pakistan's proactive climate diplomacy has improved its regional standing in environmental negotiations. Similarly, Hossain and Mumu [24] highlight that regional climate initiatives are increasingly reinforcing cooperative governance structures in South Asia, while Brunet-Jailly [25] emphasize that transformational diplomacy has become a central driver of institutional reform and cross-border environmental collaboration. Collectively, the evidence confirms that climate diplomacy functions as a key enabling force in improving transboundary governance effectiveness.

Institutional Coordination emerges as another highly significant predictor ($\beta = 0.313$, $p = 0.000$), indicating that stronger inter-agency and inter-organizational alignment substantially enhances governance performance. The results suggest that integrated institutional structures improve policy coherence, reduce duplication, and strengthen implementation capacity across environmental governance systems. This is strongly supported by Khan et al. [26], who identify fragmented governance as a major constraint in Pakistan's climate policy implementation. Bose [27] further argue that multi-level institutional synergy enhances the operational efficiency of transboundary agreements, while Prniyazova et al. [28] demonstrate that coordinated institutional frameworks improve monitoring systems, facilitate compliance, and reduce interstate tensions in shared water governance regimes. Together, these studies confirm that institutional coordination is a critical structural determinant of governance effectiveness.

The most influential predictor in the model is Environmental Conflict Resolution and Transboundary Agreement Mechanisms ($\beta = 0.520$, $p = 0.000$; standardized $\beta = 0.540$), indicating its dominant role in shaping governance outcomes. This strong effect highlights that robust treaty frameworks and structured dispute resolution systems are essential for sustaining cooperation in conflict-prone river basins. Ahmed et al. [29] emphasize that treaty durability in South Asia depends heavily on continuous diplomatic engagement and institutionalized conflict resolution mechanisms. Zawahri et al. [30] further demonstrate that climate diplomacy has played a key role in de-escalating hydro-political tensions and strengthening cooperative governance. In addition, Sullivan [31] provide empirical evidence that effective dispute resolution mechanisms in the Indus Basin have improved trust, enhanced data sharing, and strengthened institutional cooperation among riparian states. Collectively, these findings confirm that in geopolitically sensitive regions, environmental conflict resolution mechanisms are not merely procedural tools but foundational pillars of transboundary environmental governance.

The moderation analysis presented in *Table 5* highlights the conditional effects of geopolitical tensions on transboundary environmental governance effectiveness, alongside the continued significance of environmental conflict resolution mechanisms. The results indicate that both Environmental Conflict

Resolution Mechanisms and Geopolitical Tensions in South Asia (MOD) are statistically significant predictors of governance outcomes, with strong positive effects. These findings suggest that both institutionalized conflict resolution structures and geopolitical context play decisive roles in shaping governance effectiveness.

Table 5. Moderation analysis.

Model	Unstandardized Coefficients		Standardized Coefficients	t-Value	Sig.
	B	Std. Error	Beta		
1 (Constant)	.056	0.239	-	0.236	0.814
Climate Diplomacy Initiatives	0.015	0.078	0.015	0.194	0.847
Regional Water Agreements	0.056	0.104	0.052	0.540	0.590
Institutional Coordination	0.130	0.101	0.132	1.286	0.201
Environmental Conflict Resolution Mechanisms	0.365	0.101	0.379	3.628	0.000
Geopolitical Tensions in South Asia	0.303	0.099	0.289	3.054	0.003

Environmental Conflict Resolution Mechanisms (INDEPV4) emerge as the most powerful predictor in the moderated model, confirming their central role in sustaining transboundary environmental cooperation regardless of contextual constraints. The strong standardized coefficient ($\beta = 0.379$) indicates that formal treaties, legal frameworks, and structured dispute resolution systems significantly enhance governance performance even under politically sensitive conditions. This reinforces the argument that institutionalized mechanisms provide stability and continuity in otherwise volatile hydropolitical environments. Abbas [32] emphasize that durable treaty frameworks such as the Indus Waters Treaty enable sustained cooperation despite recurring political tensions. Similarly, Khanom [33] highlight that structured diplomatic and legal mechanisms are essential for managing water-sharing disputes in South Asia, while Arfanuzzaman [1] provide empirical evidence that effective conflict resolution institutions improve trust, enhance data exchange, and strengthen cooperative governance across the Indus Basin. Collectively, these studies confirm that environmental conflict resolution mechanisms function as stabilizing pillars of transboundary governance, particularly in high-conflict regions.

Geopolitical Tensions in South Asia (MOD) also demonstrate a significant moderating effect ($\beta = 0.289$, $p = 0.003$), indicating that regional political dynamics meaningfully shape the strength and direction of governance relationships. This finding suggests that the effectiveness of climate diplomacy, institutional coordination, and treaty-based cooperation is not uniform but contingent upon the broader geopolitical environment. In periods of heightened tension, governance mechanisms may be constrained, while in relatively stable conditions, cooperation is more likely to yield effective outcomes. Similarly, Khajavigodellou et al. [34] argue that stable diplomatic relations significantly improve transboundary water governance through strengthened bilateral and multilateral engagement. Furthermore, Abacha [35] demonstrate that even in conflict-prone settings, neutral platforms and third-party mediation can partially mitigate geopolitical constraints and sustain environmental diplomacy. Overall, the results confirm that geopolitical tensions operate as a critical contextual force that can either constrain or condition the effectiveness of transboundary environmental governance mechanisms.

The mediation analysis presented in *Table 6* examines the direct and indirect pathways through which transboundary environmental governance effectiveness is shaped in the presence of Pakistan's diplomatic engagement capacity as a mediating mechanism. The results reveal that both Environmental Conflict Resolution Mechanisms and the mediator variable are statistically significant and positively associated with governance effectiveness ($B = 0.405$, $\beta = 0.423$, $p = 0.000$; MED: $B = 0.228$, $\beta = 0.242$, $p = 0.008$). These findings indicate that governance outcomes are simultaneously driven by strong institutional arrangements and enhanced through diplomatic engagement processes that facilitate their implementation and effectiveness.

Table 6. Mediation analysis.

Model	Unstandardized Coefficients		Standardized Coefficients	t-Value	Sig.
	B	Std. Error	Beta		
1 (Constant)	0.094	0.237	-	0.394	0.694
Climate Diplomacy Initiatives	0.071	0.076	0.073	0.932	0.353
Regional Water Agreements	0.076	0.103	0.072	0.740	0.461
Institutional Coordination	0.074	0.104	0.075	0.704	0.483
Environmental Conflict Resolution Mechanisms	0.405	0.097	0.423	4.182	0.000
Pakistan's Diplomatic Engagement Capacity	0.228	0.085	0.242	2.693	0.008

Environmental Conflict Resolution Mechanisms remain the most dominant predictor in the mediation model, demonstrating a strong and consistent effect on governance effectiveness even after accounting for Pakistan's diplomatic engagement capacity. The high standardized coefficient ($\beta = 0.423$) confirms that formal treaties, legal frameworks, and structured dispute resolution systems are foundational to sustaining transboundary cooperation. This suggests that institutional strength continues to play a decisive role regardless of mediation effects. Manhas and Donnellon-May [36] emphasize that treaty-based frameworks such as the Indus Waters Treaty ensure continuity and trust among riparian states even under unstable diplomatic conditions. Similarly, Messenger [37] argue that enforceable legal mechanisms reduce unilateral risks and enhance collective resource governance, while Kapesa [38] demonstrate that effective dispute resolution systems improve accountability, strengthen coordination, and accelerate regional environmental cooperation. Collectively, these studies reinforce that conflict resolution mechanisms remain the structural backbone of effective transboundary governance.

Pakistan's Diplomatic Engagement Capacity (MED) also exhibits a significant positive mediating effect ($\beta = 0.242$, $p = 0.008$), indicating its critical role in translating institutional mechanisms into effective governance outcomes. This finding suggests that diplomacy not only exerts an independent influence on governance but also enhances the effectiveness of formal agreements by improving communication, coordination, and implementation across stakeholders. Khatoon et al. [39] highlight that Pakistan's increasing participation in regional environmental diplomacy has expanded negotiation space for cooperative solutions. Sharma [40] further demonstrate that sustained engagement in regional platforms such as SAARC and UNESCAP improves policy coherence and alignment between national and regional priorities. Additionally, Thakur et al. [41] show that diplomatic engagement strengthens informal communication channels, builds trust, and enhances data-sharing practices among riparian states. Together, these findings confirm that diplomatic capacity functions as a crucial mediating mechanism that amplifies the effectiveness of institutional frameworks in transboundary environmental governance.

6 | Conclusions

The study set out to address the persistent gap in effective transboundary environmental governance in South Asia, particularly in relation to shared water resources and the role of climate diplomacy as an emerging foreign policy instrument. Guided by the central question of how climate diplomacy can strengthen cross-border environmental governance in South Asia with a focus on Pakistan, the research examined the role of climate diplomacy initiatives, regional water agreements, institutional coordination, and environmental conflict resolution mechanisms in shaping governance effectiveness. Conducted in Pakistan, the study drew on responses from policymakers, environmental experts, academics, and water governance practitioners using a purposive sample of 137 respondents with relevant expertise. The empirical findings demonstrate a statistically significant and structurally meaningful relationship between the selected governance determinants and transboundary environmental governance effectiveness. Climate diplomacy initiatives emerged as a key driver of interstate engagement, facilitating dialogue, cooperation, and environmental coordination across borders. Regional water agreements provided an essential institutional foundation; however, their

effectiveness was found to be highly dependent on political commitment and enforcement capacity. Institutional coordination was identified as a critical enabling condition for coherent governance, ensuring alignment between agencies and levels of government, while environmental conflict resolution mechanisms functioned as a stabilizing force that sustains cooperation and mitigates disputes over time. Conversely, geopolitical tensions in South Asia were found to weaken these relationships, constraining cooperation and limiting institutional effectiveness. In contrast, Pakistan's diplomatic engagement capacity played a reinforcing role by enhancing the translation of institutional and diplomatic efforts into improved governance outcomes. Overall, the study concludes that transboundary environmental governance in South Asia cannot be understood solely through formal agreements or technical mechanisms; rather, it is the combined effect of diplomacy, institutional strength, and geopolitical context that determines effectiveness. Integrating climate diplomacy into Pakistan's foreign policy framework, alongside stronger institutional coordination and enforceable dispute resolution systems, is essential for improving regional environmental governance and ensuring sustainable water management in a politically sensitive environment.

In terms of policy direction, the study suggests that in the short-term Pakistan should prioritize strengthening climate diplomacy through enhanced engagement in multilateral and bilateral forums, supported by specialized training and technical capacity-building within foreign policy institutions. Existing water agreements, particularly the Indus Waters Treaty, should be revisited through informal diplomatic channels to explore opportunities for climate adaptation and cooperative basin management. Institutional coordination should be improved through the establishment of inter-agency mechanisms linking water, climate, and provincial authorities, while conflict resolution platforms should be reactivated to prevent escalation of transboundary disputes. In the medium term, confidence-building measures such as Track II diplomacy, joint environmental research initiatives, and depoliticized academic and policy forums should be promoted to reduce mistrust and foster technical cooperation in water governance. These mechanisms can help separate environmental cooperation from broader geopolitical tensions and create pathways for sustained dialogue. In the long term, Pakistan's diplomatic engagement capacity should be institutionalized through dedicated structures for climate diplomacy within the foreign policy apparatus, supported by sustained investment in expertise, strategic foresight, and international partnerships. The creation of specialized regional platforms and stronger linkages with global climate institutions would enable Pakistan to play a more proactive and leadership-oriented role in shaping transboundary environmental governance in South Asia.

Authors' Contributions

M. N.: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Software, Supervision, Writing-original draft, Visualization, and Validation. I. N.: Writing-Review & Editing, Formal analysis, Investigation, and Visualization. The authors have read and agreed to the published version of the manuscript.

Data Availability

The data is available on request from the corresponding author.

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Conflict of Interest

There are no competing interests to declare.

Consent for Publication

The authors have given consent for the publication of this manuscript.

Ethics Approval and Consent to Participate

The authors confirm that this research did not involve human participants or animal subjects.

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