Transboundary Water Treaties in South Asia: Exploring Climate Change and Climate Intervention Challenges

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This detailed outline accompanies the workshop presentation at the 2025 RFF and Harvard SRM Social Science Workshop. Since the draft manuscript is not yet finished, this outline provides an analysis of completed sections, details on sections in progress, and highlights the types of feedback from workshop participants that could be useful to the authors. This outline draws only from the draft report and includes sections still in progress.

Executive Summary

South Asia's hydrology, powered by the Himalayan Karakoram Hindukush cryosphere and the monsoon, faces increasing volatility. Existing transboundary water treaties (Indus Waters Treaty; Ganges/Teesta instruments; India–Nepal agreements; non-treaty contexts for Brahmaputra and Kabul) were not designed for a changing climate, much less for potential climate interventions. SRM (e.g., stratospheric aerosol injection, marine cloud brightening) could reduce certain warming-related extremes but might alter precipitation patterns, creating new governance challenges. Without adaptive sharing and clear climate/SRM provisions, fragile treaty frameworks can heighten geopolitical risks and lead to distributive injustice.

Key claim: Modernizing South Asia's transboundary regimes with adaptive, equity-centered tools is necessary to manage climate and potential SRM-related hydrological risks while reducing conflict incentives.

Why This Matters Now

- **Non-stationarity:** Warming alters seasonality, extremes, and cryosphere dynamics; historical baselines are unreliable.
- **Treaty design gap:** Dominant logics (fixed allocations, project-centric clauses) lack adaptive bands, triggers, or climate/SRM hooks.
- **Geopolitics:** Great power rivalry on Brahmaputra; sub-national veto points on Teesta; episodic escalations on the Indus such as that in play this year; no treaty on Kabul.
- **Justice exposure:** Downstream and marginalized communities bear the brunt of volatility and policy inflexibility.

Guiding questions: Which treaty features are most brittle under volatility? Where are justice/exposure mismatches largest? What minimum-viable updates reduce conflict incentives?

Hydro-Climate Context (HKH to the Deltas)

- **HKH cryosphere:** Glacier mass balance trends; contrasting signals in Karakoram vs central Himalaya; implications for early/late-season flows.

- **Monsoon dynamics:** Potential dampening of warming-driven increases under some SRM scenarios vs altered spatial distribution; significance for allocation regimes.
- **Basin heterogeneity:** Glacier-dominated Indus vs monsoon-dominated Ganges–Brahmaputra–Meghna (GBM); compound risks (glacial lake outbursts, sediment, floods).

SRM Primer & Relevance to Water Governance

- **What SRM is / is not:** Techniques to reflect a portion of incoming sunlight (e.g., SAI, MCB). Rapid temperature effects; does not replace mitigation; introduces termination risk.
- **Hydrological relevance:** Monsoon/precipitation distribution and variability could shift; inter-annual predictability and extremes matter for allocations; asymmetric basin sensitivities could reshape perceptions of gains/losses.
- **Governance questions:** What notification/consultation norms apply if SRM experiments or modeled effects have basin relevance? Who monitors signals? How to incorporate SRM uncertainty into treaty design without over-claiming precision?

Governance Background: Norms & Institutions

- **International water law touchstones:** Helsinki/Berlin-type principles; no single enforceable regional regime; reliance on bilateral instruments and River Basin Organizations (where they exist).
- **Regional practice:** Cooperation and conflict co-exist; power asymmetry (upper vs lower riparian), securitization, project timing, and data opacity recur.

Post-Independence Water Governance Basin and River

India–Pakistan (Indus Waters Treaty, 1960 – *currently in flux due to recent tensions with India holding the Treaty in Abeyance; Court of Arbitration ruled that unilateral disbandment of treaty cannot be done*).

- **Allocation logic:** Eastern rivers (Ravi, Sutlej, Beas) to India; Western (Indus, Jhelum, Chenab) to Pakistan, with defined non-consumptive Indian uses.
- **Institutions:** Permanent Indus Commission; neutral expert/arbitral tracks; repeated project disputes (e.g., Kishanganga, Ratle) reveal verification/interpretation gaps.
- **Stressors:** Episodic escalations; suspension/renegotiation rhetoric; climate extremes testing flood management and seasonal reliability.
- **Climate/SRM readiness:** No explicit variability or SRM provisions; glacier vs monsoon asymmetries complicate perceptions of 'hydro-buffering'.
- **Opportunity:** pilot adaptive bands tied to monitored flows and seasonal forecasts; joint early-warning.

China–India (Brahmaputra/Yarlung Tsangpo)

- **Baseline:** No binding sharing treaty; MoUs on hydrological data.
- **Stressors:** Great-power rivalry; perceived unilateral upstream actions; downstream exposure in India's Northeast and Bangladesh.
- **Readiness:** Absence of institutionalized adaptive sharing;

- **Opportunity:** minimum-viable data/notification protocol; trilateral basin science forum.

India–Bangladesh (Ganges / Teesta)

- **Instruments:** 1996 Ganges sharing arrangement; Teesta unresolved amid center–state politics and seasonal scarcity.
- **Stressors:** Seasonal low flows and flood extremes; sub-national veto points; renewal politics.
- **Readiness:** Limited adaptive devices; data/trust deficits.
- **Opportunity:** seasonal bands + transparent triggers; sub-national stakeholder inclusion; Teesta pathway mapping.

India–Nepal (Kosi, Gandak, Mahakali)

- **Agreements:** Legacy projects and benefit-sharing; sovereignty and implementation frictions.
- **Stressors:** Flood management, hydropower coordination, sedimentation, and seismic risk.
- **Readiness:** Potential for modernization via adaptive bands, shared risk registers, and independent fact-finding panels.

Pakistan–Afghanistan (Kabul)

- **Baseline:** No water-sharing treaty; data-scarce basin; stalled attempts at agreement.
- **Stressors:** Proposed storages; security externalities; climate variability amplifies scarcity perceptions.
- **Readiness:** Foundational hydromet investments and confidence-building steps as precursors to formal sharing principles.

Explicit climate/SRM clauses present? – No!

Indus (No) | Brahmaputra (No treaty) | Ganges (Limited/No) | Teesta (Unresolved) | Kosi/Gandak/Mahakali (Limited) | Kabul (No treaty)

Thematic Analysis (Cross-Cutting Findings)

- **Static policy logics vs non-stationarity:** Fixed quotas and project-centric clauses misfit a volatile climate baseline.
- **Power and path-dependence:** Colonial and post-colonial legacies reinforce centralization and technical determinism; local/indigenous knowledge under-integrated.
- **Data asymmetries:** Monitoring gaps, opaque sharing, and limited verification impede cooperative risk management.
- **Justice implications:** Exposure is uneven; without equity safeguards, modernization can reproduce harms.
- **Hegemonic influence:** India is the upstream hegemon in South Asia; broader view of rivers and water flows highlights the role of China in asserting power over Indian water hegemony in the region.

Policy Options & Design Ideas

1. **Adaptive-sharing clauses:** Shift from fixed volumes to indexed bands with transparent triggers (flows, seasonal forecasts); embed review cycles.
   Pilot: 2-season band for a sub-basin with joint gauge verification.
2. **Notification/consultation & SRM hooks:** Define when modeled or experimental signals warrant consultation; joint interpretation protocols; no-harm and precautionary language.
   Pilot: Annex language + a basin "signals" working group.
3. **Data commons & monitoring:** Shared hydromet stations, data integrity audits, public dashboards.
   Pilot: Third-party-audited seasonal bulletin; dashboard prototype.
4. **Conflict mediation/ombud:** Independent facilitation panels; rapid technical fact-finding to de-escalate project disputes.
   Pilot: Standing panel linked to a basin commission.
5. **Equity-first safeguards:** Minimum environmental/subsistence flows; distributional impact assessments; participation rights for affected communities and women-led orgs.
   Pilot: Equity screen for any clause change.
6. **Regional umbrella:** SAARC/BIMSTEC "South Asian Water Governance Charter" to standardize data/notification templates and host basin working groups (including SRM-signals).
   Pilot: Draft charter elements and a 12-month consultative road-test.

Methods & Evidence Base

- **Approach:** Policy/treaty text analysis; literature/media review; semi-structured expert interviews across India, Pakistan, and Bangladesh; interpretive synthesis on SRM–hydrology linkages.
- **Scope/limits:** Not a legal opinion; hydrological synthesis is qualitative/interpretive (no new climate model output in this paper); focuses on governance readiness and options.

Feedback Sought from Workship Participants

1. Top **two treaty updates** that would most reduce conflict risk under volatility.
2. A **low-regret climate/SRM governance hook** you would endorse (if any), and where to place it (treaty annex vs protocol vs RBO).
3. The largest **justice/exposure mismatch** in basin shifts under climate change, and any missing safeguards.
4. **One dataset** that would most improve adaptive sharing and verification in basins.
5. **Feasibility:** Which pilots are implementable within 12–24 months in your context?

One-Paragraph Takeaway

Without adaptive sharing, transparent data, and explicit climate/SRM provisions, South Asia's water treaties will remain brittle under shifting rainfall and extremes. Practical modernization pathways—anchored in equity, anticipatory governance, and regional fora—can lower conflict incentives while protecting vulnerable communities.