Accelerating Adaptation, Promoting Peace:

Building Transboundary Climate Resilient Water Arrangements

Concept Note

July 2024

Executive Summary:

Worldwide, 310 international river basins are shared by 150 countries and 592 aquifers cross sovereign borders (UNECE, 2018). Transboundary basins account for an estimated 60% of global freshwater flows, cover 47.1% of the earth's land surface and are depended upon by 52% of the world's population. Rivers are often the lifeblood of ecosystems, touchstones of identity and cultural significance, connecting communities, and suppliers of critical natural resources but increasingly centres of conflict (da Silva et al., 2024). In the past decades, 'climate resilience' has become a buzzword and locus of investment across academic and global policy domains. In the water sector, 'resilience' definition and how to achieve it remains strongly contested (Adger et al., 2014). Going forward there is a consensus across global water, peace and climate communities that transboundary cooperation is vital for allowing societies and biophysical systems to not only persist but thrive in the face of disturbance (Earle et al, 2015; Cooley, 2018). However, *what* climate-resilient transboundary water arrangements could look like and *how* they could be implemented, especially in fragile or conflict-affected regions, remains a topic of research, heated debate and an enduring policy headache. .

This concept note provides a conceptual overview of the Hub's Climate Resilience Water Arrangements (CRESWAS) framework. In what follows, thee note first situates the framework conceptually and its framing within the conflict-climate discourses. In the latter half, we provide a high-level overview of CRESWAS' conceptualisation and the framework's application as (i) an **analytical tool** and methodology for empirically assessing the effectiveness of water governance and resilience measures in transboundary contexts (ii) a **decision-making tool** that can support water diplomacy actors to define their barriers, aims, solutions and hence opportunities for productive, climate-proof regional cooperation therein. With this in mind, CRESWAS seeks to identify new pathways towards more situated and transformative notions of resilience in the context of highly unequal and/or water-stressed regions. Acknowledging the plethora of barriers to cooperation especially in fragile-conflict-affected states, the final section proposes complementary actions in research, partnerships and policy advocacy through which the Geneva Water Hub will seek to support its partners to

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1. Introduction

According to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 2023), anthropogenic climate change is, affecting societies around the world, manifesting largely through changes to global meteorological and hydrological cycles. Most severe in mid-latitude land masses and wet tropic regions, approximately 3.3 to 3.6 billion people are vulnerable to climate change. With many voicing environmental concerns over climate-induced water scarcity and hydrological disasters, coupled with the mainstreaming of sustainability discourses and climatic commitments, climate adaptation and resilience discourses have become prolific across academic and global policy domains (Rodina et al., 2017).

Adaptation is a process aimed at reducing the vulnerability of human and natural systems in the face of climate change impacts (Blumstein, 2021). As water scarcity increases, water-related adaptation measures have become increasingly urgent, both in terms of governance of surface water and groundwater and with regard to water quality and disaster risk reduction (Timmerman, 2020). Indeed, roughly half of the world's population already experiences severe water scarcity for at least part of the year due to a combination of climatic and non-climatic drivers (IPCC, 2023).

Conflicts over water are not new, but climate change introduces externalities into the water-security and sustainability equation. However, the uncertain and long-lasting impacts of climate-induced changes on precipitation, evaporation and rate of discharge of rivers, sea-level rise and increasing severity of droughts and floods coupled with population growth, resource competition and migration, are likely to extend water scarcity to previously unaffected regions and exacerbate water security concerns in those that are already stressed (IPCC 2023; Timmerman, 2017). The increasing incidence of extreme precipitation events have reverberating impacts on ecosystems and human systems, such as on energy production, food security, the economy, the environment, public health and disease among others (Selby & Hoffman, 2014). Water-related disasters, especially droughts, have long resulted in forced migration, this may rise as water demands and volatility of supply increases. (Scheffran et al. 2012; Rigaud, K.et al, 2018). Indeed, there is a strong overlap between regional hotspots for climate insecurity and conflict-affected countries, wherein those most vulnerable to conflict-climate impact s(UNFCC, 2019). This not only undermines the potential for the achievement of SDGs but can act as a threat multiplier for water-related conflict.

Building resilience to climate stressors is to a large extent an issue of strengthening and optimising water governance (Timmerman, 2020). Modern hydrological systems are often built with hydrological stationarity in mind (Milly,2008). Heterogenous, uncertain and asymmetric in its impacts, climate change refutes these assumptions, requiring the transformation of water systems (e.g infrastructure, laws, institutional agreements) and the governance systems that allow them to be flexible and adaptable and yet robust in the face of stressors (Milly et al., 2008; Rieu-Clark & Moynihan, 2015). Doing so demands new transformative approaches that can effectively channel adaptive activities into peaceful outcomes, even in the most fragile of contexts (Cassara, 2018).

In this domain, transboundary governance remains a recurring challenge and emerging frontier for climate change action. Transboundary basins account for an estimated 60% of global freshwater flows, cover 47.1% of the earth's land surface and are depended upon by 52% of the world's population (McCracken and Wolf, 2019). Cooperation at this level is vital to preventing the negative impacts of unilateral adaptation measures and maladaptation in climate action (UNECE, 2009). Joint actions can support the coordination of cost-effective adaptation measures, optimising the overall efficiency of water governance across a basin (IUCN, 2020). Increasingly, transboundary collaboration on specific climate threats (e.g. droughts, floods or dust storms) can spill over into broader cooperation, negotiation and peacebuilding efforts in politically fragmented basins (Ide, 2019; Barnett, 2019).

Contributing and supporting current research, policy and advocacy on the water-climate intersection to accelerate action on transboundary levels, this concept note provides an overview of the Geneva Water Hubs work to develop and advance our 'Climate Resilient Water Arrangements' (CRESWAs). Framed through the lens of 'Water for Peace' (Turley, 2023), for us, critically navigating the conflict—climate nexus to build robust transboundary water governance arrangements will require in-depth qualitative and quantitative research that embraces system complexity, moving beyond the technical to tackle the socio-political roots which underly water-crises.

Broadly, CRESWAS aims to provide comprehensive knowledge and critical analysis which can lay the foundation for context-sensitive, risk-literate and equitable hydro-diplomatic efforts that support regional water resource planning in a given empirical case. Holistic in its focus, the framework' seeks to foster interdisciplinary knowledge exchange, operating across the science-policy interface and actively working to avoid working in 'silos'. In doing so, in fragile-conflict-affected areas, the framework can act as an incubator for the production of transformative resilience building programs at transboundary scales.

2. Background and Rationale

2.1 Contextualising Resilience

Early work used the term to describe the ability of systems to absorb changes and shocks. As scholarship has evolved, 'climate resilience' has grown into an umbrella concept which encompasses the multitude of measures, formal and informal, technical, economic or institutional, that allow societies and biophysical systems to not only persist but also to thrive in the face of disturbance (Wilby,2020).

In its conceptualisation, the City Resilience Framework (Arup, 2014), a widely used conceptual framework among humanitarian and climate communities, resilient systems are *reflective* – able to learn from the past and modify standards and behaviours accordingly; *resourceful* – able to recognise alternative ways to use resources at times of crisis to meet their needs or achieve their goals; *Robust* -well-conceived, constructed and managed to withstand impacts from shocks; *redundant* – create with additional capacity to accommodate disruption and symbiotic with other systems; *inclusive*- involving broad consultation and engagement of communities and *flexible* – able to adapt to changing circumstances or crises. Whilst this definition is useful for developing strategic foresight into the end goals of water-related adaptation and best practices for resilience building (e.g in national adaptation plans and water governance strategies), these framings of resilience do not address the root causes of shock and vulnerability (fig.2), nor do they assign liability and restorative actions from those responsible which would allow societies to revert back to pre-crisis conditions (HIC-HLRN, 2023).

Nevertheless, as Elyadi (2021) explains, most understandings of resilience share at least one of four common qualities, these being the capacity to (1) maintain its structure and functions in the face of shocks, disturbances, and external pressure; (2) to quickly recover from such disruptions, (3) to adapt to changes, (4) to learn from past experiences. Central to conceptualisations of resilience is the interpretation of 'vulnerability', vulnerability, is a multidimensional process which is defined by social, political and economic forces which are intersectional and experienced differently from local to international scales. Vulnerability describes the degree to which natural built, and human systems are at risk of exposure to climate impacts. Vulnerability is a function of exposure, sensitivity and adaptive capacity (Smit & Wandel, 2006). Exposure is defined as the nature and degree to which a system is exposed to significant climate variations. Sensitivity is the degree to which a system is affected directly or indirectly, either adversely or beneficially, by climate-related stimuli. Adaptive capacity is the ability of a system to adjust to climate change variability and extremes to moderate potential damages, to take advantage of opportunities or to cope with the consequences (IPCC, 2001).

2.2 Transboundary Water Cooperation

Water governance in general is a complex and profoundly political process, in which decision-makers must balance and reconcile multiple and often competing uses and demands for water (Döring, 2020). Socio-technical by nature, hydropolitics and the use of physical water resources are inextricably linked and mediated by a diverse network of stakeholders, each with their own interests (Turley, 2023). Transboundary governance adds an extra layer of complexity for policymakers through conflicts, power relations, cultural/religious rifts, economic priorities and legislative environments which transcend national boundaries. (Zeitoun and Warner, 2006). This complexity hinders the possibility of cooperation. As history evidences, often a shared basin is viewed as a zero-sum game, where technical measures of an upstream riparian country (E.g. construction of dams, canals or upstream fisheries) reduce water availability in downstream riparian states, often infusing or spurring conflict (Woodhill 2004). As Zeitoun and Mirumachi (2015) point out, whilst in some cases transboundary water interactions result in increased cooperation, these cases are rare. Historically, it is far more likely that water scarcity intensifies social tensions.

Climate change fundamentally challenges the territorial nature of water conflicts and traditional hydropolitical relations. Blind to borders, climate impacts on water availability and its ripple effects on agriculture, energy or regional security are felt across basins (Cooley & Gleck, 2011). Creating joint, flexible and conflict-sensitive water governance arrangements and tracks for water diplomacy between riparian states is increasingly important if adaptation agendas are to be robust and resilient in view of climate volatility.

Benefits of cooperation on climate resilience can range from improved water management such as river flow, water quality, soil conservation and increased hydropower and agricultural production, to improved flood-drought management, environmental conservation and navigation, to benefits beyond the water arena such as on food and energy security, reduced disputes/conflict risk pathways and simulating regional trade and markets (Sadoff and Grey, 2005; Timmerman, 2017). However, despite increasing policy appetite for transboundary cooperation in international fora, at national levels, considerable barriers continue to impede concrete progress (Cassara, 2018). These include; extensive biophysical and hydrological data requirements, a lack of financial, and technical, knowledge and human capacities for water governance, limited data sharing, transparency and monitoring tools, uncoordinated infrastructure constructions and fragmented institutional arrangements, disparities in policy cohesion with community-level needs and interests, political fragmentation, polarisation and inertia among historically polarised states, regions or communities (Ide, 2019; Rieu-Clark & Moynihan, 2015).

Transboundary cooperation can and does take place on different levels depending on the context. These can range from formal and informal information-sharing agreements to joint ownership and management of infrastructure to establishing river-basin organisations, to the harmonisation of national water laws, agreements and treaties on local, national and regional scales (Zeitoun and Warner, 2007). Timmerman (2011) argues that prevention and resolution of water resource conflict between water use in transboundary contexts can be realised by developing common rules and procedures that enable the joint management of shared water resources, which make up a 'transboundary water regime'. He identifies 5 core elements as making up this regime: the policy setting, the legal setting, the institutional setting, information management and exchange, and financing systems. Together, these pillars form an 'enabling environment', that when implemented effectively offers a pathway to climate-proofing transboundary water regimes (Timmerman, 2017).

2.3. Productively Navigating the Climate-Conflict Nexus

Climate and resource-related conflict are linked in complex ways, largely indirect, multidimensional and changing over time (Adger et al., 2014). In the water sector, the linkages between climate-related stressors and armed conflict are often tenuous and challenging to trace (Selby & Hoffman, 2014). This

relationship has received growing attention from academic, policy and donor communities alike but the question of attribution remains divisive, sitting on a spectrum of certainty (Turley, 2023b; Scheffran et al. 2012; Vivekananda et al, 20214).

For example, studies from 'Water Security' scholarship see climate change as a major driver of disaster and a 'risk multiplier' to water insecurity, along with population growth, resource competition and migration, fuelling conflict, instability and social breakdown (Black et al.,2022; Von Uexkull and Buhaug, 2021). In contrast, 'water-related adaptation' scholarship is reticent to make causal links between climate and conflict, seeing water as a critical delivery mechanism in climate adaptation and mitigation strategies (Turley, 2023b).This perspective emphasises that impact cascades at local and transboundary levels must be understood to assess a country's vulnerability to climate change (Caretta et al., 2022). Even more cautious on attribution is the 'social vulnerabilities' perspective which sees the asymmetric burdens of climate change as a function of social-political contexts and vulnerabilities. Focused on human responses to climate impacts, this perspective sees water crises as profoundly socio-political, where conflicts are not caused by climate change itself but by human reactions to it (Grafton et al, 2022).

In parallel, drawing on environmental and climate justice literature on water, there is a growing call for new pathways and grounded rethinking of resilience that centre notions of 'equity' and 'justice' in decision-making (Boelens, Vos & Perreault, 2018; Gimelli et al, 2018; Rodina et al, 2017; Turley 2023a). Drawing on environmental and climate justice literature on water, there is a growing call for new pathways and redesign of resilience planning that centres notions of 'equity' and 'justice' in decision-making (Boelens, Vos & Perreault, 2018; Gimelli et al, 2018; Rodina et al, 2017; Turley 2023a). Placing the subaltern at the centre, this scholarship argues for a focus on distributional and processual dynamics to examine how hydropolitical power relations mediate decision-making, inclusion, representation and hence adaptive capacity over time (Rodina, 2017).

In sum, the current trajectories of climate action and discourses on water-related resilience indicate (i) the urgent need for cooperation in transboundary contexts, (ii) enduring barriers and institutional lock-ins which continue to impede progress, especially in fragile and conflict-affected areas with limited governance resources, (iii) continued uncertainty over attribution on the climate- fragility-conflict nexus (iv) the need for greater integration of equity and justice considerations in climate action.

In this frame, we see a unique space for 'the Water for Peace' viewpoint to research and policy at the climate-security-water intersection. It is in this niche that the Geneva Water Hub positions itself to contribute to climate action. Geneva Water Hub takes a critical approach to attribution in the climate-water-security nexus. Echoing Rodina et al (2017), we call for continued critical interrogation of the various aspects of resilience, and for questioning whether particular elements or pathways to water-related adaptation, however, developed, benefit society as a whole or if they maintain existing inequalities. Attributing climate change to conflict can be riddled with assumptions and inconsistencies, and so too can claims directly linking climate change and water to peace (Zeitoun et al., 2020a; Selby et al., 2022). Un this frame, the cascading and place-based nature of climate change, calls into question the value of predictive research activities and water governance 'panaceas. CRESWAS seeks to shed empirical light on the evolving nature of the climate and conflict interface but conceptually it aims to push for thinking beyond attribution and towards conflict transformation.

3. CRESWAS AS A CONCEPTUAL TOOL

Grounded in critical hydropolitics, this section expands on this section situates CRESWAS' conceptual framing and elucidates how we seek to harness the Geneva Water Hubs' 'Water for Peace' perspective to add value to research, partnerships and policy advocacy going forward.

Anchored between the University of Geneva and the Geneva Graduate Institute and in long-term partnership with the Swiss Agency for Development and Cooperation (SDC), the Geneva Water Hub (GWH) is a Center for Competence on Water for Peace. Our experience shows that when water is shared equitably and spared from the ravages of conflict, peace can prevail. We define peace holistically, as the rejection of violence and social injustice, poverty, discrimination by race or gender and other forms of violence. In addition to the absence of violence (negative peace), peace is also about promoting equitable distribution of good quality water through robust legal, institutional and policy frameworks prioritising human dignity, fairness, inclusivity, greater social cohesion, sustainable use and effective management (positive peace) (Turley, 2023).

Embracing complexity, in CRESWAS and conceptualisation of 'climate resilience', seeks to avoid making causal claims about climate change and conflict linkages. We argue that anthropogenic change will undoubtedly affect weather patterns, food production and livelihoods. it is unlikely that climate-induced scarcities will be a primary cause of conflict (Zeitoun et al., 2020b). We recognise that responses to water crises and climate-induced scarcity alike exist along a spectrum of violent conflict to peace and cooperation, hence we see water crises and conflicts as entangled in politics and context.

Connecting biophysical analysis with critical hydropolitics methodologies and dynamics, CRESWAS examines how different human and environmental elements in a water system interact to influence individual and society's ability to access critical resources and 'bounce' back from shocks and disasters. This requires us to not only focus on the details of implementation but also to engage with the processual dynamics that shape hydro-political power relations and mediate decision-making, inclusion, representation and hence adaptive capacity over time (Rodina, 2021). Bringing together interdisciplinary research fields, for us, studying conflict-climate linkages requires in-depth granular qualitative and quantitative research that embraces epistemological pluralism and fosters dialogue and cooperation between climate, water, security and peacebuilding communities at the science-policy interface. In international fora, this research can strengthen the imperatives for states to enhance the protection of freshwater and associated infrastructure in international law and influence decision-making and diplomacy in the UN Security Council and beyond.

Crucially, CRESWAS offers a means to mainstream critical 'water for peace' and 'resilience' insights within public, private and international spheres. Reflecting the UN Special Rapporteur on the rights to water definition (OHCHR, 2023), in moving towards conflict transformation, in CRESWAS' climate resilience approaches, its 'water for peace' lens promotes the "equitable distribution of good-quality water through robust legal, institutional and policy frameworks prioritizing human dignity, fairness, inclusivity, greater social cohesion, sustainable use and effective management" (UNGA, 2023).

More broadly, CRESWAS can act as a springboard for discussing broader complex water issues. Climate-induced water scarcity 'shrinks the pie' with which to build water agreements but also opens an opportunity for creative peacebuilding pathways where climate action (e.g wetland restoration, flood control, water sharing agreements, shared infrastructure projects) becomes a confidence-building measure which can spill over into broader cooperation and peace in society (Barnett, 2019).

Indeed, mediators in the peacebuilding sphere will increasingly need tools to consider the short, medium and long-term implications of climate change for their engagements (DPPA, 2023). Integrating holistic climate-resilience analyses in peacebuilding, such as that offered by CRESWAS, can aid the brokering of more durable peace agreements that can withstand climate volatility and pre-empt climate change and maladaptation's unintended consequences. For example, CRESWAS cases could support knowledge on the impacts of the weaponisation or destruction of critical water infrastructure on civilian vulnerability to climatic shocks in conflict zones. This work is crucial to mainstreaming water-sparing, not just sharing, as integral to climate resilience.

4. BUILDING CLIMATE RESILIENT WATER ARRANGMENTS

This section presents the CRESWAS methodology as an analytical and decision-making tool for building climate resilience in transboundary contexts. CRESWAS aims to evaluate in material and scalable terms what conflict and climate dynamics mean for human security outcomes and water governance priorities at a given point in time. With a focus on access and control over water resources, CRESWAS' conceptualisation of resilience also focuses on unpacking and making visible the multidimensional, multiscalar and intersectional social, political and economic vulnerabilities that underly water crises and conflicts.

4.1 Scale and Scope

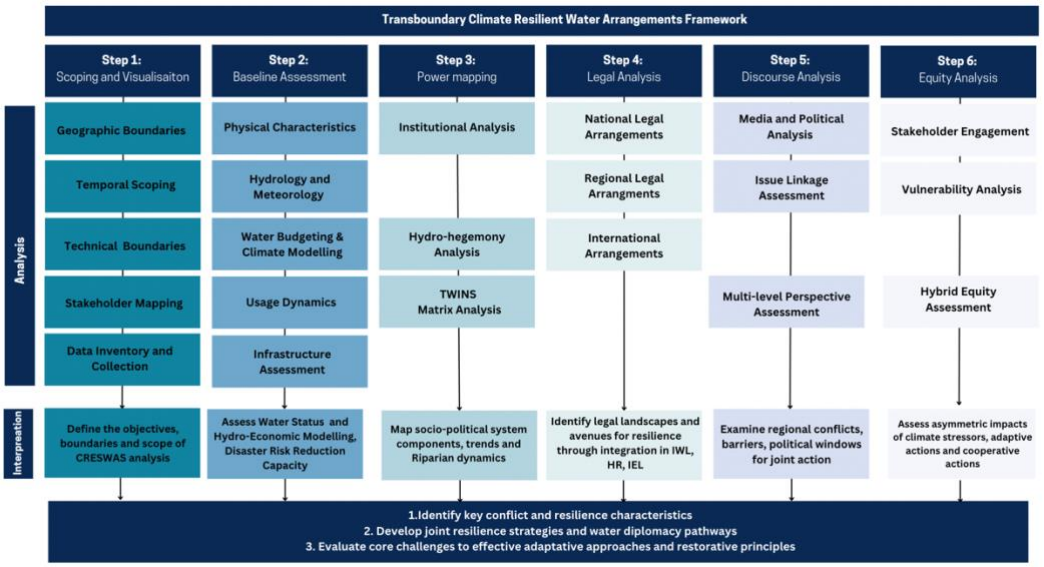
In terms of scale, whilst CRESWAS' applies a stepwise methodology its exact composition will vary from place to place. The application of CRESWAS is not limited to the analysis of river basins, indeed it can be adapted for assessments of aquifers, groundwater and coastal contexts, at micro (local and community), meso (sub-basin and national) and macro (transboundary and regional) scales. As cooperation in transboundary contexts takes place at multiple levels, in CRESWAS 'arrangements' is an intentionally broader term that embraces cooperative diversity, taking into account the multifunctional role of water and cross-scale interactions. Practically this extends our focus to encompass the diverse set of formal and informal governance and institutional measures surrounding water use, realised by developing common principles, rules, agreements, discourses and decision-making procedures which enable peaceful joint management of shared water resources. The CRESWAS approach presented here can be applied to any stakeholder or sectoral group. In its empirical application, we will support partners to adapt the framework to on-the-ground realities, resources, and strategic priorities.

CRESWAS is designed to complement existing practices, frameworks and programs related to resilience and human security in the water, peacebuilding and development fields. In the water sectors, CRESWAS can supplement governance, accounting, resilience and disaster risk reduction programs, adding additional capacity to assess, measure and trace the complex socio-political dimensions of transboundary water crises. CRESWAS' methodology intersects with those used in AGWA's Water Footprint Tracker (AGWA, 2024), the City Resilience Water Approach (RNC, 2023), and the Water Resilience Assessment Framework (CWM, 2024).

Supporting water diplomacy efforts, the Framework is complimentary to the pursuit of UN Sustainable Development Goals. At national levels, it can highlight areas for improved water governance, pinpoint priorities and barriers for transboundary water-related adaptation in NAPS, NAPAs and NDC commitments and assess options for bilateral or multi-lateral joint projects, harnessing water as a vehicle for peacebuilding. Within this, one of our contributions to supporting regional partners can involve using the CRESWAS framework to identify and nurture examples of cooperative behaviour on Water for Peace. Without advocating for cut-and-paste solutions from one setting to another, we see the value in sharing relevant aspects from one case to inspire others to similarly peaceful ends, and subsequently in highlighting lessons that could be transposed in other transboundary contexts (Döring, 2020).

4.2 CRESWAS AS AN ANALYTICAL AND DECISION-MAKING TOOL

The CRESWAS Framework aims to provide comprehensive knowledge on transboundary resilience dynamics, laying the foundation for dynamic hydro-diplomacy, climate policymaking and water-related adaptive approaches which can withstand climate volatility. Through six core steps, CRESWAS maps the institutional characteristics of transboundary resilience dynamics in a given water system (Appendix I) 'Resilience capacity' is measured in terms of the relationship between interacting factors: water resource availability, water use, infrastructure, arrangements, and discourse on water governance and human-responses to climate change based on the four principles of resilience defined by Elyadi (2021).



4.2.1 STEP 1

4.2.1 Step 1: System Mapping

The first step of CRESWAS analysis is to define the boundaries for the analysis both in terms of geographical, technical and temporal scoping and in terms of the parameters for data acquisition, analytical assumptions and methods for valuation and normalisation of climate risks on a basin-wide level. CRESWAS analysis is primarily focused on transboundary scales, but in geographic boundary settings, an entire watershed or basin may not be the primary unit for analysis. Depending on the objectives of the evaluation, system boundaries can focus on sub-systems, types of arrangement, or specific legal or cooperation agreements involving two or more riparian parties. In scoping analysts should also decide on their technical boundaries for the CRESWAS analysis and may take a whole systems perspective, assessing this dimension is important as damage to technical elements in a system, such as during floods, disasters or from warfare, can strongly impact adaptation and fragility in a region have implications for water security, that would be obscured by solely focusing on extraction. Third, to account for the impact of climate volatility and conflict dynamics on system boundaries over time, defining the temporal scope of a study is important for accurately tracing how biospheric, geo-political, and institutional mechanisms and discourses alter resilience dynamics over time. In this frame, stakeholder mapping and institutional analysis are needed to categorise and prioritise stakeholders' perspectives that are most relevant given a CRESWAS geographical scope and desired outcomes.

The choice of system boundaries is necessarily a subjective choice based on the objectives of the analyst, policymakers or riparian states involved. Ideally, a CRESWAS analysis could look at all systems dynamics across a basin but in practice, this is not always feasible or practical. As discussed previously data availability, accuracy, and coverage vary significantly by region, country or basin, as do standards of transparency and data accessibility. In this frame, depending on the availability of time/resources, a narrower system boundary may be chosen to allow for comparative analysis on transboundary levels, although a system boundary that is too narrow may exclude consequential impacts.

4.2.2 Step 2: Biophysical Baseline Assessment

Having established the boundaries and scope for analysis, the second step of CRESWAS is to conduct a biophysical baseline assessment and scenario modelling to examine potential climate risks over time. The biophysical baseline assessment is a water status assessment overview of a basin's: basic

physical characteristics, hydrology, usage dynamics, climate and infrastructure landscape. Such assessment can be conducted on a joint basis between multiple riparian states or in isolation depending on the context. Baseline data can then be used to calculate current water budgets and efficiency trends. Baseline assessment establishes in quantitive terms the state of play. Based on these findings, analysts can predict the degree of changes in the availability due to climate change and develop new hydro-economic tools for optimal water allocation across a basin. Cooperative vs non-cooperative scenario modelling of joint action in material terms can evidence economic benefits of water-sharing arrangements, creating a 'business case for climate action' which can help overcome political inertia on collaboration over shared resources.

4.2.3 Step 3: Power Mapping and Institutional Analysis

The third stage of CRESWAS analysis is to assess the power relations which mediate water governance and the institutions which maintain them. These insights can help in understanding how different stakeholders' responses to environmental stressors or resource scarcity catalyse water crises and provide insights into power imbalances and relations in international water conflicts and pathways for considering cooperation dynamics among riparian states. Across the literature on water governance, an abundance of methodologies has been developed to analyse power relations on national or sub-basin scales, but few have been developed to map transboundary hydropolitics and power hierarchies specifically. In the advancement of the CRESWAS methodology, Zeitoun and Warner's (2006) Theories of Hydrohegemony and Mirumachi's Transboundary Waters Interaction NexuS framework (TWINS) (2015), are two such frameworks that can be applied in compliment to CRESWAS for developing a multiscalar, robust and yet temporally sensitive power mapping of shared water resources. In assessing conflict-affected states, these frameworks that refute the notion that conflict is inherently negative, and cooperation is inherently positive, critical power mapping demonstrates that the simultaneous consideration of conflict and cooperation is both insightful and possible.

4.2.4 Step 4: Legal Analysis

The fourth stage of a CRESWAS assessment is to conduct an assessment of a basin's legal and regulatory landscape (Tignino & Kebebew, 2023). Legal frameworks play a pivotal role in strengthening transboundary water-sharing agreements and improving the quality and conservation of water resources (Tignino, 2020). To begin with, CRESWAS analysis involves assessing the strengths and weaknesses of national-level legal and regulatory frameworks for water resource management and subsequently seeks to understand how International water law, international environmental law and human rights law and their customary principles might be integrated into the review, creation or harmonisation of transboundary legal regimes on water sharing and sparing (Tignino, 2020). Where relevant, this stage of CRESWAS might also assess the extent to which accession relevant to Global Freshwater Agreements can also be a feed into enhancing the resilience of transboundary water-sharing arrangements in the long term. Key Agreements include; the United Nations Convention on the Law of the Non-navigational Uses of International Watercourses (United Nations Watercourses Convention) and the United Nations Economic Commission for Europe (ECE) Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention

4.2.4 Step 5: Critical Discourse Analysis

The fifth step of CRESWAS is critical discourse analysis which combines written and oral media analysis with transition theory's multi-level-perspective (MLP) to examine how different narratives/ideologies over shared resources change over time and how these may sustain or reinforce inequality. Across the political science literature, the implications of language and discourse and their strategic utilisation by state actors are well understood and documented (Zeitoun and Warner, 2007). How a country interacts with a co-riparian and the tactics it uses are rooted in a broader negotiation strategy. In this frame, discourses can play a role in water-sharing interactions and negotiations, centring certain conversations while silencing others. As an analytical framework, CDA scrutinises not only the content

and structure of language use on transboundary water governance but also the contextual factors influencing its production and reception. The multilevel Perspective framework (MLP) provides a useful tool for how specific thematic discourses sit within broader systems dynamics. Developed by Geels (2002), the MLP is a theoretical approach used to analyse complex socio-technical transitions, conceptualising these transitions across three levels: niches (innovation spaces), regimes (dominant practices and rules), and landscapes (broader socio-economic contexts). The combination of CDA and MLP also aims to examine regional conflicts, barriers and thus political windows for joint action via issue linkage (e.g. securing agri-food-energy needs or human/conflict-related security reasons). As a decision-making tool, lessons from discourse and MLP analysis can be used to identify specific areas of shared political will, security risks or environmental concerns that can be springboards for issue-linkage or peacebuilding activities.

4.2.6 Step 6 : Equity Assessment

Step six of CRESWAS seeks to center the asymmetric impacts of climate change and of adaptive measures, and cooperative measures. Analytically, CRESWAS uses a 'hybrid-equity approach' to skeleton equity analysis, remaining open to capturing pluralistic interpretations of equity and the diverse ways these may play out in shared basins, the hybrid-equity approach can act as a policy toolkit for assessing the sources of water inequity, where these are distributed, whom this affects, and why. (Meerow & Newell, 2016). Drawing on frameworks from international relations and law and integrating distributional, procedural and recognition justice tenets from the environmental and climate justice literature, the hybrid-equity approach uses a set of directional principles to consider both local perspectives and universal principles which transcend localised understandings of water equity (Turley, 2023a). These core tenets are: Common good, considerations of non-humans and future humans, inclusive procedure, sharing burdens and addressing power imbalances, the directional principles were designed to "point in the direction in which water policies must move to serve fairness as contexts and circumstance change". In stage 6, CRESWAS also centres on examining the extent to which equity and justice dimensions, or rather socio-political characteristics are/ could be better captured, assessed or measured in national-level indicators and metrics on resilience, such as in NDCs and NAPAs.

4.3 Data Interpretation and Resilience Analysis

Having conducted an extensive analysis of both the biophysical and socio-political, legal and discursive landscapes of a given case study, the seventh stage of CRESWAS aims to bring together key findings to evaluate the strengths and weaknesses of national resilience strategies and subsequently the potential barriers and opportunities for joint action on shared-water basins. Based on this, considering the objectives and desired characteristics of a resilience strategy, CRESWAS seeks to identify 'windows of opportunity' or 'common ground' elements that when sequenced could build upon each other to foster new areas for transboundary cooperation even in times of conflict or an entry point to review and climate-proof regional water governance mechanisms to ensure their longevity and effectiveness. Since the primary objective of CRESWAS is to provide the knowledge base to aid hydro-diplomatic efforts aimed at designing more climate-resilient transboundary water arrangements, CRESWAS empirical findings can then be used to inform decision-making or risk assessment directly or feed into other aforementioned complimentary assessment frameworks/ tools which centre on climate-strategy planning, implementation and monitoring stages specifically

4.4 Limitations and Caveats

The previous sections provided a high-level overview of the CRESWAs framework however there are several caveats to bear in mind. Whilst the framework is designed to focus on the water sectors, it is not tailored to specific geographies (e.g. water stressed, fragile or water-abundant zones), sectors (e.g. agriculture vs domestic) or to specific stakeholder perspectives (e.g. public or private), this will need to be done on a case-by-case basis. CRESWAS can help stakeholders assess their position within

a given water system boundary and identify opportunities to improve resilience within this space, but further work is needed to understand which lenses are most useful based on the state of play and/or if there are specific institutional issues and concerns which go beyond the scope of the framework. The application and implementation of CRESWAS analysis in transboundary contexts is limited by the availability of data and information required to perform analysis. CRESWAS analysis is also contingent on stakeholders' knowledge and willingness to engage, these gaps or human biases may also limit the depth of studies. CRESWAS analysis is also temporally specific, thus periodic review of the age and accuracy of data (e.g. hydrological, streamflow or demographic data) is needed to ensure the findings' validity in decision-making as operating conditions change.

5. WATER FOR PEACE: AN ENTRY POINT FOR CLIMATE ACTION?

Whilst CRESWAS is a useful framework for analysing transboundary resilience dynamics, a pronounced appetite-action gap continues to impede cooperation on climate adaptation on water at national and regional levels. In complement to our CRESWAS concept, the Geneva Water Hub is committed to helping its partners create an *enabling environment* for action on critical water issues (Timmerman, 2017). Building on action areas identified in our 'water for peace' positioning paper (Turley,2023b). This includes among other things;

5.1 Collaboration and Partnerships:

At the local level, to strengthen regional-scale resource planning we seek to support partners to develop mechanisms and institutions to share benefits at a basin scale, focusing on the prioritisation of water for vital needs and human rights. To do so we seek to create a network of Regional Innovation Hubs (RIH) to act as centres for cooperation on water resilience and simultaneously drivers for mediation and peacebuilding efforts. Transposing lessons from our longstanding relationship with the Pôle Eau Dakar, these Hubs could also act as focal points for regional dialogue, transboundary hydro-diplomacy, knowledge and capacity development and act as a forum for innovative water governance solutions and their integration climate risk reduction strategies.

At the national scale, leveraging our expertise we seek to nurture new partnerships with states and like-minded organisations to support the implementation of water-related adaptation projects on the ground. Meanwhile, through our research branches at UNIGE and the Graduate Institute, we will also pursue cutting-edge research collaborations with policy institutes, think tanks and research bodies to expand the knowledge base in the water, climate and security interactions and via our 'science-policy incubator' scheme which seeks to nurture the work of new and ground-breaking researchers (GWH, 2024).

At the international level, to accelerate the development, implementation and integration of transboundary water governance mechanisms, the GWH will spearhead the 'Transboundary Cooperation Challenge' (TCC) initiative. Taking inspiration from the 'Freshwater Challenge' (FWC), the purpose of the TCC will be to aid countries in reaching their international commitments on climate, biodiversity, disaster risk reduction and SDGS whilst also promoting water diplomacy and peacebuilding through advancing focus on transboundary cooperation as a vector for resilience. To support the TCC we seek to create a technical expert group which will 1) set up and maintain a transboundary tracker which will identify, nurture and expand the knowledge base on instances of cooperative behaviour on Water for Peace; (2) develop and review the CRESWAS methodology further; (3) organise annual to keep track of progress, share lessons, experience and concerns, (4) improve the mobilisation of financial resources to fragile and conflict-affected states.

Through the **Policy and Advocacy pillar** of our work, we also seek to increase water diplomacy engagement and traction in both peacebuilding and climate change spheres. There is a strong

consensus that strong policy and legal frameworks are essential for addressing freshwater challenges but present a peculiar challenge in transboundary contexts. This can involve supporting water diplomacy actors to define their problems, solutions and climate resilience methodologies through actions such as via the: (i) facilitation of inclusive, safe and open discussion using our extensive experience in facilitating track 2 dialogues, bilateral and multilateral safe spaces, and mediation on critical water issues, (ii) convene a Group of Friends on Water and Peace meeting strategize new pathways to accelerate national action on transboundary water security. We also seek to foster interdisciplinary exchanges between peace and climate experts through collaborations with the UN Group of Friends on Climate and Security, the Peacebuilding Commission or groups such as Mediators without Borders and the Transboundary Water Cooperation coalition (iii) Advocating for greater attention to water sparing, notably the protection of water infrastructure before, during and after armed conflict, through Global Alliance to Spare Water from Armed Conflicts (GWH, 2024c). (iv) harnessing our extensive in-house legal expertise. we seek to support efforts to harmonise and shape the conceptualisations of Water for Peace and sharing in International Water Law.

5.3 Training and capacity building

Tailored education and training opportunities that leverage both theoretical insights and practical expertise are vital to aiding partners can overcome appetite-design gaps to overcome inertia towards transboundary cooperation. The Geneva Water Hub aims to enhance training and capacity building through world-class educational and training opportunities, such as through our Massive Open Online Courses (MOOCs), an annual two-week summer school, and tailor-made training courses in blended, in-person and online formats on transboundary water governance and critical hydropolitics. These educational programs can be built to cater to a wide array of participants from members of RIHs and river basin organisations to civil society representatives, international organisation personnel, military officers, government officials and diplomats. Through this, we also seek to foster a global network and community of practice of professionals dedicated to advancing water for peace across diverse scales and geographies

6. CONCLUSIONS

This concept note provided a high-level overview of the Geneva Water Hub's 'Climate Resilient Water Arrangements' framework and the Hub's broader contributions to this space. Broadly the objective of a CRESWAS analysis is to provide knowledge and key insights aimed at supporting our partners in creating climate-resilience transboundary water arrangements, even in fragile and conflict-affected contexts. Going forward, the Geneva Water Hub seeks to advance the empirical applications of the framework to support regional-scale resource planning and resilience-building activities. Embracing complexity, in doing so we seek to harness the 'water for peace' perspective to expand and contribute to critical research which unpacks the complex interrelationships between climate change, water security and conflict in transboundary contexts. However, CRESWAS and our other work also seek to harness our perspective to push and shape the policy agendas to support regional partners in addressing particular barriers to transboundary action on water issues whilst simultaneously bringing the subject of water governance in conflict-affected states as a priority area for the water sector and in climate-policy making spheres going forward.

7. MORE ABOUT THE GENEVA WATER HUB

Anchored at the University of Geneva, and the Geneva Graduate Institute, the Geneva Water Hub is a Centre of Competence on Water for Peace. Ever since it launched the Global High-Level Panel on Water and Peace in 2017, the Hub's landmark report A Matter of Survival has shaped water policy in the development and humanitarian sectors, influenced research agendas, and encouraged peace through the Sahel. The Swiss Agency for Development and Cooperation has recognised the Hub's excellence/competence by re-committing its support of 50% of the Hub's core activities through to 2027 (and has established a twelve-year administrative framework to see it through to 2035). The Hub now plans to grow steadily and expand its influence by partnering with new supporters.

One of the keys to the Hub's success is the extreme confidentiality it maintains throughout the processes. Guided by International Water Law, the Geneva Water Hub positions water at the heart of peacebuilding efforts, harnessing water as a mechanism for sustainable development and conflict transformation. As an organisation, we convene formal dialogues, informal conversations and roundtables, mediate techno-political issues, deliver training courses and shape the research agenda on water resource management as a pathway for political resolution. Whether in fragile or stable contexts, the Geneva Water Hub strives to empower local actors to integrate water into humanitarian, peacebuilding and development efforts.

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