The Himalayan Confluence

India, Nepal and Bhutan's Hydro-Strategic Cooperation

by

Filippo Verre

The Himalayan Confluence: India, Nepal and Bhutan's Hydro-Strategic Cooperation

by Filippo Verre

2026

Ethics International Press, UK

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

ISBN (Hardback): 978-1-83711-664-5
ISBN (Ebook): 978-1-83711-665-2

Table of Contents

List of Abbreviations viii

Introduction xi

A new approach for the management of transboundary water resources xi

The traditional narrative regarding transboundary hydro-relations. Water conceived as an element of tension. xxiv

The alternative narrative regarding transboundary hydro-relations. Water as a tool to foster interinstitutional dialogue ..xxxii

Theoretical Framework xli

Structure and Methodology liii

Chapter 1. From Asymmetry to Interdependence: A Geopolitical Assessment of the Indo-Nepal Hydro-Economy 1

Introduction 1

The historic bond between India and Nepal 2

The hydro-strategic relationship between India and Nepal..... 13

The economic linkages through water. Impacts of Indo-Nepal agreements on production and industry 36

The positive reaction of local and international media outlets to the Indo-Nepali hydro-strategic cooperation..... 57

The challenges in the hydro-strategic collaboration between India and Nepal 65

Chapter 2. The Indian-Bhutanese Hydro-Political Relations: A Historic Partnership 73

Introduction 73

Indian-Bhutanese hydro-political relations: a historic partnership 76

Bhutan's Major Hydropower Projects and Their Regional Impact..... 85

The Indian hydro-strategic interconnection with Bhutan. Economic, agricultural and energetic benefits..... 100

The positive reaction of local and international media outlets to the Indo-Bhutanese hydro-strategic cooperation..... 105

The challenges in the hydro-strategic collaboration between India and Bhutan 109

The Indo-Bhutanese cross-border hydro-strategic cooperation and mountain ecosystems. A methodological framework 119

Chapter 3. Ambivalent Currents: Nepalese and Bhutanese Perceptions of India's Hydro-Strategic Activism..... 133

Introduction..... 133

From Cooperation to Grievance: Nepal's Backlash against India's Hydro-Strategic Activism 137

Bhutan's dilemma. Thimphu Backlash to India's Hydro Influence..... 162

Divergent Teleological Reactions to Indian Hydro-Strategic Activism in Nepal and Bhutan 183

Conclusion. The Himalayan Confluence as a Paradigm of Hydro-Diplomacy and Cooperative International Relations..... 197

Collaborative Hydro Strategy in practice..... 202

Monopolised Interdependence and Structural Asymmetry. Negative Externalities of India's Presence in Nepal's and Bhutan's Hydro Economy. 211

The Himalayan Confluence as a Prototype for Cooperative Hydro-Diplomacy 217

Bibliography 221

Academic Articles 221

Monographs 233

Journals 234

Useful Links 238

List of Abbreviations

- **ADB** Asian Development Bank
- **BCM** Billion Cubic Meters
- **BHE** Black Hole Effect
- **BOOT** Build Own Operate and Transfer
- **BSHDP** Bhutan Sustainable Hydropower Development Policy
- **CHP** Chukha Hydropower Project
- **CAGR** Compound Annual Growth Rate
- **DGPC** Druk Green Power Corporation
- **EIA** Environmental Impact Assessment
- **EJC** Empowered Joint Group
- **FDI** Foreign Direct Investment
- **FIGA** Framework Inter-Governmental Agreement
- **GNH** Gross National Happiness
- **GoI** Government of India
- **GSDP** Gross State Domestic Product
- **HGPA** Himalayan Glacier Protection Agreement
- **HHC** Himalayan Hydro Cooperation
- **HPO** Hydropower Purchase Obligation
- **IEE** Indian Energy Exchange
- **IPPAN** Independent Power Producers Association Nepal
- **ISTS** Inter-State Transmission System
- **IJCs** International Joint Commissions
- **IJV** Intergovernmental Joint Ventures
- **JCWR** Joint Committee on Water Resources

- **JPP** Jaldhaka Power Project
- **JVHP** Joint Venture Hydropower Projects
- **JWP** Joint Water Projects
- **MENA** Middle East North Africa
- **MHPA** Mangdechhu Hydroelectric Project Authority
- **MHPs** Manas Hydroelectricity Plants
- **MoENR** Ministry of Energy and Natural Resources
- **MoEWRI** Ministry of Energy, Water Resources and Irrigation
- **NCHM** National Center for Hydrology and Meteorology
- **NEA** Nepal Electricity Authority
- **NFPI** Neighbourhood First Policy of India
- **NHPC** National Hydroelectric Power Corporation
- **NWCDA** National Environment Commission and Department of Agriculture
- **OCP** One Child Policy
- **PDA** Power Development Agreement
- **PLI** Production-Linked Incentive
- **PWD** Proactive Water Diplomacy
- **PPAs** Power Purchase Agreements
- **RGoB** Royal Government of Bhutan
- **SAPDC** SJVN Arun-3 Power Development Company
- **SFG** Strategic Foresight Group
- **SJVN** Satluj Jal Vidyut Nigam
- **THP** Tala Hydroelectric Project
- **TWC** Transboundary Water Conflicts
- **UP** Uttar Pradesh
- **WW** Water Wars

Introduction

A new approach for the management of transboundary water resources

Water is the lifeblood of the planet, fundamental to the functioning of ecosystems, the sustainability of livelihoods, and the preservation of biological health. In the contemporary environmental landscape, this so-called "blue gold" occupies an increasingly central and complex role. Water scarcity has emerged as a critical global challenge, driven by a combination of overexploitation, pollution, and climate change. Rapid population growth, together with rising demands from agriculture, industry, and urbanization, is placing unprecedented pressure on water resources, resulting in shortages that endanger both human communities and natural ecosystems. At the same time, water pollution represents a profound threat to environmental integrity and public health. Industrial discharges, agricultural runoff, plastic debris, and pharmaceutical residues degrade water quality, undermining aquatic life and eroding biodiversity. These challenges are further intensified by climate change, which is reshaping precipitation regimes, accelerating glacier melt, and amplifying extreme events such as floods and droughts. Such transformations disrupt water availability and magnify water-related risks, increasing the vulnerability of communities and ecosystems across the globe.

In the contemporary context, the increasingly complex challenges of water resource management - further intensified by alarming climate change-related phenomena - have elevated water to the status of a critical strategic resource. This is largely due to the dual value that water assumes across multiple domains. On the one hand, it is indispensable for the survival of all forms of life and for the stability

and prosperity of human societies. A reliable and continuous water supply is a fundamental prerequisite for modern civilization, not only for biological survival but, even more decisively, for economic activity and industrial production, both of which require vast quantities of water. On the other hand, water resources constitute a key vector for the generation of one of the cleanest and most environmentally sustainable forms of energy: hydropower. The principle underlying hydropower generation is relatively straightforward. The kinetic energy of flowing water is converted into electricity through dedicated infrastructures such as hydroelectric power plants, dams, and turbines, enabling continuous energy production. Although simple in its theoretical design, this mechanism forms the economic backbone of many mountainous countries, including Nepal and Bhutan, two of the three central actors examined in this book. In this respect, the energy-generating potential of a hydroelectric facility increases when the kinetic force of water is harnessed across multiple levels of elevation. Consequently, the closer a plant is constructed to a natural waterfall - or areas with significant vertical drop - the greater its potential hydroelectric output, at least in theoretical terms.

In light of this dual value, control over water resources has acquired profound strategic significance in the contemporary era. It is therefore no coincidence that water-related tensions are increasingly emerging across different regions of the world, as states and communities seek to secure access to water resources, often at the expense of their geographical neighbors. Examples of such dynamics are numerous. In many contexts, competing interests over shared water systems give rise to diplomatic frictions, particularly when large-scale dams and water management projects are undertaken unilaterally by upstream countries. These initiatives frequently generate disputes among neighboring states, each striving to guarantee a stable water supply for expanding populations and growing economic needs. The

accumulation and control of water resources for energy generation and domestic supply thus represent a significant threat to peace and stability in several parts of the world. More broadly, the geopolitical, social, economic, and environmental consequences of this global "blue gold rush" are not only difficult to predict but also deeply alarming. As noted, these tensions linked to increasing competition over water allocations affect numerous regions worldwide. While this research focuses on Asia - specifically the Himalayan region - it is important to emphasize that such challenges are far from unique to this area. To better grasp the scale and implications of these dynamics, two major international cases warrant consideration: the outbreak of the Arab Spring and the Syrian civil war. These events have profoundly contributed to social, economic, and diplomatic instability across the Middle East and North Africa (MENA) region. Although many analysts have rightly interpreted the unrest in Tunisia and Syria as driven by demands for political change, democratization, and freedom from corrupt and authoritarian governance, far fewer have recognized the critical role that water scarcity and mismanagement played as underlying drivers of these crises.

Regarding the first case, the connection between the Arab Spring and water management, albeit not often reported, is rather evident, with clear ramifications involving a very prominent Asian nation. Specifically, in 2010, China suffered a sharp drought in its wheat planting areas, resulting in a severe drop in its domestic grain output (Shatanawi, 2015; Hindiyeh et al., 2023). Accordingly, Beijing authorities, which traditionally focus on acquiring strategic fossil resources such as oil and gas abroad, resorted to the global grain market in a bid to obtain vital supplies. China's abrupt surge in demand put highly high pressure on global grain inventories, resulting in food price rises on a colossal scale around the world. Wheat is a staple component of the cuisine in regions such as North

Africa and the Middle East and is mainly supplied through importation, so such a price hike had catastrophic implications for several MENA countries (Hindiyeh et al., 2023). The cost of bread, an essential nutrition element for numerous Middle Eastern societies, rose steeply, compounding the prevailing economic woes. It is worth considering that all major countries in the region were already facing high unemployment, stagnant income growth, and deteriorating social disparities (Hindiyeh et al., 2023). All these social and economic problems were fueling the protests against the ruling elites, who were considered incapable and too corrupt to tackle such a complicated situation. Rising prices of staple commodities like bread compounded the woes of marginalized sections of society, fueling mass frustration and ire (Aggestam et al., 2016).

Concretely, in Tunisia, which is where the Arab Spring began[1], the high cost of living, including bread, was a key grievance that led to protests. To a greater extent, similar dynamics were observed in Egypt, where bread subsidies were - and still nowadays are - a cornerstone of social habits and stability; similarly to what had happened in Tunisia, the rising wheat prices caused by the increased demand from China strained government budgets and sparked unrest (Shatanawi, 2015). As a consequence, these economic stresses, rooted in global food market disruptions, helped to ignite and sustain the

[1] In December 2010, Mohamed Bouazizi, a 26-year-old street vendor in Sidi Bouzid, Tunisia, set himself on fire in protest after police confiscated his cart and humiliated him. Bouazizi, the family's primary breadwinner, faced daily struggles to earn a living in an environment of corruption, unemployment, and injustice (Shatanawi, 2015). His self-immolation became a symbol of widespread frustration against the authorities of the so-called "ancient regime", as economic hardship and lack of opportunities were affecting the country tremendously (Shatanawi, 2015). The act sparked mass protests across Tunisia, leading to the overthrow of President Ben Ali and igniting the broader Arab Spring movement across the Middle East and North Africa.

protests that characterized the Arab Spring, which was historically and geographically initiated in Tunisia in December 2010 (Aggestam et al., 2016). The drought in China, which was an exogenous factor in contraposition with the numerous endogenous causes within the apparatuses and sociopolitical systems of several Middle Eastern states, is a striking example of how interconnected global systems are, particularly regarding water, food, and economic stability. In this regard, it is relevant to take into consideration that a localized environmental crisis in one part of the world cascaded into a global economic shock which, in a sort of negative domino effect, exacerbated tremendously the existing vulnerabilities in regions already struggling with political and social tensions, such as the MENA region (Shatanawi, 2015; Hindiyeh et al., 2023).

Moreover, also the Syrian Civil War, which, as mentioned, was the second aforementioned international crisis in the MENA region worth of "water attention", can be traced, in part, to a severe water crisis in the years leading up to the conflict. Specifically, from 2006 to 2010, Syria had experienced a series of unprecedented droughts, among the worst in its recorded history (Haar et al., 2023; Tabor et al., 2023). These droughts, which were exacerbated by climate change and poor water management, devastated the agricultural sector, particularly in northeastern Syria, a region historically known as the country's breadbasket. The prolonged water shortage resulted in a vast agricultural loss, which essentially made it impossible for most of the farmers to sustain their means of livelihood if compared to the pre-drought scenario. In fact, as a result of the lack of water grazing land, large herds of cattle died (Gama, 2023). Consequently, hundreds of thousands of Syrian rural citizens were forced to abandon their farm plots and move towards urban areas, seeking employment and stability. This internal displacement put a tremendous burden on already overcrowded cities such as Aleppo, Damascus, and Homs,

which were not equipped with the infrastructure or resources to take in the massive influx of population (Haar et al., 2023; Tabor et al., 2023).

The urban migrants were exposed to extreme economic hardship, scrambling for low-income jobs, housing, and essential services in already cash-strapped cities beset by unemployment and inequality. Social pressures increased as these new arrivals were bound to be marginalized with little government assistance (Gama, 2023; Tabor et al., 2023). The Syrian government's response to the drought, on the other hand, was feeble, characterized by malinvestment and the allocation of water-dependent sectors such as cotton cultivation, which further worsened the crisis. Essentially, therefore, the intersection of rural deterioration, mass displacement, and urban overcrowding created the "perfect storm" and the fertile ground for a civil conflict that has been destroying the country for almost 15 years. In fact, the uprising that took root in 2011, sparked initially by demands for political reform, quickly garnered support from desperate and marginalized segments of society (Haar et al., 2023; Gama, 2023). The lack of sound economic alternatives, combined with the government's inability to address the root causes of their desperation, made these societies more susceptible to supporting the rebellion or joining opposition forces. It ought to be underscored that the drought and its cascading effects were not the sole cause of the Syrian Civil War, but, at the same time, they significantly weakened the social and economic fabric of the country, which was already struggling, making it more vulnerable to tensions which escalated in conflict (Gama, 2023; Tabor et al., 2023).

The cases depicted in the Arab Spring and the Syrian civil war are emblematic of how water resource management and water-related environmental disasters can cause tremendous hardship to local

populations that often result in wild protests. In both the Tunisian and Syrian cases, the previous conditions of institutional instability, systemic weakness, and economic crisis undoubtedly caused the uprisings. Nevertheless, the "water factor" weighed heavily in terms of the final eruption of generalized discontent towards the institutions. The Tunisian and Syrian dynamics, when read through the lens of hydro-strategy, provide insight into the extent to which proper water resource management and a resilient drought response can not only limit damage to local populations but prevent insurgencies capable of disrupting institutional arrangements. From these two cases, and many others, it is possible to understand the reason why nowadays states are increasingly focused on the quest for the so-called "water independence". In fact, especially in arid regions such as the Middle East and North Africa, the possession of substantial water resources underlies the strategies implemented by the ruling classes to safeguard not only domestic development but also institutional stability.

It is worth noting that water-related crises occur not only in the Mediterranean Basin. In fact, currently, several regions around the world are experiencing tensions and conflicts over water resources, driven explicitly by growing scarcity, geopolitical disputes, and increasing demand for this precious natural element (Radwan, 2020). These so-called "hydro-tensions" often manifest as political, economic, or even military confrontations over transboundary rivers, lakes, aquifers, canals, and water infrastructures. In the Middle East, for instance, which is among the most arid regions of the globe, the Tigris and Euphrates rivers, flowing through Turkey, Syria, and Iraq, are a source of significant tension (Krzymowski, 2019). Specifically, Turkey's large-scale dam projects, such as the Ilisu Dam, have raised several concerns downstream in Iraq and Syria, where reduced water flows have already severely exacerbated water scarcity and

contributed to economic challenges and social instability (Radwan, 2020). Similarly, the Nile River is another example of the fierce tensions that can erupt among nations regarding water supply (Wedajo, 2024). Ethiopia's Grand Ethiopian Renaissance Dam (GERD) - inaugurated in 2011 - has sparked disagreements with downstream nations Egypt and Sudan, as they fear the project could reduce water availability crucial for their agriculture and drinking supplies (Endaylalu, 2024; Wedajo, 2024).

In addition, the Asian continent is also often involved in water-related political and diplomatic crises, as cases of interstate tensions are very frequent. For instance, Tibet, which is the largest plateau in the world, plays an important strategic role for India regarding water supply.

The Indus[2], the Ganges[3], the Brahmaputra[4], and the Mekong[5], which are some of the world's most prominent rivers on which much of the

[2] The Indus River spans approximately 3,180 kilometers, flowing through China, India, and Pakistan, with a catchment area of around 1.16 million square kilometers. It is a vital water source for over 300 million people, primarily in Pakistan, where it supports the world's most extensive contiguous irrigation system. Specifically, the river is essential for agriculture, drinking water, and hydropower, underpinning the economies and food security of the region (Wood, 2018). Originating in the Tibetan Plateau, it traverses diverse terrains before emptying into the Arabian Sea, playing a critical role in sustaining livelihoods and ecosystems in one of the most water-stressed regions globally (Wood, 2018).

[3] The Ganges River, stretching 2,525 kilometers, is a lifeline for over 600 million people across India and Bangladesh. Its catchment area spans about 1.09 million square kilometers, making it one of the largest river basins in the world (Klöpper, 2008). Originating in the Indian Himalayas, it sustains vast agricultural lands, provides drinking water, and holds immense cultural and religious significance. In addition, the Ganges supports fisheries, hydropower, and industry while also being central to rituals and ceremonies. It is relevant to consider that despite its importance, the river faces severe pollution and ecological degradation, threatening the livelihoods and well-being of the millions who depend on its waters daily (Klöpper, 2008; Tagliacozzo 2022).

[4] The Brahmaputra River stretches 2,900 kilometers, with a catchment area of around 651,000 square kilometers, spanning China, India, and Bangladesh. It supports over 60 million people, providing water for agriculture, drinking, and hydropower. It originates in Tibet and flows through the Himalayas and Assam before joining the Ganges. The river is vital for livelihoods and ecosystems but faces challenges from flooding, erosion, and upstream water management disputes (Dutta et al., 2024).

[5] The Mekong River, stretching 4,350 kilometers, is one of Asia's longest rivers, with a catchment area of approximately 795,000 square kilometers. It is worth considering that this prominent water course serves as a lifeline for an estimated 70 million people (Klöpper, 2008). Concretely, this relevant amount of Asian citizens depends on the river for a variety of activities, such as agriculture, fisheries, transportation, and drinking water. Moreover, the Mekong supports one of the world's most productive inland fisheries and sustains vital rice-growing regions, making it a cornerstone of food security and economic activity in Southeast Asia. As a consequence, its importance for the Asian continent is

society and economy of many Asian states[6], including India, is based, flow from Tibet. Inevitably, the construction of any upstream facility on these rivers, such as a dam or hydroelectric power plant, has downstream repercussions in terms of supply. In this regard, in South Asia, the Indus River system remains a contentious issue between India and Pakistan, as both nations depend heavily on its waters for agriculture and energy. The situation is further complicated by decades of political hostility and the vulnerability of the Indus Waters Treaty[7] under current geopolitical pressures (Dutta et al., 2024). Thus, possible diplomatic tensions between nations sharing rivers and waterways on their territory are relatively frequent, especially given the population size of the most prominent Asian nations. In addition to the severe water tensions involving the Indus River, the Mekong River, flowing through six countries in Southeast Asia - China, Myanmar, Laos, Thailand, Cambodia, and Vietnam - has recently become a focal point of a significant water crisis. The leading cause of tension is driven by the construction of numerous upstream dams,

---

both ecological and socio-economic, underpinning the livelihoods of diverse communities along its course (Klöpper, 2008; Neto et al., 2023).

[6] The number of Indians residing downstream from the Tibetan watercourses is unclear. However, according to some projections, the Indian citizens directly affected in terms of supply from the Himalayan rivers range between 350 and 450 million individuals (Tagliacozzo, 2022).

[7] The Indus Waters Treaty, which was signed in 1960 between India and Pakistan, can be considered a landmark agreement brokered by the World Bank to manage the use of the Indus River and its tributaries (Ranjan, 2020). It allocates the eastern rivers (Ravi, Beas, Sutlej) to India and the western rivers (Indus, Jhelum, Chenab) to Pakistan, ensuring water-sharing rights amidst ongoing political tensions (Tagliacozzo, 2022). From a practical standpoint, the treaty establishes mechanisms for dispute resolution and technical cooperation, including a Permanent Indus Commission. Despite conflicts between the two nations, the treaty is considered a successful example of transboundary water management and remains in effect, fostering cooperation over critical water resources (Ranjan, 2020; Tagliacozzo, 2022).

particularly in China and Laos, which alter the river's natural flow and reduce water availability downstream (Prokurat, 2015; Dutta et al., 2024). In this respect, these disruptions have severe consequences for the livelihoods of millions who depend on the Mekong for fishing, agriculture, and drinking water. Concretely, in Vietnam's Mekong Delta, reduced water flow has caused several serious problems, such as intensified saltwater intrusion and threatening rice production in one of the world's most fertile regions. Climate change exacerbates the crisis, with unpredictable rainfall and prolonged droughts further stressing the river system (Prokurat, 2015; Dutta et al., 2024). The competing interests of upstream and downstream nations have fueled tensions, as downstream countries demand equitable water-sharing agreements while upstream projects continue to expand (Peña-Ramos et al., 2021). Similarly, another hotspot regarding the Asian scenario is Central Asia, where water disputes have arisen among countries like Uzbekistan, Kyrgyzstan, and Tajikistan over the Amu Darya and Syr Darya rivers (Peña-Ramos et al., 2021). These rivers are vital for irrigation in a region heavily reliant on agriculture, and disagreements over dam construction and water allocation have caused recurring tensions between the countries involved in several water disputes.

Undoubtedly, in the global context, cases of water tension are many, with unpredictable political consequences. At the same time, it is worth taking note that water can also be a harbinger of peace and collaboration among communities and states. Such collaborative scenario is indeed less frequent since, as highlighted above, states are increasingly interested in obtaining as much of the available water resources as possible, often even to the detriment of downstream countries. Population growth[8] and climate change are two factors of

[8] It ought to be highlighted that the demographic deficit currently occurring in many European nations, which is increasingly marked by ageing populations

great concern for national leaders, who are increasingly committed to the water security of their apparatuses. However, cases of transboundary water cooperation, while far less frequent, are equally important and deserve to be explored in depth. In this regard, this book aims to shed light on Himalayan water cooperation between three important players - two regional (Nepal and Bhutan) and one global (India) - which have, over time, forged a form of hydro-strategic relationship marked not by conflict or prevarication but by constructive confrontation and dialogue, with the ultimate goal to maximizing as much as possible the joint management of water resources.

The so-called Himalayan Confluence between these three nations stands out as a clear example of how peaceful and constructive dialogue among nations over water matters can be not only implemented but also sponsored as a positive approach to be reproduced in other scenarios. The primary purpose of studying this trilateral collaboration, which is focused on the joint exploitation of the transboundary water resources of India, Nepal, and Bhutan, lies in identifying key collaborative patterns that could be employed in other contexts to foster inter-institutional dialogue. Concretely, this Himalayan Hydro Cooperation (HHC) approach, if implemented in scenarios where transboundary water resources are a cause of political tension, could provide a solid starting point for reversing a

---

and declining birth rates, contrasts sharply with the population growth in Asian and African countries, where higher fertility rates and younger populations drive an increase in new citizens. This divergence creates both challenges and opportunities. In fact, while Europe faces labour shortages and economic pressures linked to an ageing workforce, Asia and Africa, on the other hand, contend with the need to provide education, jobs, and resources for growing populations. In this scenario, the control of water resources for a growing population can represent a serious strategic task to be accomplished.

dangerous trend. Specifically, the cases briefly described above related to water conflicts on the Nile River, the diplomatic disagreements over the management of the Tibet Plateau, or the tension caused by over-exploitation upstream of the Mekong River could benefit from a different, peaceful teleological interpretation toward resolving water conflicts in a community-based manner. In fact, as it will be studied in this research, the solutions of hydro-strategic collaboration could be replicated in multiple scenarios, contributing to a decisive easing of the tension already present, to the prevention of possible conflicts, and to a generalized balancing of national interests with the goal of joint management of shared water resources.

The aim of this research is to illuminate the existence of cooperative practices centered on water collaboration in the management of transboundary water resources. In this context, a viable alternative to political and diplomatic confrontation - and even to armed conflict - already exists and is effectively embodied by the HHC framework. As will be discussed in the following chapters, the three countries examined in this study are bound together by deep historical, cultural, and socio-economic ties, shaped by centuries of interaction and geographical interdependence. Indeed, as is often the case in transboundary water disputes, states experiencing hydro-political tensions are frequently connected by long-standing networks of trade, institutional dialogue, local cooperation, and shared cultural traditions, spanning centuries, if not millennia. Regrettably, the short-sighted and self-interested perspectives adopted by many contemporary political leaders have hindered the continuation of institutional dialogue on the shared management of transboundary water resources. As previously noted, water control has rapidly acquired a strategic primacy that compels states to pursue narrow, unilateral approaches. By contrast, as demonstrated by the case study

analyzed in this research, the sustainable and peaceful governance of transboundary water resources necessitates a high degree of cooperation among neighboring countries, particularly as a means of preventing the emergence of destabilizing water-related tensions.

The traditional narrative regarding transboundary hydro-relations. Water conceived as an element of tension.

As highlighted above, the assumption that is often associated with hydro-strategic issues entails that water constitutes an irredeemable source of tensions and potential conflicts rather than a vehicle for peace and institutional dialogue. In this regard, the majority of research works that have been carried out on water issues show that most observers, analysts and researchers have produced remarkable research material in which the primary approach has been to study water as a *casus belli* or as an inherently harmful element, especially in light of the problematic present climatic conditions and future projections. Undoubtedly, an increasingly hot, arid world with low rainfall rates and growing deforestation cases in many geographical areas represents the perfect scenario for hydro-strategic analyses focused on the conception of the "war factor" represented by water. Moreover, the fact that in many regions of the world, demographic projections for the coming decades predict significant cases of growth adds another layer of negative perception regarding water issues. Consequently, since water will most likely assume a prominent strategic value for states and communities in the coming years, it is relatively comprehensible to understand why it is inherently approached with a conservative aim, especially when attempting to study its transboundary implications.

The idea of water conceived as a source of tension, rather than collaboration, has been a central theme in the works of Mark Zeitoun, Ashok Swain, Naho Mirumachi and other scholars who explore the intricate dynamics of transboundary water conflicts with a peculiar approach mainly focused on power dynamics. Specifically, their research emphasizes how shared water resources often might become arenas of political struggle and harsh confrontation rather than opportunities for cooperation, dialogue and peaceful resolution of political and diplomatic disputes. It is worth considering that this perspective challenges sensibly the more optimistic narrative of water, considered as a natural catalyst for peaceful collaboration between nations, revealing instead how disparities in power, governance, and access can exacerbate fierce tensions and anticipate potential conflicts (Wolf, 1995; Biswas et al., 1997; Blanchon, 2024).

Mark Zeitoun, one of the most prominent authors with an approach to hydro-strategic matters, has produced extensively on this subject in recent years. From a theoretical standpoint, his work on hydro-hegemony is pivotal in framing water as a source of conflict. In two of his most relevant academic contributions - *Reflections: Understanding Our Use and Abuse of Water*, 2023, Oxford Press and *Power and Water in the Middle East: The Hidden Politics of the Palestinian-Israeli Water Conflict*, 2008, Bloomsbury Publishing - he highlights how power asymmetries between riparian states, specifically those sharing a river, often lead to the domination of upstream nations over downstream ones. In his view, rather than fostering mutual benefits, water often becomes a tool for asserting control, as upstream states manipulate flow, infrastructure, or treaties to serve their interests, usually at the expense of weaker neighbors. In this regard, Zeitoun's analysis of the Nile Basin and the Tigris-Euphrates system underscores clearly this dynamic, showing how dominant states may use their strategic position to extract advantages, fueling resentment

and discord that could theoretically and potentially lead to harsh confrontations.

Similarly, besides Zeitoun's approach, also Ashok Swain's research focuses on how water scarcity can easily exacerbate existing political and social tensions, particularly in regions already burdened by evident economic disparities and fragile governance. Concretely, in two of his most prominent works - *The Environmental Trap: The Ganges River Diversion, Bangladeshi Migration and Conflicts in India*, 1996, Uppsala University Press and *Diasporas, armed conflicts and peacebuilding in their homelands*, 2007, Uppsala University Press - the author argues that while water stress may not directly cause wars, it acts as a multiplier of conflict, intensifying disputes over access and allocation. In Ashok Swain's vision, regions like South Asia and the Middle East, where rivers cross national boundaries involving millions of citizens of different nationalities, competing claims over water rights have often led to prolonged political standoffs, further entrenching mistrust between nations and dangerous tensions between the ruling leaderships. Swain points out that the absence of effective international mechanisms to address these disputes often disadvantages weaker nations, fueling perceptions of injustice and escalating tensions.

Naho Mirumachi is another relevant scholar who produced extensive research on water strategic issues with a similar approach to the one adopted by Zeitoun and Swain. Her conceptualization presents a sophisticated viewpoint on transboundary water disputes, contesting conventional dichotomies of conflict in opposition to cooperation. In her impactful research production, she points out that collaboration regarding shared water resources frequently does not signify the elimination of conflict; instead, it often exists alongside persistent underlying tensions. This concept, sometimes referred to as the

"conflict-cooperation nexus", highlights that even in situations where treaties or agreements may exist, inequities, power imbalances, and unresolved disputes can still remain embedded in the relationship between riparian states, negatively affecting their mutual political and diplomatic connection. In one of her most prominent academic works - *Transboundary Water Politics in the Developing World*, 2015, Routledge - Mirumachi focuses on how power dynamics and institutional frameworks shape water-sharing agreements. She observes that weaker states join agreements less because of mutual advantage than because of coercion or lack of alternative, producing a sort of "compelled cooperation" (Mirumachi, 2015). Such agreements can create a facade of cooperation while reinforcing inequalities that can, in turn, furnish the basis for renewed conflict. According to her vision, as in the case of the Ganges River, for example, India's hegemony is likely to dominate the interests of Nepal and Bangladesh, illustrating how such asymmetries can result in weak forms of cooperation.

Another key aspect of Mirumachi's vision is her focus on how water conflicts are embedded within broader social, economic, and political contexts. In her book written in collaboration with Zeitoun and Warner - *Water Conflicts: Analysis for Transformation*, 2020, Oxford University Press - she argues that transboundary water management cannot be understood in isolation from these more significant dynamics. Other factors, such as environmental degradation, population growth, and climate change, should be taken into account, as they may be the cause of exacerbated potential for water scarcity, amplifying the possibility of both tension and conflict. Mirumachi also critiques the emphasis on technical solutions in transboundary water management, such as infrastructure development or technological innovations. According to her vision, while these may provide short-term relief, they may often overlook the deeper political and social issues driving disputes. In her work, she advocates for more inclusive

governance models that prioritize equity and transparency, ensuring that all stakeholders - especially marginalized communities - have a voice in decision-making processes in order to limit the conflicts that rather often arise between upstream and downstream riparian states.

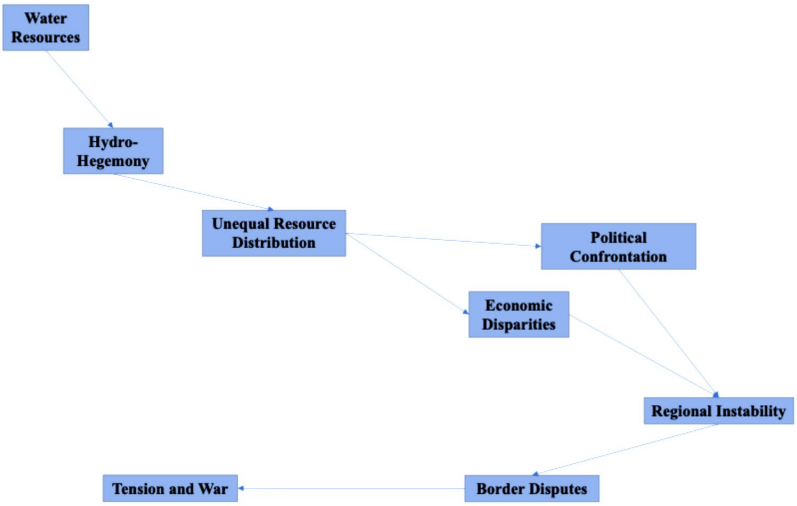

Diagram 1: The results of Hydro Strategy with a confrontational approach

As depicted in Diagram 1, according to the traditional model that identifies water and water management as a factor of tension and destabilization, bitter confrontations between nations for hydro supremacy are almost inevitable. The presence of transboundary water courses in a region often leads to the emergence of hydro-hegemony, a concept whereby one country or community acquires power at the expense of another on the basis of maximising water resources. Hydro-hegemony inevitably leads to the unequal distribution of resources, as upstream countries seek to secure a large amount of the water at the expense of other regional players located geographically downstream. Over time, this situation leads to the

creation of worrying economic disparities and political confrontations that can result in diplomatic protests. Consequently, there is a growing regional instability fostered by hydro-hegemonic dynamics that can often lead to borderline regional conflicts over control of supply sources. The result of all this is a constant state of hydro-strategic tension that can result in outright water wars.

The main reason why these aforementioned authors - and also many others - consider water as a factor intrinsically harbinger of tensions and conflicts between states is primarily due to the weakness of global institutions regarding the management of transboundary water resources. In this regard, the absence of a comprehensive international legal framework to govern shared water resources significantly undermines the ability to manage transboundary rivers and basins equitably, often leading to the unchecked exercise of hydro-hegemony by upstream nations (Zeitoun, 2023). In such situations, as reported by Swain (1996; 2020), upstream states often exploit their geographical advantage in order to control water flows, frequently to severe and dangerous detriment of downstream nations. Inevitably, as a consequence, these dynamics contribute to generate conflict and mistrust and destabilize regional relationships by threatening human security. Specifically, when upstream nations construct dams, divert water, or otherwise alter the natural flow of rivers, downstream states are often left vulnerable to reduced water availability, diminished agricultural productivity, and environmental degradation (Zeitoun, 2023; Zeitoun & Warner, 2006). This unilateral control over shared resources undermines the principles of fairness and sustainability and threatens irremediably peace and stability for the region in which the river is geographically located. The absence of enforceable legal mechanisms means there is no neutral arbitrator to mediate disputes or hold states accountable for actions that harm others (Swain, 2020; Zeitoun, 2023).

It is worth noting that this lack of regulation also significantly exacerbates power asymmetries. In fact, hydro-hegemonic states use their technical and financial resources, along with political influence, in order to establish infrastructure projects that consolidate their control in the long term (Mirumachi, 2015). Downstream nations, often reliant on the goodwill or cooperation of their upstream neighbors, have very little and inconsistent leverage to ensure equitable water sharing (Swain, 2020; Zeitoun, 2023). Therefore, in the worst cases - such as the dispute over the GERD between Egypt and Ethiopia or in the case of the Mekong water tensions - this dynamic can exacerbate already existing tensions, in this way fueling broader geopolitical conflicts and eventually creating infrangible barriers to regional cooperation (Mirumachi & Zeitoun, 2020). Furthermore, the lack of a binding framework may often leave smaller or weaker states without resources to protect their internal interests. In this respect, it ought to be considered that while principles like those in the UN Watercourses Convention (1997) or the Helsinki Rules (1966) suggest equitable and reasonable water use, these guidelines lack serious and reliable enforcement power. In addition, many states have not even ratified them, leaving these important treaties in a situation of substantial institutional inconsistency (Mirumachi, 2015; Swain, 2020; Zeitoun, 2023). As a result, the exploitation of shared water resources becomes a zero-sum game, undermining opportunities for collaborative solutions that could benefit all parties.

The UN Watercourses Convention, which is often cited as a landmark treaty, still remains nowadays as the only semi-binding international legal instrument specifically addressing the non-navigational use of transboundary watercourses. Unlike the Helsinki Rules Treaty, the UN Convention ratified in 1997 had, theoretically, the political and diplomatic goal to constitute the international legal basis for the management of transboundary water resources. The Helsinki Rules,

on the other hand, although considered as the first international attempt to limit the powers of upstream nations, had limited impact due to the too-generic framework of the treaty that eventually transformed it into a mere declaration of intent with little actual effectiveness. However, even though the UN document had more chances to be implemented, its limited adoption by key upstream riparian states -such as Turkey, Iran and China - and lack of enforcement mechanisms undermined its potential to prevent inequitable practices and resolve disputes effectively.

Specifically, the UN Watercourses Convention established relevant principles such as no significant harm (art. 5), the equitable and reasonable utilization (art. 6), the duty to collaborate (art. 8) and the obligation to exchange information and cooperate (art. 11). These principles were intended to promote fair and sustainable management of shared water resources. However, as mentioned, the convention has not been universally ratified, with many key upstream states abstaining from participation. Evidently, this limited substantially its practical applicability, especially in regions where water disputes are most acute (Mirumachi, 2015; Swain, 2020). Even for states that have ratified the convention, the lack of a strong enforcement mechanism reduced sensibly its ability to compel compliance, leaving significant gaps in the governance of transboundary water resources. Such evident and robust legal void allowed - and still nowadays allows - upstream states to exploit their geographic advantage, constructing large-scale infrastructure projects like dams or diversions without adequately considering the downstream impacts (Mirumachi & Zeitoun, 2020). In this regard, it is relevant to note that downstream nations often lack resourses to protect their water security or mitigate harm in the absence of binding arbitration or enforcement provisions. Such a situation, as thoroughly examined in the works of Zeitoun, Mirumachi, Swain and others,

fosters a system where hydro-hegemony thrives, with water allocation driven by power dynamics rather than legal principles or mutual benefit (Zeitoun & Warner, 2006; Mirumachi, 2015; Swain, 2020).

The alternative narrative regarding transboundary hydro-relations. Water as a tool to foster interinstitutional dialogue

The traditional narrative about the role of water as a catalyst for crises and tensions in the world's driest regions represents an important area of hydro-strategic research. As mentioned, because of the probable troubling climatic, demographic, and economic future[9], this precious natural element, indispensable to life, will increasingly be the subject of contention among key players at the local, regional, and national levels. However, although less substantial from a quantitative standpoint, it is worth mentioning another strand regarding the study and analysis of hydro-strategy. This strand

[9] Large urban agglomerations, which will become numerous in the coming years in several parts of the world, are often hit severely by water shortages. The latter directly and severely impact industries reliant on consistent water supplies, such as agriculture, manufacturing, and energy production. As water becomes scarce, factories reduce operations, farms fail to produce, and power plants struggle to meet demand, resulting in widespread job losses. For instance, during the Cape Town water crisis occurred in 2018, the Western Cape Province experienced the loss of 37,000 jobs, with an estimated 50,000 individuals falling below the poverty line due to job losses and increased living costs (Egieya et al., 2024; Döring et al., 2024). Similarly, during the Chennai water crisis of 2019, several industries in the Indian megalopolis, including IT and manufacturing, reported operational slowdowns and many workers were forced to migrate. In addition, prolonged droughts further deter investments, destabilizing local economies and increasing unemployment. Without resilient water management, cities face the dual challenge of supporting growing populations while mitigating the socio-economic toll of water scarcity (Egieya et al., 2024; Döring et al., 2024).

considers water as a potential instrument of peace among the peoples of neighboring nations. The latter, having to manage water resources in common, have many more advantages with an approach focused on collaboration rather than a vision focused on hoarding water and maximizing water resources at the expense of neighbors. The central assumption behind this view is that a water crisis is not confined in geographic boundaries. In this regard, even an upstream nation, while undoubtedly in a position of strategic strength when compared to downstream nations, has nothing to gain by favouring through its policy and decisions a reduced access to water to other actors. Indeed, a water crisis creates severe national instability with substantial regional effects, as demonstrated by the cases concerning the origin of the Arab Spring and Syria. From those cases, not due solely and exclusively to water-related reasons, it is rather evident how a hydro-related crisis has generated serious sociopolitical instability that has spread to the regional context, coming to "infect" many other nations in dangerous and concrete ways.

Specifically, in the case of Syria, Turkey's cross-border management of shared water resources could have been much more weighted and wiser. In this regard, it is worth considering that from a supply standpoint Damascus can only rely on one relevant river for its water needs - the Euphrates. Over the years, Ankara, which is the strongest actor from a hydro-strategic standpoint being upstream from Syria, has built numerous dams on its national territory. This has sensibly limited the flow of water downstream to northern Syria, which is considered the most fertile region of the Arab country[10]. As

[10] Turkey's extensive dam construction on the Euphrates River, particularly under the Southeastern Anatolia Project (*Güneydoğu Anadolu Projesi* - GAP), has significantly reduced water flow to downstream nations like Syria. Notable structures along the shores of the Euphrates include the Atatürk Dam, completed in 1992, which alone can hold the river's entire annual discharge. It is one of the