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Water and International Relations in The Euphrates-Tigris Basin:

How Can We Avoid an Inevitable Conflict?

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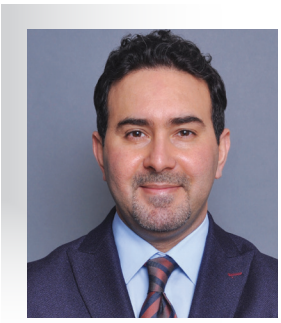
CLEAN TIGRIS

Content



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Sameh is an expert on Water management, Water conflict and resolution, holding a PhD from TU Bergakademie Freiberg. He is the founder of Green Charter GC in Germany for Water and Environmental consultancy. Sameh has led several international projects in Europe and the Middle East. He firmly believes that water could be a source of cooperation and peace rather than a reason for conflict.

1. Introduction

As the most extensive river system in Western Asia, Euphrates and Tigris rivers run 2,800 km and 1,850 km respectively, from Turkey through Iraq and Syria, finally meeting at the Al Qurnah (Southern Iraq), forming the Shatt Al-Arab River, and eventually discharging to the Gulf. Thousands of years of the rivers' journey have shaped the Mesopotamian as a cradle of civilization. This civilization enriched the world with innovations, science, culture, and art. In 1986, at ten years of age, I witnessed the Tigris river flood in Baghdad, the river that split the ancient city and Iraq's capital into two parts, the Karkh and Rusafa districts. My home was a few meters away from the riverbank. The civil protection authority called for an emergency campaign; childish curiosity pushed me and my neighbours to ask the working team onsite to let us volunteer. The chief in command asked us to help the professional staff move sandbags close to the riverbank to prevent water flooding to the main road. This simple yet effective technique drew my attention - bags acting as a barrier to divert water flow. Even though the bags were not perfectly sealed, they worked well in maintaining the situation. Eventually, the flood had been controlled. This event shaped my very early relationship with the Tigris River. From then, I would observe the water level and its unfortunate decline with time. I learned many lessons from this experience. I discovered the river's indescribable rage, the power of nature that riverbanks have to face, and the resources that are required to confront that power. I also realized how important collaboration and organization are in helping to minimize and manage imminent risk. Not least, I understood how essential leadership is by observing the chief in command working hard on the ground, shoulder to shoulder with his staff and colleagues.

Water has a tremendous impact on our lives on many different levels; it is a fundamental source for life. The average human's ability to survive without water is a mere 3 days, and all civilizations have arisen / developed / evolved and faded / waned based on water availability. Water also gains spiritual power through different rituals. It is an extraordinary element with polymorphic states; available predominantly in liquid form, it turns to gas form when it has boiled, and solidifies when frozen. In its solid form, water becomes less dense, which implies two things. The first is that freezing strains the living cells' membrane, which naturally contains a lot of water. Secondly, because ice is less dense than water, it floats. This means that freezing in rivers and lakes occurs from top to bottom, which enables fish and other species to survive during the wintertime [1].

One of the primary sources of water's power is its use in daily life, as a multi-functional element that influences various sectors. Water is a major concern for the management and development of urbanization, where 90% of all natural disasters world wide are water-related [4 -> 2]. About 50% of the wetland have been lost in the last century, and the demand for global food production will continue to increase dramatically to reach approximately 50% [5 -> 3]. UNESCO (The United Nations Educational, Scientific and Cultural Organization) has announced that by 2025, about 2/3rds of the world's population will have limited access to fresh water [2 -> 4], and it has also been estimated that by 2030, 24–700 million people will be displaced due to water scarcity and climate change [3 -> 5]. Conversely, 50 children are dying daily due to poor sanitation and unsafe drinking water [6].

Tigris River by Tiba Saud, Baghdad 2015

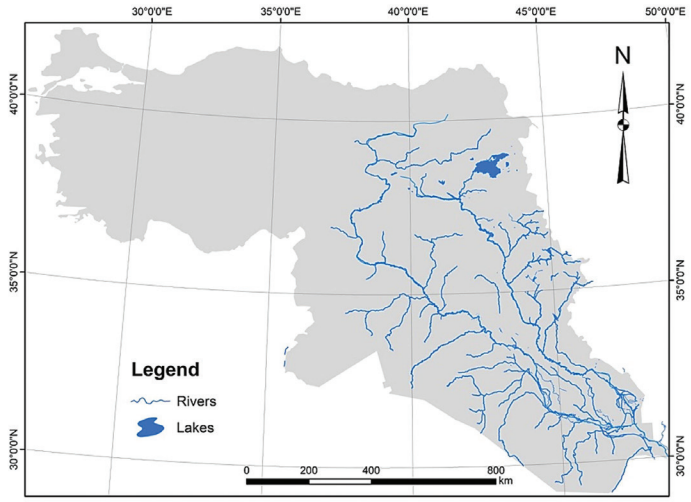
"I greeted you from a distance, so greet me. Oh, Tigris of the goodness and the mother of the gardens
I greeted you with thirst and seeking your shelter as a Dove between water and mud."

By: Muhammad Mahdi Al-Jawahiri - Iraqi poet

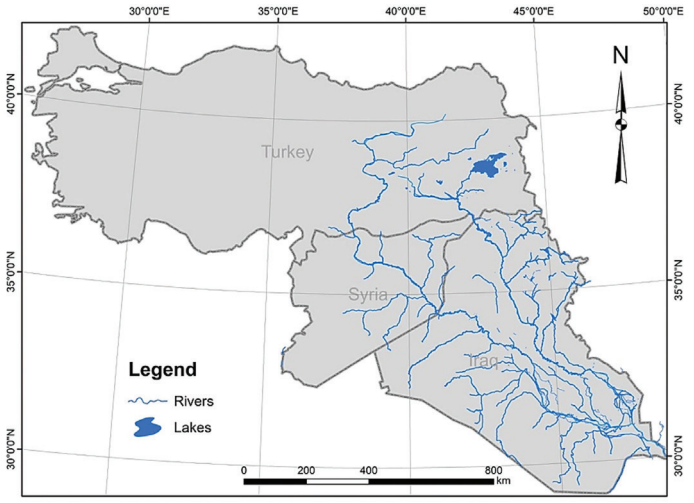
2. Factsheet of Water Resources of Iraq

As an outcome of World War I, with changed geopolitical positions and new political orders and borders, Iraq was considered a downstream for Tigris, and the ultimate downstream for the Euphrates. Turkey has been recognized as an upstream for both rivers in the region. This profound event has changed the shape of the region and the fate of water allocation, as well as international relations. New perspectives have emerged for each riparian country, where each of the three partners has its own national development plans that might conflict with others.

About 98% of surface water resources in Iraq is found in rivers, lakes, and marshlands. Over 70% of Iraq's water is consumed by the agricultural sector, and at least 15% is lost by evaporation from lakes, reservoirs, rivers and marshlands. Iraq needs about 13% of its water



a) During the Ottoman Empire.



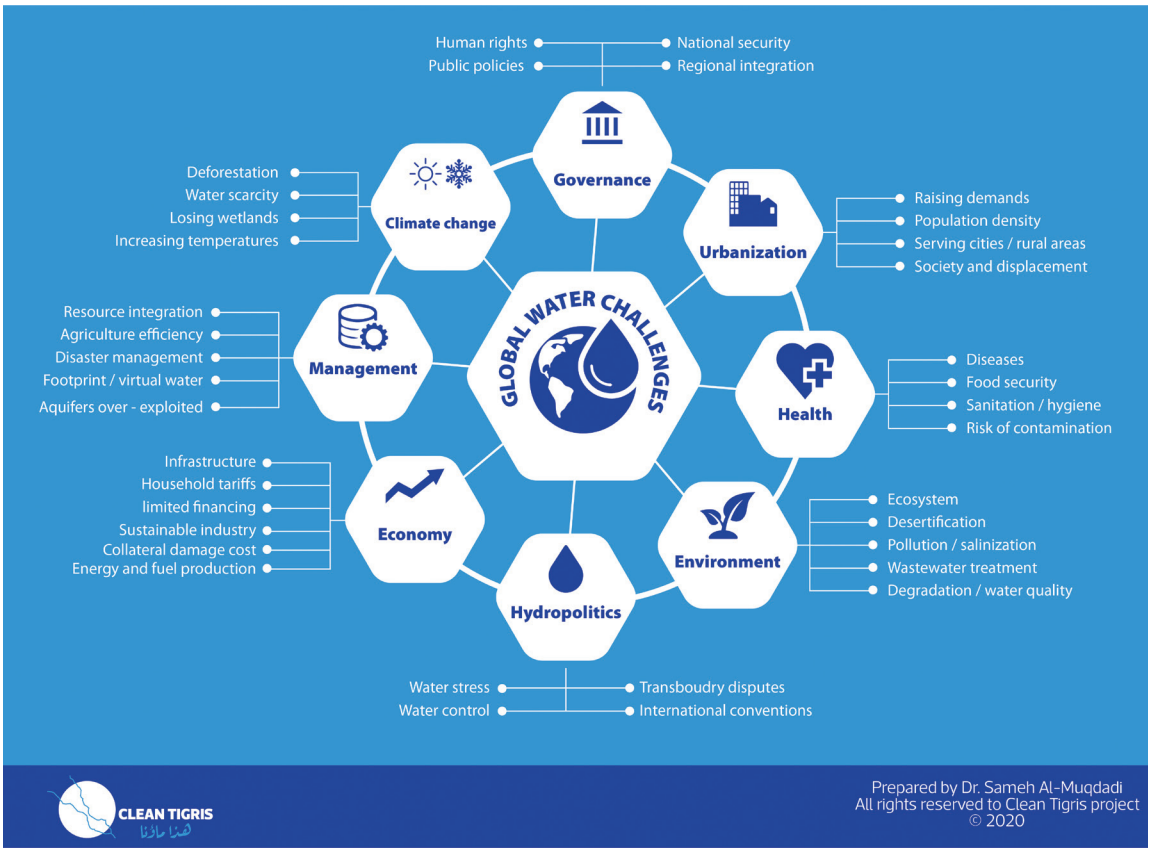
b) Political borders after WWI.

Maps conducted by Dr. Arsalan Ahmed Othman

resources for environmental sustainability, such as empowering the Shatt Al Arab River with sufficient water shares to push back the seawater, and providing the marshlands with sufficient water shares to be sustained. Only 8% is used in the sectors of municipalities and industry [7]. However, the relatively high population growth in Iraq (2.3%) is another challenge to compete with; more than 65% of the population is young [8], which will significantly increase water demands in the future. This raises a fundamental question and an explicit trade-off: although most of Iraq's surface water resources go to the agricultural sector, Iraq still imports most necessary crops. Another challenge is that the estimation of the groundwater reservoirs is still unclear, since many studies have been conducted using mostly old techniques and technologies.

3. Challenges

Water resource-related challenges in Iraq are manifold. These challenges can be summarized in three main parts: 1) internal challenges represented by management capacity, 2) external challenges that reflect the influence of climate change, and 3) hydropolitics. The top five challenges for each of these have been tackled as follows:



Global Water challenges

3.1. Internal Challenges: management capacity

"A goal without a plan is just a wish" - Antoine de Saint Exupéry.

Although Iraq has tried hard to develop the management capacity of water resources during the last couple of years, the country is still in urgent need of enhancing the integrated management system. The top five challenges in this context are:

1. **Agriculture:** There are losses due to inadequate distribution systems and water leakage: about 60% of agricultural water is wasted due to the traditional irrigation methods used by local farmers [9]. Old agriculture technologies lead to low efficiency. Developing irrigation methods by investing in modern technologies is urgently needed. In the 1970s, the agricultural labour force represented 31% of the economically active population; this percentage was significantly reduced to 8% in 2004 due to the presence of agricultural mechanization, development of education, health services in urban areas, and increased job opportunities encouraging rural-urban migration [10].
2. **Water supply and demand:** Iraq is struggling with an outdated water supply network infrastructure, where most water pipes suffer from leakages and cause at least 40% of water loss [11]; the gap between supply and demand will be increasing by more than 50% in 2030 [12]. Climate change, population growth, and the reduction of surface water shares are considered significant burdens.
3. **Governance and public policies:** Although Iraq already has informative national legal policies to regulate the country's water resources, the

Tigris River, Baghdad - Al-Jadriya near University of Baghdad

By: Ayman Qadoori Oct. 18, 2020

government sector is still bogged down from poor implementation and practices. Too many stakeholders and authorities are involved in the decisions regarding water resources; about 59 federal and non-governmental authorities share the decision on water matters, which is probably one of the challenges hindering any sort of development.

4. **Awareness:** The future of water resources relies significantly on public awareness. Water is a matter of solidarity; it is not only a responsibility of the local or federal governments, but rather, all sectors should be consolidated to solve the shortages. Despite the few water awareness campaigns that have been conducted by the Ministry of Water Resources, the Ministry of Agriculture, and a few NGOs, the country still did not manage to draw sufficient attention to raise a comprehensive public program that helps people, particularly farmers, to understand the importance of water as an element they deal with on a daily basis. The media also needs to be encouraged to play a vital role in this context.

5. **Water degradation:** Due to the substantial drop in the water shares of both Euphrates and Tigris rivers, the concentration of pollutants has increased dramatically, where salinity has increased ~3 times during the last decade, from 457 ppm to 1200 ppm [13].

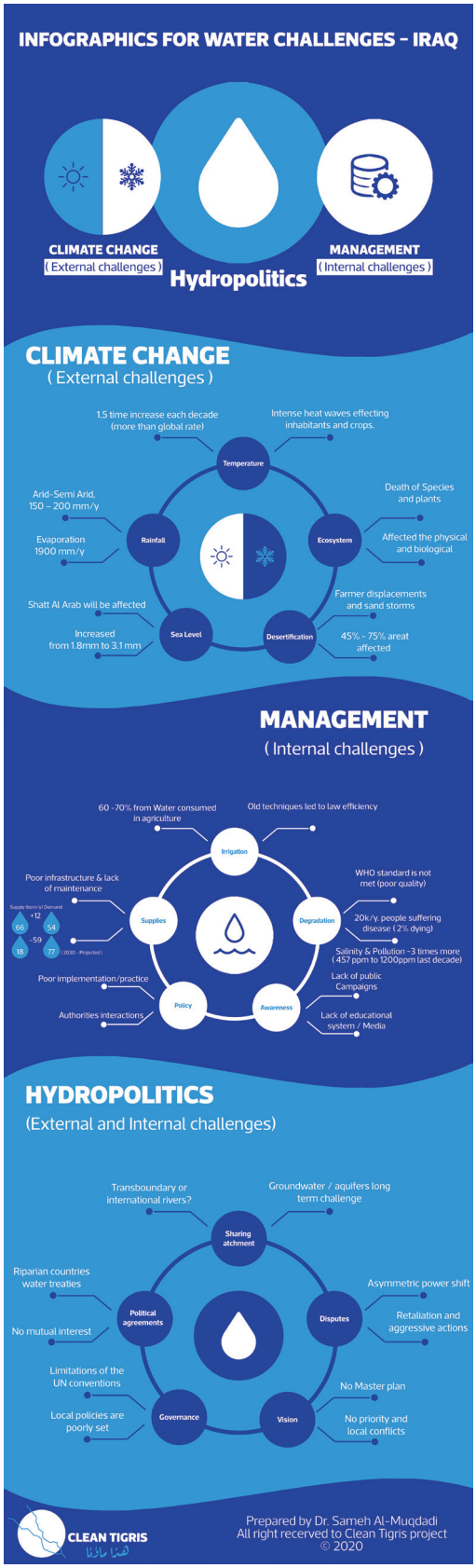
3.2. External Challenges: climate change

In terms of the external challenges, climate change is considered one of the main factors that threaten the country's water security. Globally, Iraq is among the top five countries vulnerable to climate change, which is attributed to decreased water and food availability [14]. As the French writer and philosopher Voltaire said, «Men argue. Nature acts». It is rather hard to manage the climate change impact due to the numerous factors and the various interlinks within the process of climate change. However, with proper risk assessment, we could be well prepared for the potential threats. The top five challenges in this context are:

1. **Temperature:** The temperature rates are increasing ~1.5 times each decade, which is more than the global rate [13]; the intensity of the heat waves affects the inhabitants and the crops negatively.

2. **Rainfall:** The climate is subtropical semi-arid with rainfall usually in winter, from December to February, with an average precipitation of ~200 mm/year. However, the average rainfall varies between 1200 mm/year in the north to less than 100 mm/year in the south. The summer temperatures are extremely hot, with daily peaks reaching over 43°C during July and August.

3. **Sea level:** The sea level has increased from 1.8 mm to 3.1 mm [15], impacting Shatt Al Arab River, which already has



a minimum flow insufficient to prevent the seawater intrusion.

4. **Desertification:** Climate change and the significant drop in the levels of both Euphrates and Tigris rivers have caused a demographic change due to the desertification that affects between 39% – 54% of Iraqi territories [16]. Regular sandstorms have forced farmers to be displaced from the village to the cities, deserting their farms.

5. **Ecosystem:** Biodiversity has been severely affected due to the direct threat to species and the planet. Practices such as illegal hunting and harvesting are destroying the ecosystem [17]. Other clear examples are the drying of the marshlands during the 1990s and the intensive oil exploration [18].

3.3. Hydropolitics

Generally, 'Hydropolitics' or 'Water Politics' as a term reflects on how politics is affected by water resources. It also reflects water as a tool that can enforce a certain foreign or a local political agenda. Hydropolitics is considered as a sword with two edges, with internal and external challenges. Since 1920, the Euphrates – Tigris basin has been struggling from hydropolitical influence. The top five challenges in this context are:

1. **Sharing catchment:** Globally, about 400 transboundary river basins are potential for disputes [19], and the Euphrates-Tigris basin is indeed one hotspot for potential conflict [20].

After the United Nations Resolution for Watercourses [21], whether the river would be identified as an international river (that would be treated under the UN resolution), or instead as a watercourse, became a critical and sensitive issue. However, most of these challenges focus on the water surface, where the groundwater is considered a struggle that might face the region in the long run.

2. **Political agreements:** Most of the water conventions and treaties within the Euphrates-Tigris riparian countries were often subject to rapid change due to the political instability and the lack of mutual agreements.

3. **Governance:** There are some limitations within the UN convention on watercourses; in addition, the local policies are poorly implemented. The country lacks a comprehensive plan to enhance the outdated systems and enforce implementations to guarantee systematic governance.

4. **Potential disputes:** The lack of strategic agreements maintains tension over water levels. With the fragile political system, asymmetric power is often changing and some riparian countries remain with less political clout. This leads to retaliation and occasionally aggressive actions. Collectively, this always raises the risk of conflict.

5. **Lack of vision:** The region has no strategic vision regarding an in-depth assessment of challenges and opportunities. Each country only focuses on a national scale, with less attention to the bigger picture. Also, locally, Iraq needs to build a rigid master plan to secure the water resources and give this valuable element a priority.

4. Background of Hydropolitics at The Euphrates-Tigris Basin

Water may be used as a weapon in three forms: too much of it causes floods, too little leads to water scarcity, and its low quality creates pollution. The ancient Mesopotamian witnessed the first water conflict and its resolution, where thousands of years ago the Sumerian city-states fought over water resources as a vital element in the emergence of the cradle of civilization. The ancient scripts prove that both water conflicts and resolutions have deep roots that are linked to many issues, such as human nature, conflict of interest, and foreign policies. Likewise, within the current political borders created after World War I, which have shaped international relations, water conflict and hydropolitical events could be considered collateral damage for the new order in the region. Naturally, rivers do not follow political borders; rather they follow simple rules: the rule of gravity and the pressure differences. Several events prove that water has been used as a political tool to enforce local or regional agendas in the Euphrates-Tigris basin.

The first agreement between Iraq and Turkey dates back to 1926, followed by

a friendship treaty in 1946. However, three decades later (1962–1993), about 45 negotiation rounds were conducted between the three countries (Iraq, Syria, and Turkey), which ended with no concrete agreement between them. During that time, a only two significant conflict events happened: in 1974 between Syria and Iraq, and in 1990 between Syria and Turkey. After the GAP project was completed, the negotiation approaches and bargaining power for both downstream and upstream countries had changed; thus, a new strategy needed to be developed to ensure peace and reach mutual agreements.

For four decades, the Kurdistan Workers Party (PKK) was in conflict with the Turkish government to obtain Kurdish independence and autonomy. The unstable region was convenient for the Turkish government to establish the strategic and multidimensional GAP, covering 10% of Turkish territories. The Turkish administration was recognized as being of national importance in the region both in terms of economic development (the lowest gross domestic product and the high demand for development), as well as the political aspect (more than 95% of the registered voters voted for one party or for an independent candidate) [22]. The ultimate goals are to manage national security risks, aligned with comprehensive development for the unstable region. As a consequence of the GAP, water shares in both the Euphrates and Tigris rivers were significantly reduced, and the tension between the riparian countries was unleashed. Hence, Syria braced the PKK, providing them with logistical support to force Turkey to sign the 1987 protocol. Turkey then agreed to provide Syria with sufficient water shares, followed by the signing of a security protocol in 1992. The two decades of water and security conflicts ended with the signing of the Adana agreement in 1998. This agreement established strategic cooperation between the two countries on different levels, the water shares being amongst the top of them. The period between 1998–2011 reflects ideal relations between the two countries; it was a promising and historical period for the international relations between them. The water resources proved to be an incentive for building such a mutual interest. In March 2011, the relations between both countries were led to a new page of dispute, where Turkey supported the uprising and played a fundamental role in establishing the Free Syrian Army (FSA), and Syria once again tried to use the PKK card against Turkey. This eventually led to the collapse of the Adana agreement, and thus the return to a zero-sum game.

For a couple of reasons, the relationship between Iraq and Turkey was a bit less tense, since they share both rivers, unlike the Turkey-Syria model, where Syria relies solely on the Euphrates River. Also, relations between Iraq and Turkey have been tightly linked through an excellent economic exchange. However, the two gulf wars kept Iraq from addressing future water resources challenges as it remained focused on local scale conflicts, the marshlands being one of the bad examples of how water is used as a tool in national

security and political decisions. The dry out of the marshlands during the 1990s led to significant degradation. Only 3% remains from the central marsh, 14.5% of Al-Hammar [23], and the marshlands have been restored after 2003 to maintain the degradation. However, the marshlands still face some challenges, especially after water shares have declined in both the Euphrates and Tigris rivers. Despite the well-done efforts of registering the marshes as international heritage in 2016, Iraq has not significantly improved the water resource sector due to several reasons: endless political instability, fragile security, corruption, and lack of a clear national plan. The dark time of ISIS added insult to injury, where Iraq and the entire region were under a significant threat by an extremist group. ISIS was establishing a new era on using water as a weapon and a source of threat, and the occupation of the dam empowered them to threaten the cities by causing floods through exploding the dam; at the same time, they could use the dam as a secure shelter that security forces would avoid striking. Between 2014-2015, ISIS had seized the Mosul and Ramadi dams in Iraq and the Tishrin dam in Syria; here, they used dams as both a safe shelter and a potential weapon that could be used against any possible attack.

Euphrates River, Al-Jazeera regulator

By: Mohammed Saab April 26, 2020

5. Why Is The Region Not Reaching an Agreement?

The water conflict in the Euphrates-Tigris basin has a long history. For a century, the riparian countries (Iraq, Turkey, and Syria) have failed to reach a strategic agreement in water shares. There are several reasons for that, some of which are listed below:

- The limitations of international laws, where the UN Convention for Natural Resources and the International Watercourses of 1997 gives the same weight to the past as to the present [24].
- The lack of agreement about whether to define the Euphrates and Tigris rivers as international rivers (as Iraq and Syria claim) or as transboundary watercourses (as Turkey claims).
- The question of whether the rivers should be treated as one basin (as Turkey and Syria want) or as two separate basins (as Iraq requires)
- The adoption of different water allocation formulas, where Iraq and Syria believe in 1:1 water allocation, while Turkey proposed a three stages project that allocates water based on the country's needs.
- The different perspectives found in negotiations on the issue, where Turkey emphasizes sovereignty, Iraq highlights the Mesopotamian heritage, and Syria expresses food security concerns.
- The region's fragile political environment, particularly in Iraq and Syria, resulting in the three riparian countries rarely gathering around one round table, as well as a lack of mediation.
- The lack of consideration for a strategic partnership of sustainability when making agreements, where most are conducted merely on the basis of acute political requests.

It is for these reasons that the downstream countries followed different approaches to water negotiations; the task of obtaining a mutual agreement was somehow challenging. The distrust dominating the region forms a significant obstacle. Thucydides, the well-known ancient Greek philosopher and the general of war, considered fear as the main driving force of conflict; distrust generates fears that encourage an inevitable conflict. This concept has led Syria to use the PKK as a political card for more than a decade against Turkey, employing it as bargaining power during negotiations on water allocation. Such an issue-linkage strategy aimed to change the asymmetric power dynamic through an external political tool. However, while this pragmatic tactic might be approved and quickly result in earning more water allocation, it would never establish a strategic partnership. Once the asymmetric power shifts, the agreement will collapse. The region witnessed a similar case in 2011 during the uprising in Syria, when Syrian-Turkish political relations were entirely ruined after ten years of excellent agreement.

Iraq and Turkey use another approach in

their water relations, which is represented by the benefit-linkage model. The two countries' political relations have always relied on economic exchange, which has recently reached 16 billion USD per year, and is expected to increase to 20 billion USD per year [25]. One of the major oil export pipelines of Iraq passes through Turkey to Europe (Kirkuk–Ceyhan Oil Pipeline). Iraq also opens its construction market to Turkish companies for national projects in Iraq. This economic cooperation has been reflected in water resources cooperation, leading to less tension than the Turkey - Syria model. An excellent example occurred in 2019, during the flood of the Tigris river basin. The cooperation between both countries helped in surpassing the crises that threatened the Iraqi oil fields – one of the only national revenues that Iraq has, due to the good communication between the Iraqi Ministry of Water Resources and the Turkish authorities. The benefit-linkage approach is a better option than the issue-linkage one, and provides a good basis for the countries to negotiate water in a positive environment. Still, it does not provide a sustainable solution, particularly in the long run; decisions rooted in economic exchange are linked to a margin of interest, which is subject to change. Therefore, the region needs to adopt and implement a strategy to alleviate the risk of failure during any agreement process.

At the state level, Turkey faces three classic challenges: 1) joining the European Union, 2) energy shortage, and 3) political instability in the southern region. Conducting the GAP would solve at least two of these challenges; by developing the southern region to manage the political instability, jobs for 3.5 million citizens - 40% of the GAP region population - can be created [22]. The GAP project will also generate clean power, where the expected annual capacity will be 27 billion kWh; this is 45% of the potential water energy in Turkey. The anticipated plan for 2020 involves increasing the hydropower capacity to 34,092 MW [26]. Through this, the energy and security challenges will be mitigated, since joining the European Union is not currently a priority for Turkey [27]. However, developing the energy sector through clean sources like hydropower, and developing the southern region and increasing the GDP, would push them a step forward to fulfil EU membership requirements in the future.

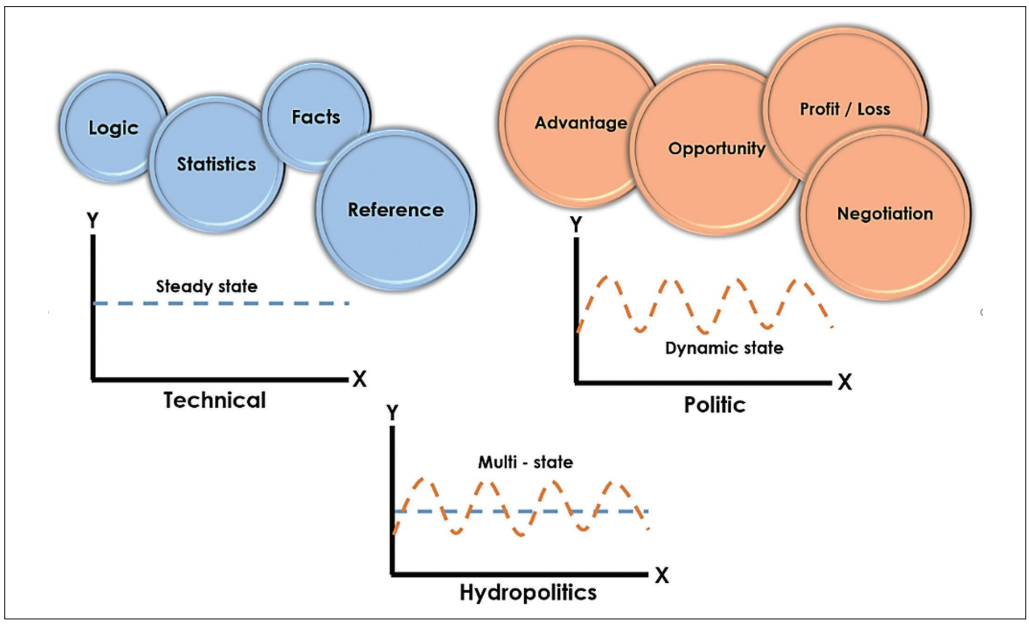
For more than 40 years - the lifetime of the GAP's accomplishment - Turkey worked hard and manoeuvred intelligently in order to gain time and secure the resources to conduct its national project. Perhaps, the proposal for a three-staged plan was one of the tools used to gain time. However, the proposal does sound like a practical approach that includes: 1) establishing a joint, independent technical committee to collect hydrogeological data for the riparian countries; 2) analysing the data in order to understand the demands and requirements per country; and 3) developing a shared formula to allocate the resources appropriately to each of the riparian countries [27]. Regardless of the actual intention behind this proposal, the

three-staged project was indeed the best technical suggestion that would bring the riparian countries together to a round table to communicate. Besides encouraging direct discussion and negotiation, the project would also generate a joint technical committee that includes experts from the three countries. This was the first attempt to shift the conflict from the political level to a technical level, which would be a great move if sustained. Such a direct dialogue would enhance the regional policies regarding water, energy, and food security, and would therefore encourage peace.

6. Negotiation Over The Water

Water negotiation is a challenging task; it carries two different levels of discussion. One is a technical level, where the discussion usually relies on facts, logic, statistics, and references. This type is assumed to have a steady-state environment. Conversely, politicians engage in more dynamic discussions, since they come from entirely different perspectives. In this context, the debate emphasizes profit and loss, opportunities, advantages, and bargaining skills. Managing a hydropolitical negotiation is a hard task because it is a multi-state topic.

Quite a few skills are required for water negotiations, such as knowing the authority level of the opposition negotiator, mastering the negotiation style that will be adopted, and being able to categorize the issues. One needs to avoid discussing broad matters, but rather focus on specific ones. Also, one needs to study in-depth the alternatives the opposition has in order to



Discussion Principles of Water Negotiation and Hydropolitics

define the zone of a potential agreement. These skills will facilitate negotiation rounds and make the discussions fruitful, positive and adoptable, which in turn creates a better opportunity for reaching an agreement.

Further knowledge is needed for the delegations that will address water negotiation. The system's thinking approach is a useful and effective tool for recognizing the areas of conflict, designing a conceptual model for the issue of water shortages, and highlighting the mismatches and gaps that might exacerbate water conflict on both local and regional levels. One of the fundamental concepts of system thinking is the mental models that we have adopted. Mental models are the ideas, beliefs, concepts, and facts that help us visualize the real world. A good example is how downstream countries consider the national development of upstream countries to be a threat. In contrast, upstream countries perceive the downstream countries' objections to water control as a threat to their sovereignty. These different perceptions lead to building preconceived models, which might be incorrect, and more crucially, might lead to creating biases and metaphors that would influence the water negotiations. The mental models might evolve negatively if we encourage these metaphors and adopt them. However, two questions are worth asking: 1) why are these mental models essential for water negotiations, and 2) how relatable are these mental models that we adopted - as individuals or as entities - to the real world?

The mental models are important because they shape our behaviour, form our beliefs, and direct our actions. The metaphors and biases are deep mental models that can often steer our thinking in the wrong direction. The systems' rationale is all about paying attention to these metaphors and updating our mental models to reflect reality better. Most of the mental models that we have without reliable field investigation have gaps; therefore, we should work to evolve them to keep them aligned with the behaviour and actions to ensure better outcomes. This evolution should occur through direct dialogue between the riparian countries in order to mitigate the distrust, bring mental models closer to reality, and ensure better decision making to minimize the risk of the actions taken.

Whenever we discuss water conflict and resolution, we need to go back to the icon of water conflict, which is the massive dams. Dams are a common technique used for water resource management. While few dams are useful, plenty of massive dams might be a threat to peace. The massive dams' negative impact is tremendous, from unleashing the distrust between the riparian countries to causing severe environmental degradation, threatening food security, and leading to socio-economic difficulties. Massive dams, misunderstanding, mistrust, and irresponsible political decisions, are a perfect toxic cocktail that could exacerbate hatred and encourage disputes. Without extreme control in the building of massive dams, water control would be harmful whenever chance and power are with

Euphrates River, Hit city – Water Wheels

By: Hamza Ahmed Sep. 26, 2019

upstream countries. Such behaviour may have been accepted thousands of years ago. Thucydides reflected the school of realism in international relations when he said, «Right, moral and justice, can exist only between equal powers». In other words, only equal powers can negotiate. One of the outcomes of World War II was the establishment of the United Nation and its Charter, whose 3rd principle states that «no one can be stronger than others». This principle has represented one of the essential tenets of European politics for several centuries, after considering the balance of powers as the fundamental principle of international politics. The modern code that emerged shifted the power and gave a better chance to the less powerful countries to negotiate. An excellent example of this matter is comparing the water conflict and resolutions of the Euphrates-Tigris basin to those of the Nile basin. Despite the differences and similarities, and although the downstream country for the Nile basin (Egypt) has a more powerful military source than the upstream (Ethiopia), this would not lead Egypt to win the fight, since modern wars turned to the courts; hence, negotiations emerged as a critical tool.

7. From Conflict to Cooperation, Is It Possible?

Despite the global negative image that potential water conflicts have, statistics show promising records since 1948, with only 37 water conflict incidents versus ~295 agreements that were negotiated/signed [28]. Developing the capacity of negotiation skills and system thinking are needed tools for achieving the ultimate goal and obtaining a strategic agreement to secure sustainable cooperation. However, the possibility of collaboration is infeasible without raising two fundamental questions: 1) is it sufficient to bring in a good experience of tools, like negotiation skills and system thinking, to reach cooperation, and 2) are there intermediate phases between water conflict and cooperation? The following section will answer these questions.

Negotiation skills and system thinking as tools are used to find a water resolution that might alleviate the risk of conflict, but they do not guarantee cooperation. Of course, there is no magic trick that turns conflict into collaboration; instead, it is a process that needs a sufficient understanding of the influence of water hegemony and the potential profits and losses for the riparian countries. This corridor of transformation management needs to be well-equipped in order to pass through it. Hence, water conflict and transformation management require outstanding leadership to turn any water challenge into an opportunity; Zeitoun et al [29] emphasize leadership capacity, where the future of transforming hydropolitical hegemony from asymmetrical to equitable water sharing relies on potential leadership. Knowing the gaps and mismatches through the system thinking approach doesn't only show us where we are; rather, it allows us to know where and when an opportunity might be created from a challenge. Transformation management needs a straightforward discussion and dialogue process to confront and attack the challenges with enthusiasm and confidence, put aside the psychological and cultural barriers, and look at the bigger picture of the Euphrates-Tigris basin. The management needs to pull back the deep old metaphors' tendency for the natural and replace it with innovative approaches that work for the region, while not limiting itself to national plans. Last but not least, it needs to build on the regional strengths of the riparian countries, and avoid the weaknesses.

Albert Einstein said, "We cannot solve our problems with the same thinking we used when we created them". In their book "Managing and Transforming Water Conflicts", D.J. Priscoli and T.A. Wolf [24], extensively describe transformation management approaches in four interaction phases. The four phases were highlighted in four sectors: negotiation level, water claiming, collaboration type, and geographic scope. These phases show the transformation from conflict to cooperation; ten years later, a fifth phase was developed to guarantee sustainability for the entire transformation system[30].

stage	Negotiation stage	Common water claims	Collaborative skills	Geographic scope
1	Adversarial	Rights	Trust building	Nations
2	Reflexive	Needs	Skill building	Watersheds
3	Integrative	Benefits	Consensus building	Benefit-sheds
4	Action	Equlty	Capacity building	Region
5	Sustain	Sharing	Joint projects	Union

Transformation stages for water conflict

The transformation management system showed that real partnership needs significant time, capacity, efforts, resources, and a very strong understanding of the water conflict environment. However, even if the riparian countries reach cooperation, there is no guarantee to keep it sustained, especially under fragile political stability. Excellent examples are the fall of the Adana agreement between Syria and Turkey, and the joint technical committee between Iraq and Turkey that reached a mature stage of cooperation but ended with no strategic agreement. Therefore, sustainable tools such as sharing water resources concerns, conducting joint projects, and proposing a union, would ensure the success of cooperation in the long run, secure the transformation system, and, most notably, reduce the risk of collapse in the worst-case scenario.

Yes, it is possible to walk through the transformation stages, reach the cooperation, and eventually sustain it. This way, peace for the region of the ancient rivers will be secure. In his book "Water, the epic struggle for wealth, power, and civilization" [31], Steven Solomon says, «Who manages the water, manages the civilization».

8. The Future of The Region With or Without Strategic Agreement

Albert Einstein said, «Imagination is more important than knowledge». Let us travel to the future and imagine how the region of the Euphrates-Tigris basin would be 20 years from now under two different scenarios. In the first scenario the riparian countries have reached a strategic agreement, while in the second they have not. Four aspects will be highlighted to visualize the differences; landscape, environment, economy, and people and newspaper headlines.

8.1. Scenario 1: countries achieve a strategic agreement (conceptual model for 2040)

a) The landscape: The 3.8% increase in annual population growth has resulted in more urbanized areas. However,

these demographic changes have not affected the health of the ecosystem. The landscapes' exposure to natural elements have been well protected by the law: the vegetation cover, the natural parks, the forest access and the proximity to water. These factors have been sustained not only quantitatively but also qualitatively with regards to the experience itself. The natural lakes, wetlands, farmland and forest have been very well protected and developed. The marshlands in Iraq have been entirely restored and designed to become natural parks. The natural conservation area Hasankeyf in Turkey has been well secured, and the archaeological sites are well protected from any possible flood that might threaten the area. The natural conservation lake Al-Jabbul in Syria has been well protected from any potential pollution caused by the sewage and the pesticides of the surrounding agricultural fields.

b) The environment: The environment looks rather promising, water quality has improved, and water quantities are better organized and equitably shared. The agriculture sector has been developed such that fewer pesticides and fertilizers are used, and an effective recycling system for sewage water has been implemented so that 40% to 50% of it is recycled. Evaporation has been reduced by over 60%. Laws on extracting the groundwater have been adopted and the countries have agreed to embrace the strategy of water harvesting and reservoir protection. In addition, many wetlands have been registered as protected environmental zones, and some of the lakes have been registered under the UNESCO's World Heritage Programme. Biodiversity in the region is well protected and regularly monitored. Freshwater fish can move freely in the rivers, and their populations are harvested within biological limits. Ecosystems are healthy and functioning, providing valuable ecosystem services to all communities, thanks to the mutual agreements between the riparian countries. Several environmental laws and policies have been established, along with high-value fines if any party breaks them. The quality of the Euphrates and Tigris rivers' water has improved following collective efforts to ensure that treated wastewater discharged to the river meets international water quality standards. The countries sharing the rivers' basins have started an expert working group to evaluate the economic and environmental impacts of tourism in the region, proposing regional standards for water and energy use in hotels, developing low-impact transportation, identifying tourism sectors that can be expanded without damaging the environment, and laying the basis for a design of awareness campaigns for tourists on the region's unique natural and cultural heritage.

c) The economy: The mutual interest and collaboration of the riparian countries have led to a trustworthy system of

commerce. The distrust has been replaced by complex links of economic and security strategic agreements. Statistically, the countries' annual revenue varies between 20 Billion USD to 27 Billion USD, where the GDP has been increased over 2.7% per annum, and free zones have been established to ensure better commercial and economic systems. The new taxation, customs, navigation, general procedures, and policies have been well organized and coordinated between the riparian countries. The market is stable and is rather attractive for investors and international companies. The military manufacturing/importing has been reduced from 210 billion USD/year to 20 billion USD/year, which means diminished over 90% where most of the investment now goes to research and development to empower the innovation industry and to improve the educational system. These economic achievements have attracted global investors to the region, where the countries' investment indicator rate has been increased to be in the top ten global healthy environments for investment, thus leading to the creation of more than 7 million jobs. The vision for 2050 is the cornerstone, where the establishment of Euphrates-Tigris Union (ETU) will be announced and be considered an ideal partner of the European Union to form the biggest united global coalition worldwide.

d) People and newspaper headlines: The people are filled with hope and are proud to pass on a healthy system to the next generations, the violence and crime activities have been reduced significantly, and the agreement between the countries has led to establishing peace in the region and building the future for each country. The citizens recognize the agreement's day as a national day to celebrate the right future path. The experience of the Euphrates-Tigris riparian countries will be a model for the next generations. The experience of the Joint Technical Committee for the Euphrates-Tigris riparian countries is announcing an additional package this week to facilitate the work for the wave of international investors. The United Nations recognizes this experience as a successful case study for the global community and establishes in Iraq an International Institute of Water for Peace (IIWFP). The ETU countries initially fund the institute. During the World Water Summit – Turkey in October 2040, the Iraqi Minister of Water Resources states: "The nation that has the water and the will, will inevitably develop".

8.2. Scenario 2: countries fail to achieve a strategic agreement (conceptual model for 2040)

a) The landscape: The region has changed over the past twenty years to respond to the growing population's needs and the country's drive to keep the economy expanding. There has been a conversion

of forested areas to farmlands. Smaller farms have been bought out and consolidated to create industrial-scale agricultural operations. An increasing portion of the landscape is devoted to extractive industries, including mining and quarries. Natural areas adjacent to cities have also been replaced by new suburban developments, as the growing human populations increasingly seek economic opportunities in and near cities.

b) **The environment:** Water quality issues have increased in the absence of a cooperation framework for the Euphrates - Tigris basin. The river water has not been managed in a coordinated manner, with each country taking the amount it deems appropriate to fulfil its needs. The rivers' levels have declined by at least two meters. Iraq's human settlement as the most downstream country on the Euphrates-Tigris basin has increasingly encountered difficulties in meeting its water needs. The tensions have increased between Iraq and the upstream country (Turkey). Tensions between Iraq and Syria have also increased as Syria has intensified its use of the Euphrates River to increase its water supplies. In general, water quality in the region has decreased due to intensive agriculture, conversion of forested land to farmlands, and poorly managed industrial waste runoff. More particularly, Iraq has not altered its land-use policy to consider the water footprint and avoid cultivating certain crops such as wheat and barley that consume water. As a result of the intensive logging that was allowed, Turkey's lower catchment has been clear-cut with no long-term plan to replace the forests that once stood there. Therefore, erosion on the clear-cut lands has accelerated, and sedimentation of the Tigris River has become a significant water quality problem for the downstream river users. The forests in the border between Turkey and Iraq that once facilitated the infiltration of 80% of precipitation are now gone, leading to dramatically increased surface runoff and consequently increased flash flooding. Iraq and Syria are increasingly angry at Turkey, blaming it for the sedimentation problems in the Euphrates and Tigris rivers, which have impacted the irrigation systems and caused extensive damage by the flooding, as well as affected fisheries, decreasing fish abundance and diversity. Another result of the lack of a regional plan for the Euphrates-Tigris basin is the absence of a cooperation framework for the riparian countries in aquifer sharing. In the past twenty years, the aquifer's riparian countries have intensified their exploitation of the aquifer due to rising populations and the declining availability of surface water from the Euphrates and Tigris rivers. To complicate matters, the sustainable yield of the aquifer has also decreased significantly over 20 years. The aquifer has experienced reduced recharge due to a decrease in the mean precipitation

(because of climate change), and the region has a recharge reduction from the Euphrates and Tigris rivers due to siltation of the riverbed (resulting in reduced hydraulic connectivity between the aquifer and the riverbed). Because of these conditions, as well as pressure, the countries have been forced to drill deeper wells to access the groundwater, and pumping costs have increased accordingly. Since there is no exchange of monitoring data between the aquifer's riparian countries, no country knows how much the others are extracting, and each one blames its neighbours for the declining groundwater levels, and for the resulting increased cost to access groundwater that is further and further away from the surface. The pollutant loads from the Euphrates and Tigris rivers have reduced the fisheries' productivity. Many fishers now spend more boat days at the river to meet their catch targets, catching fish outside of biologically sustainable limits, which shall lead to collapse in the coming years, and therefore to alarming concerns about food security for Iraq and Syria.

c) **The economy:** In the past twenty years, the regional economy has remained productive; however, signs indicate stagnation. Intensive agriculture and confined livestock production have increased in order to meet the region's growing population's food needs and drive economic development. However, that has been done by placing intense pressure on the region's ecosystems, with substantial impacts on the Euphrates and Tigris rivers (elevated nutrient and pesticide levels, decreased productivity of river fisheries, and contamination from animal wastes). The extraction of minerals and metal ore has also intensified. In the absence of strong environmental protection enforcement in the region, many waterways have become impacted by toxic runoff from poorly managed mining waste. Also, logging has increased across the region, with contracts awarded to one or two important foreign firms that tend to bring in their workers to extract the timber. In the absence of a regional plan for the Euphrates-Tigris basin, which could have included economic cooperation provisions, interstate commerce remains difficult and expensive. Complicated procedures hamper shipments of commodities from one country to another at the borders, and governments are increasingly assessing high import fees on goods originating outside their borders to protect national interests. The result is that while GDP across the region has increased (due to increased logging and agriculture), the annual per capita income has stagnated, with the purchasing power of the average citizen continuously decreasing over the past twenty years. People have become increasingly worried about their financial security and do not have an optimistic outlook on the future.

d) People and newspaper headlines: The newspapers tend to focus on the increasing tensions among the countries in the region, highlighting how one country often blames its neighbours for their economic or environmental woes. The Euphrates-Tigris basin is a connected ensemble of ecosystems and communities. Each country sharing the bay has instead decided to manage their territories as an isolated, unconnected part of the broader system. This has led to a lack of cooperation and unsustainable use of the basin's natural resources, leading to severe environmental degradation that will be the legacy for the next generation. The tensions have caused a dispute between the three countries (Turkey, Syria, and Iraq), with the downstream hosting the Turkish oppositions that supports them to create more pressure on the Turkish government. Military bases have been built close to the borders of each country, reflecting the adopted escalation policy. The issue-linkage strategy has led Turkey to implement more water projects without consultation with the downstream, which eventually causes severe drought and environmental degradation. As a result of the geopolitical disputes and the desertification, the downstream people have been displaced. Intensive and successive waves of immigrants' flow to Europe from the Middle East causes global security concerns, demographic and cultural challenges, and increased tension between Europe and Turkey where the former blames the latter for lack of border control.

9. Conclusion and Recommendations

Water conflict and resolution are complex systems with multidimensional challenges; they require deep consideration and knowledge within different sectors. The Euphrates-Tigris basin and the riparian countries are critical for deciding where the region is headed. The decision would shape the region for upcoming generations. A sustainable resolution would never emerge under tensions; instead, it needs extraordinary leadership to negotiate the water and turn the challenges into an opportunity that could reflect the entire region's prosperity. The negotiation itself in this context is not the goal; rather, understanding the journey's dynamics to reach sustainable cooperation is the ultimate goal. The Chinese philosopher Lao Tzu, in 500 BC., described the Philosophy of Water «Wild and Well»:

> *Be humble: flowing from high to the low.*
>
> *Be flexible: whenever you find an obstacle or rock, it will turn around.*
>
> *Be polymorphic: different states (liquid, gas, concrete).*
>
> *Be adaptive: take the shape of the place.*

When we negotiate water, we should follow the philosophy of water flow, the

rule of the element that we are negotiating for, and the reason that gathers us on a round table. We should always keep the negotiation's momentum to support a healthy environment and better understand our partners.

The time factor is a crucial element to obtain agreement; understanding the power of time is essential since each passing moment brings challenge or reveals an opportunity. Heraclitus, the Greek philosopher, said, «You cannot step into the same river twice, for other waters are continually flowing on». This profound statement shows the power of time; it means that the world continually changes and that no two situations are the same. As water flows in a river, one cannot touch the same water twice when one steps into a river.

The following recommendations are fundamental for the Euphrates – Tigris basin to reach a sustainable water resolution:

- Reactivating the three-stages project proposed by Turkey, encouraging the riparian countries to join and empower the joint technical committee's proposal. The committee will work on a technical level to pull back the regional water resources management from the political realm to a technical one. The three-stages project will encourage the development – linkage approach that would link the quantity of water shares for each country to the development plans. More development leads to more water shares.
- Establishing a comprehensive leadership program including Dialogue and Mediation aspects by gathering experts from different disciplines and backgrounds (experts, politicians, and civil society), the idea being to gather them on a round-table to ensure a broad spectrum of participants in order to tackle the challenges and come up with practical solutions.
- Modelling the transformation management tool and customizing it for the regional scale to illustrate the status from water conflict to cooperation, in particular for the decision-makers. This would help recognize the potential sectors for cooperation, and reveal the gaps.
- Encouraging the role of incentive policy through joint strategic projects to foster the riparian countries' economy and security. This includes establishing a joint research centre to conduct research and develop the capacity building for water diplomacy, sustainable development goals, and most importantly, leadership and public policy. One of the objectives of this centre would be to establish an integrated database to be used by the riparian countries for future projects, and to monitor the progress of the water management system.
- Conducting a regional evaluation for the commissioning of dams and for a feasibility study of the currently existing dams. Although Iraq is more in need of regulators than dams, two

strategic dams need to be completed (Makhoul and Bekhme dams). Cooperation with Turkey to use the Ilisu dam as an additional hydropower source is also a possibility that would result in increasing the water allocation for Iraqi marshlands on one side, and in securing the Hasankeyf ancient town and the nature conservation area on the other side.

- Governing and centralizing water resources such that there are fewer possible stakeholders, in order to avoid potential conflicts of interest and unnecessary bureaucracy.
- Developing regional awareness campaigns to highlight the factsheets of the water challenges and climate change influencing the region. Water education should be considered fundamental, and should start in primary school.
- Requiring the riparian countries to develop a mathematical model for possible floods and droughts, using the metrological records' patterns, and taking into consideration that climate change is a fundamental factor for the region.
- Employing modern technology as a legal requirement in the riparian countries, particularly Iraq and Syria. The current irrigation system is outdated and needs to be replaced with a sophisticated one that has a closed drainage system and a modern piping network to reduce water losses due to evaporation. Smart irrigation techniques are highly needed to increase agriculture efficiency.
- Developing a regional map for the riparian countries that shows the key strategic crops (i.e., wheat, barley, rice, corn and dates), in order to encourage production according to a lower water footprint and establish financial support initiated by the agricultural sector.
- Leading a comprehensive and integrative investigation of groundwater reservoirs, in order to estimate the groundwater quantity and quality on a regional scale.

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