UNCHARTED WATERS OF THE MIDDLE EAST: RE-VISITING THE EUPHRATES-TIGRIS CONFLICT IN TROUBLED TIMES

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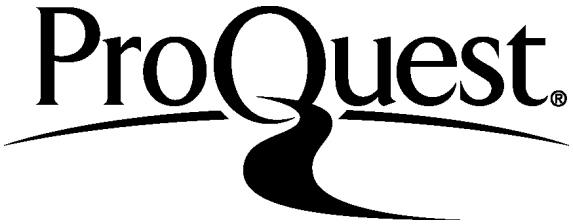

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ABSTRACT

This study was set to explore the link between hydro-politics and hydro-developments in the Euphrates-Tigris basin. Turkey, Syria and Iraq have exploited the Euphrates and Tigris Rivers through unilateral, large-scale ambitious projects over the past half-century. Although these extensive damming and irrigation activities have caused drastic changes in the hydrological characteristics of the rivers, our argument here is that the main reason the dispute deteriorated, was due to the national security perceptions of riparian countries, which have been driven by historical mistrust, ideological rivalry and ethno-religious conflicts. Water has been another dynamic catalyst to already complex interstate security relations. At this point, a hydro-hegemony framework appears to be a simple, but comprehensive analytical tool for examining the water-power-conflict nexus. Issue-linkage strategies have been an effective source of bargaining power to narrow the power gap among riparians. Water conflict in the Euphrates-Tigris basin will become more difficult to manage since inherited problems from the past are coupled with complex demographic, climatic, and political challenges. Lack of reliable data, efficient irrigation and agricultural practices, and effective demand management policies further complicated the situation. Riparian countries can only cope with the difficulties of the future through collaborative action.

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TABLE OF CONTENTS

www.manaraa.com

www.manaraa.com

LIST OF TABLES

www.manaraa.com

LIST OF FIGURES

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CHAPTER 1

INTRODUCTION

Historical Context

The Euphrates and Tigris rivers, both of which have their sources in the highlands of eastern Turkey, are critically important water sources to both the Middle East and southwest Asia. The land between them, historically known as Mesopotamia, has rich fertile soils, and was home to many ancient civilizations. The Euphrates and Tigris are the '*exotic*' rivers of the region, and pass through different climatic, topographic and demographic zones in their journey.[1] Water history of these two rivers goes back to 10,000 BC and the great civilizations of the Sumerians, Acadians, Babylonians and Assyrians who lived there, and who first developed what has been termed 'hydraulic civilization'.[2] In addition, the famous code of King Hammurabi, which is known as the first printed law in human history, comprised nearly 300 sections of irrigation rules. Finally, the first, but also last known war over water occurred more than 4, 500 years ago along the Tigris Basin, between the states of Lagash and Umma. After the collapse of the Ottoman Empire, which for centuries had been in control of the entire region, at the beginning of the 20th century, the three modern states of Turkey, Syria and Iraq were founded. These three countries are riparians of the basin.

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[1] Frederick M. Lorenz and Edward J. Erickson, *The Euphrates Triangle: Security Implications*
[2] Dogan Altinbilek, "Development and Management of the Euphrates-Tigris River Basin", Water Resources Development, Vol.20, No.1, March 2004, p.15

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Figure 1: The Euphrates-Tigris Basin and general overview of 'Fertile Crescent'

The history of Mesopotamian hydraulic-civilizations is as old as mankind, and is accepted as one of the regions that gave birth to hydrology.[3] Despite unfavorable climatic and geographic conditions, human genius since ancient times has been successful in benefiting from water utilization to bring life and prosperity. This has enabled the transformation of this arid region into a ' Cradle of Civilizations'.[4] The link between innovation and irrigation has been a decisive factor in the rise and collapse of early civilizations. The availability of water for irrigation and domestic use by sophisticated techniques, and flood control practice that has been enhanced,

[3] Daniel Hillel, Rivers of Eden: The Struggle for Peace in the Middle East (New York: Oxford University Press, 1994) p. 97-98

[4] Historically, the ancient city-states of Mesopotamia in the Fertile Crescent are most cited by Western and Middle Eastern scholars as the 'Cradle of Civilization'. The convergence of the Tigris and Euphrates rivers produced rich fertile soil and a supply of water for irrigation. The civilizations that emerged around these rivers are among the earliest known non-nomadic agrarian societies.

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allowed the possibility of supporting large populations and complex city-states.[5] The historical location of water utilization activity has mostly been in the lower parts of the basin, which is now Iraqi territory. The scale of the development has varied from small diversion facilities to more complicated engineering works such as the Nahrawan Canal.[6] However the main characteristics have not changed until modern times; only a small proportion of water from both rivers was being utilized for human activities, which prevented any conflict over water utilization.[7] Another explanation for the relatively peaceful utilization pattern might be the fact that the Euphrates-Tigris basin had been customarily ruled by one strong centralized government, and did not have a real transboundary character. As a result, until the end of the Ottoman Empire, which governed the whole region for almost 400 years and was the last example of this powerful administration,

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[5] During the peak of these two civilizations, the land between the rivers supported as many as 20 million inhabitants.
Also See R. Andrew Lien, *Still Thirsting: Prospects For A Multilateral Treaty On The Euphrates And Tigris Rivers Following The Adoption Of The United Nations Convention On International Watercourses,* Boston University International Law Journal (Spring, 1998) p. 20;
Mehmet Ugur, *Strategic Factors In Developing Effective Transboundary Water Resources Regimes The Case of Tigris-Euphrates Basin,* A Thesis Of The Fletcher School of Law and Diplomacy, 2009, p.65; Marwa Daoudy, *The Geopolitics of Water in the Middle East: Turkey as a Regional Power*, p.396;
Scott L. Cunningham, Do Brothers Divide Shares Forever: Obstacles to the Effective Use of International Law in Euphrates River Basin Water Issues

[6] Nahrawan Canal is one of the most impressive ancient hydraulic structures. It was built in the 6th century C.E. in order to convey water from the Tigris eastward to extend the area of irrigated land almost to the Persian frontier. Canal was nearly 300 km long and about 30 m wide.
Daniel Hillel, Rivers of Eden: The Struggle for Peace in the Middle East, p. 98

[7] Peter Beaumont, Restructuring of water usage in the Tigris-Euphrates Basin: The impact of modern water management policies, *Coppock, J. and Miller, JA Transformation of Middle Eastern Natural Environments: Legacies and Lessons, 113*(168), p. 169. Retrieved from http://environment.research.yale.edu/documents/downloads/0-9/103beaumont.pdf

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this watercourse system had national character, and river utilization was not a significant issue. [8]

When the three nations namely Turkey, Syria and Iraq were founded on the past legacy of the Ottomans after World War I, the Euphrates-Tigris waters became a matter of international affairs, and was the subject of several bilateral agreements in the early nation-building period of the three riparian countries. Although there had been several territorial conflicts between the three riparians in that period relations were reasonable and water issues were resolved in a collaborative rather than contentious way. Although history provides us with little evidence of conflicts arising out of the use of the Twin Rivers, the situation has changed acutely in the second half of the 20th century as each riparian discovered the huge potential of rivers, and embarked on large-scale water development schemes. The rivers that had given life to this arid region for thousands of years started to be hotly contested by riparian countries as is evident in other transboundary river basins of the Middle East. The basic characteristics of this developing contestation has been: prioritization of domestic projects and national priorities without any consideration given to the needs of other riparian states and river ecosystems, and lack of institutional capacity to plan, implement and operate processes in a sustainable manner. Ultimately resulting in a zero-sum game approach, which consists of winners and losers. John Kolars, one of the leading experts on Middle East water resources, has

[8] Mehmet Ugur, *Strategic Factors In Developing Effective Transboundary Water Resources Regimes The Case of Tigris-Euphrates Basin*, p. 65

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ranked over-ambitious river development efforts in the Middle East and their commonalities.[9] The Euphrates-Tigris basin has shared the same fate, whilst the development processes started with holistic visions of what might be accomplished by 'taming a river'; the social and environmental consequences of unilateral actions were not carefully considered. The separate planning and development, and lack of coordination among riparians in the last half century, has made the situation worse, instead of the matter being resolved. Through various projects the three riparian countries have achieved massive storage and extensive irrigation capacity, which has placed pressure on natural flow regime in the basin. Although there have been some cooperative efforts between the riparians to prevent serious conflict in the last half of the 20th century, inter-state relations have been tense, not only because of water issues, but also as a result of regional conflicts. During 1974-1975 and the early 1990 period, when the major upstream storage facilities were being impounded, riparian relations were extremely tense, and nation states were on the brink of armed hostility. Two bilateral agreements were signed during this conflictual period, namely: between Turkey and Syria, and between Syria and Iraq. These agreements were concentrated solely on allocation of river flow and lacked any holistic vision to solve the problem. So although there was lack of basin-wide water agreement, these separate bilateral agreements have created a de facto settlement.

[9] Asit K. Biswas, *International Waters of the Middle East: From Euphrates-Tigris to Nile* (New York: Oxford University Press, 1994).

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Riparian relations were developed from Millennia time until the beginning of the Syrian uprising in 2011. The hostile relations were replaced by more cooperative and creative approaches, in which riparian countries collaborated on various issues from environmental conservation to climate change mitigation measures. Despite the existence of some treaties, protocols and other agreements, exploitation of the Euphrates and Tigris rivers has remained a major source of friction in relations between the three countries.[10]

Defining the Problem: A Policy Perspective-What went wrong?

Although we will try to analyze the hydrological aspects of water conflict in the Euphrates-Tigris basin in a separate chapter, to gain an understanding of the political dimension of conflict, we need to briefly touch on how hydrologic interdependencies shaped the political and economic life of the land between the two rivers, and provided a structure for the legal disputes over water in the Mesopotamia today. Managing water resources among competing demands has always been challenging. This situation has been exaggerated by the climatological characteristics of the Euphrates-Tigris system, as in the case of many arid and semi-arid basins, such as high seasonal and multi-annual fluctuations; and which makes sustainable river management extremely difficult even within the boundaries of a single

[10] R. Andrew Lien, *Still Thirsting: Prospects For A Multilateral Treaty On The Euphrates And Tigris Rivers Following The Adoption Of The United Nations Convention On International Watercourses,* p.275

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nation.[11] Physical geography also has been another factor that has determined the nature of hydrologic dependencies of riparians and their overall needs. Almost all of the Euphrates flow, and a considerable amount of the Tigris flow are generated in upstream Turkish territories.

Despite the fact that hydrologic and geographic factors have been influential in the context of conflict, the main reason for worsening dispute is rather the unilateral and uncoordinated water development projects of riparian countries that began to stress the river system's capacity and ultimately lead to destabilization of the basin.[12]

In the 20th century, particularly in the second half, the Euphrates-Tigris basin has witnessed the implementation of extensive multi-purpose water resource development projects, with the construction of dams, reservoirs, hydropower plants, and flood protection schemes. However, the most significant change during this time was the shift in location of water management activity, and the type of water controls introduced. Since then emphasis has switched from downstream water diversions to large-scale upstream storage facilities, and that paradigm shift in the pattern of water usage has had a profound effect on all aspects of development within the basin.[13] In order to understand this paradigm shift and its role in conflict, we need to carefully look at the driving factors, so as to come up with an answer

[11] Mehmet Ugur, *Strategic Factors In Developing Effective Transboundary Water Resources Regimes The Case of Tigris-Euphrates Basin*, p.56

[12] Aysegul Kibaroglu, Waltina Scheumann, Evolution of Transboundary Politics in the Euphrates-Tigris River System: New Perspectives and Political Challenges, Global Governance 19 (2013), p. 279

[13] Beaumont, *Restructuring of water usage in the Tigris-Euphrates Basin: The impact of modern water management policies,* p. 171.

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for the question of: Since history provides little evidence of conflict in the basin, why did riparian countries need to initiate extensive development projects that caused conflict; what went wrong?

Economic Development Problematique

Achieving social and economic development has been a standing goal for all the governments of the region.[14] After nation building efforts during the first half of the 20th century, all three riparian countries embarked on extensive development initiatives for various reasons. Ever-growing population in the basin has been the main factor of the development needs for these countries, which in turn has impacted the pace and type of development. The region's population growth has been exceptionally high over the past half century and has put great pressure on riparian countries, for the availability of water. The total population of the Euphrates–Tigris Basin countries is around 131 million, 22 million of whom live in Syria, almost 33 million in Iraq and more than 74 million in Turkey.[15] According to recent World Bank projections, by 2050, the total population of the basin will be more than 200 million.[16] Another salient point is the overall population growth rate of riparians, which has been 2.3 percent for Syria and 2.9 percent for Iraq whilst the

[14] Munther J. Haddadin, Water Issues in the Middle East Challenges and Opportunities, Water Policy 4 (2002), p. 214

[15] http://data.worldbank.org/indicator/SP.POP.TOTL

[16] http://databank.worldbank.org/data/reports.aspx?source=Health%20Nutrition%20and%20Population%20Statistics:%20Population%20estimates%20and%20projections

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world average is around 1.3 percent. Turkey's population growth rate is relatively small, and has decreased to world average levels.[17]

Significant population impetus has lead to increased development efforts for food and energy security for growing populations. This has led to a turning point in the basin; upstream multi-purpose projects were implemented in a unilateral fashion, without consideration of riparian and environmental needs. Food and energy security have not been the only focus of economic development; rather they have been two important pillars of a wider concept, which is national security.

National Security Perceptions

National security perceptions have been the dominant phenomenon in the basin, one which has impacted severely the course of conflict and riparian relations. The past legacy of political mistrust and regional rivalry between riparian countries under the Cold War structure has transformed water conflicts from technical issues to being a showcase of greater contention. The Euphrates-Tigris dispute therefore, cannot be understood without the consideration of regional issues such as border insecurity, and covert support of regime opponents against one another, which has paralyzed relations more seriously.

Large-scale irrigation and hydropower projects that were initiated in the 1960s were perceived by downstream riparians as threat risks to their national securities, and they tried to block these activities through various

[17] http://data.worldbank.org/indicator/SP.POP.GROW

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means. This security misperception promoted the policy of self-reliance in each riparian country, which resulted in the prioritization of domestic projects and national priorities. Food security has been an important pillar of this policy and has had a significant impact on the intensification of disputes as it caused the over use of water in irrigation, in spite of poor economic returns. Within this context, national security translated into food security, and food security translated into water security. As a result access to water resources has been regarded as an important means of power in the region, which has led to extensive, large-scale unilateral development efforts to appropriate as much water as possible. Since international law has not been an adequate tool for dispute settlement, riparians have been unable to agree on which set of international legal standards should be employed to reach a permanent tripartite treaty that would 'share' (Syrian and Iraqi terminology) or 'allocate' (Turkish terminology) the river's flow amongst them.[18]

[18] Mehmet Ugur, *Strategic Factors In Developing Effective Transboundary Water Resources Regimes The Case of Tigris-Euphrates Basin*,

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CHAPTER 2

Hydropolitics in the Euphrates-Tigris Basin

This chapter examines the transboundary water relations in the Euphrates-Tigris basin between Turkey, Syria and Iraq during the last 100 years and the evolution of these relations from competitive-unilateral actions to cooperative-institutional collaboration over four consecutive periods, namely:

i) *Harmonious Nature of Relations*, which was observed between the years (1920-1960), where river utilization was limited and domestic politics and nation-nation building efforts prioritized.

ii) *Contentious Nature of Relations*, that was apparent in the 1960-1980 period, after the re-discovery of socio-economic potential of rivers by upstream riparians, which caused shift in location, and type of water development.

iii) *Conflict-Driven Nature of Relations*, which has been the most complex period, dominated by regional security issues, and evident in the 1980s-1990s.

iv) *Cooperation-oriented Nature of Relations*, the period started at the millennia and ended by 2011, in which relations were transformed from hostility to cooperation with overall development of bilateral relations.

Our goal in this part of the work is to understand: how transboundary water relations evolved in the region during the last 100 years, what the characteristics of each consecutive period are and how these are reflected in

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legal texts of that period, and how national water policies are re-oriented by consideration of power dynamics and regional developments.

Before starting to analyze each period separately and in detail, we first need to define the political aspects of the problem, and leave the hydrologic aspects for the next chapter.

Harmonious Nature of Relations: Past Legacy and New Strategic Orientations

Throughout history, the Euphrates-Tigris basin had been almost entirely ruled by unitary authorities under different empires. The Ottoman Empire, which ruled from the 16th century to the early 20th century, was the last of these empires to govern the region.[19] During this time period, Euphrates-Tigris waters did not have international statue, and since water utilization was not significant, no conflict occurred for a long period of time. After World War I, Ottoman rule came to an end. The geopolitical map of the Middle East changed dramatically, which resulted in a British mandate over Iraq, a French mandate over Syria, and an independent Turkish state in residual Anatolia. For the first time in Mesopotamian history, hydro-politics became an issue of international relations.

The first efforts in terms of water resource management along the Euphrates-Tigris Rivers in the early 20th century focused on engineering facilities in downstream areas in order to control the flow of the rivers. The Hindiya Barrage, located on the Euphrates, was built in Iraq between the

[19] Salih Korkutan, *The Sources Of Conflict In The Euphrates-Tigris Basın And its Strategic Consequences in The Middle East*, Naval Postgraduate School Monterey, California 2001, p.13

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years 1911 and 1914 during the Ottoman Era, and was based on a British Engineering report that had been prepared by engineer William Wilcox.[20] Colonial powers continued their efforts through data collection and improving canal structures, and these experiences became the basis of early Iraqi development projects.[21]

Modern Iraq inherited the ancient legacy of being the largest user of the Euphrates-Tigris Rivers,[22] and not surprisingly, was the first country that sought the ways of developing Twin Rivers. Whilst under British mandate, the Department of Irrigation had already been established and the first data collection and irrigation projects initiated. After the British mandate, Iraqi efforts to harness the Euphrates-Tigris Rivers continued with organizational restructuring, and several dams and canals were built to add to existing ones.[23] Until the 1970s, Iraq had been the exclusive user of both rivers with almost a 30 BCM per year consumption, compared with Syria at 2 BCM, and 820 MCM for Turkey.[24]

Syria had to wait until the 1950s, after World War II, with the introduction of motorized pumps, to initiate the first utilization projects in

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[20] Salih Korkutan, *The Sources Of Conflict In The Euphrates-Tigris Basın And its Strategic Consequences in The Middle East*, p. 13-14

[21] Mehmet Ugur, *Strategic Factors In Developing Effective Transboundary Water Resources Regimes The Case of Tigris-Euphrates Basin*, p.66

[22] Joseph W. Dellapenna, "The Two Rivers and the Lands Between: Mesopotamia and the International Law of Transboudary Waters," BYU Journal of Public Law 10 (Fall 1996), p. 222

[23] Salih Korkutan, *The Sources Of Conflict In The Euphrates-Tigris Basın And its Strategic Consequences in The Middle East*, p. 15

[24] Joseph W. Dellapenna, "The Two Rivers and the Lands Between: Mesopotamia and the International Law of Transboudary Waters, p. 223

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her territories. Although Syria was slower than Iraq to make use of this new technology, irrigated areas in Syria increased significantly from 295,000 ha to 657,000 ha, between the years 1945 and 1960. By comparison the amount of water that Syria was extracting remained small, around 2-3 BCM, and did not affect downstream developments.

Although the Euphrates and the Tigris provide substantial water and potential for economic and agricultural development, Turkey did not harness that potential until the late 1960s, when the demand for electrical energy emerged as the most urgent priority. First studies were initiated in the early 1930s, with the establishment of the Electrical Resources Survey and Development Administration (EIEI is the Turkish acronym) in 1936. The purpose being to survey water resources in Turkey, and identify the hydro-electrical potential of the country, which could be utilized to meet national electricity needs. The agency initiated intensive studies all around the country, particularly in the Euphrates-Tigris basin, to assess the potential of rivers; and built the first hydrometric station on Euphrates in 1936 and on Tigris in 1947.[25] Another remarkable institutional development of that early period was the establishment in 1953, of the General Directorate of State Hydraulic Works (DSI is the Turkish acronym). DSI has been the most influential actor in Turkish water resource management structures since then. DSI launched reconnaissance studies in the basin, and completed initial

[25] Salih Korkutan, *The Sources Of Conflict In The Euphrates-Tigris Basın And its Strategic Consequences in The Middle East*, p. 16

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development plans that envisaged the construction of three dams on the lower Euphrates and five dams on the Tigris.[26]

Hydropolitical relations among the three riparians from the early 1920s until the late 1950s can be characterized as harmonious.[27] Although there had been some initial efforts to utilize river flow, none of the countries engaged in major development projects. The inefficient and ineffective development and management practices of riparians due to lack of financial and institutional capacities had no significant impacts on the quantity and quality of water, as the amount of water used was very small.[28] Riparian countries experienced a period of political instability after their independence, and focused on nation-building efforts; water resource utilization was not a priority in that early period. However, the first hydro-development plans developed in that period of time, which would shift the location and type of water development.

A series of bilateral treaties were signed between the mandate power France on behalf of Syria and Turkey, and between Turkey and Iraq in this period. Although partners and issues handled differed, the fundamental characteristic of the legal arrangements were their focus on cooperation, rather than dispute settlement. British and French mandates agreed to consult over the uses of the rivers, and established a consultative committee

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[26] Salih Korkutan, *The Sources Of Conflict In The Euphrates-Tigris Basın And its Strategic Consequences in The Middle East*, p. 16
[27] Aysegul Kibaroglu, Transboundary Water Relations in the Euphrates-Tigris Basin, *Water Law and Cooperation in the Euphrates-Tigris Region*, p.66
[28] *Ibid.*, p. 66

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for this purpose.[29] The first legal arrangement among riparian countries was an agreement between France and Turkey in Ankara in 1921. This agreement put an end to the state of war and aimed to promote peace between the two nations. *Article 12* of the treaty stated the right of the city of Aleppo in using Euphrates water from Turkish territory to satisfy water demand in the city. *The Lausanne Peace Treaty*, which regulated several regional issues among riparian countries, did not include any detailed provision addressing the status of the Euphrates-Tigris Rivers. However, in Article 109 there is emphasis on the need for dispute settlement should any negative consequence occur for any party after confirming new frontiers.[30] *The Convention of Friendship and Good Neighborly Relations between France and Turkey* was concluded in 1926. The aim was to strengthen cooperation and friendship between France and Turkey, and again addressed the topic of water supply for the city of Aleppo with emphasis on the commitment by both parties to coordinate their plans for the use of river flow. The Tigris River was mentioned for the first time in a protocol between France and Turkey with the purpose of delimitation of the Turkish-Syrian frontier. One of the most important legal texts of that period, which shows the harmonious nature of the relations concerning water issues between riparians, particularly Iraq and Turkey, was the Protocol annexed to the

[29] Joseph W. Dellapenna, "The Two Rivers and the Lands Between: Mesopotamia and the International Law of Transboundary Waters, p.237
[30] Lausanne Peace Treaty: http://www.mfa.gov.tr/lausanne-peace-treaty.en.mfa

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Treaty of Friendship and Good Neighborly Relations in 1946.[31] This protocol has been a remarkable step in basin timeline since it included quite far-reaching rights and obligations for both parties, such as consultation, prior notification, joint monitoring, data sharing, and technical cooperation.[32]

To conclude, the basic characteristics of that initial period were;

- Water consumption was not at significant levels, as riparian countries were mainly concerned with their own urban and rural populations.
- There were very few large-scale development projects, most were located in downstream regions, and were not sufficiently consumptive to become matters of dispute.
- Riparian countries focused on domestic issues and establishment of organizational structures for water resources planning and management.
- Legal texts of this initial period were cooperative in manner, however they lacked executive standards and institutional bodies to realize them.

[31] Aysegul Kibaroglu, Transboundary Water Relations in the Euphrates-Tigris Basin, *Water Law and Cooperation in the Euphrates-Tigris Region*, p.67

[32] Max Planck Institute for Comparative Public Law and International Law, *Max Planck Compilation of International Treaties and Other Documents Relative to the Euphrates and Tigris*, p. 4

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Contentious Nature of Relations: Hydro-Development Imperative

Although relations had been mostly cooperative and harmonious in the period 1920-1960, it was becoming obvious in the late 1950s that this situation was not going to continue for much longer, as each riparian began planning to exploit the potential of the Twin Rivers. All three riparians initiated major development projects to improve socio-economic conditions, and further consolidate their regimes, resulting in relations between them becoming more tense and competitive.

At the beginning of the1960s, Turkey and Syria put forward ambitious energy and irrigation projects, while Iraq was announcing new schemes for an extension of its irrigated area. [33] Unlike early utilization efforts, projects in this period differed in scale and water consumption. The most important and critical change from ancient times was the shift in location and the type of controls introduced in the basin, by which the emphasis of development switched, from downstream diversion to upstream water storage facilities. [34] In this section we will explore the impetus behind that shift, and try to understand how it shaped the overall political atmosphere and course of water conflict in the region.

Iraq's utilization of the Euphrates and the Tigris Rivers is as old as the history of humanity. It was not surprising therefore to observe the first

[33] Ayşegül Kibaroğlu, *Building a Regime for the Waters of the Euphrates and Tigris River Basin*, (London: Kluwer Law International, 2002), p.170
[34] Beaumont, *Restructuring of water usage in the Tigris-Euphrates Basin: The impact of modern water management policies,* p. 171.

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efforts of development in modern times occur in this part of the basin.[35] The main reason behind this occurrence is Iraqi dependency on the Euphrates and Tigris waters. Although for Syria and Turkey it has been a regional developmental issue, most Iraqi land lies in the Euphrates-Tigris basin and both rivers constitute 98 per cent of Iraqi water supply; for Iraq the Euphrates-Tigris is a matter of life and death in the same way that Egypt depends almost entirely on the river Nile.

In the beginning of 1950s, the newly established Board of Development and Ministry of Development intensified planning efforts to utilize the Euphrates-Tigris Rivers, and several dams and canals were constructed with the assistance of international companies.[36]

Since the majority of upstream developments were situated on the Euphrates and water available for Iraqi consumption had been gradually limited, Iraq prioritized its development efforts on the Tigris. Although Turkey has started to construct several projects on Tigris within the framework of GAP project, they were not intended for consumptive usage.[37] Another significant advantage that the Tigris offered to Iraqi planners was diversion of additional water to Euphrates for meeting any of its shortfalls. This need had been realized by the Thartar Canal (Depression) in 1950 that was built between the Twin Rivers, northwest of Baghdad, and with a surface

[35] Mehmet Ugur, *Strategic Factors In Developing Effective Transboundary Water Resources Regimes The Case of Tigris-Euphrates Basin*, p.77
[36] Ayşegül Kibaroğlu, *Building a Regime for the Waters of the Euphrates and Tigris River Basin*, p.206
[37] *Ibid*., p.209

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area of 2710 km^2. Its total capacity is twice that of Ataturk Dam, the largest scheme in Turkish development plans, and has played a strategic role in preventing floods from the Tigris and alleviating water shortages in the Euphrates basin. In addition to the Thartar Canal, Iraq built the Euphrates Dam and the Samara Dam during the 1955-1956 period, thereby increasing its flood control capacity. Moreover, Iraq has embarked on extensive irrigation projects and initiated the Kirkuk Irrigation Project that involves irrigation of more than 300,000 ha, and the Jezirah Irrigation Project that aimed to irrigate 250,000 ha of land.[38]

Although remarkable infrastructural development was realized in this period, the outcome was not promising due to the failure of land use policies, chronic soil salinity and waterlogging problems, as well as political instability. More than one million people were working in agriculture during the 1950s, and Iraq was a wheat and rice exporter. However, after transforming from being mainly an agricultural country to an oil-producing semi-industrial nation, Iraq became a food importer.

Syrian experience with water development schemes regarding the Euphrates started in the early 1960s with the Euphrates Valley Project when the Ba'ath Party came to power. The Syrian economy had been based on agriculture so as to increase the share of agricultural output in GNP, and to meet the challenges of rapidly rising energy and food demands. In response to this imperative, the government of Syria made plans to build a large dam

[38] Ayşegül Kibaroğlu, *Building a Regime for the Waters of the Euphrates and Tigris River Basin*, p.210

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on the Euphrates River in its first 5-year development plan.[39] Although the project was envisaged by the French in 1927, actual realization of the project was only made possible in 1963, with technical and financial assistance from the Soviet Union. The Euphrates-Tabqa, later renamed al-Thawra (meaning 'revolution' in Arabic) finally became operational in 1973.[40] Tabqa Dam was designed to: be the centerpiece of the Euphrates Valley Project, prevent seasonal flooding, generate 11.7 BCM storage capacity to irrigate 640,000 ha of land, and provide 60 per cent of the electricity needs of the country. However, these objectives could not be fully realized after more than 40 years because of its inappropriate design and over-estimated irrigation targets. The Syrian government controversially rescheduled its irrigation targets to 370,000 ha, after realizing the adverse affects on the scheme by: high gypsum levels in the soil, salinization caused by over-pumping, and collapse of canals due to seepage.[41]

Another reason for the failure was the ulterior motive of the Ba'athist regime to use agricultural development as a means of extending their authority, and recasting social class structure whereby small farmers had to

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[39] Ayşegül Kibaroğlu, *Building a Regime for the Waters of the Euphrates and Tigris River Basin*, p.194

[40] Patrick McQuarrie, *Water Security In The Middle East: Growing Conflict Over Development In The Euphrates-Tigris Basin*, Thesis, M.Phil International Peace Studies Trinity College, Dublin, Ireland, 2003, p. 30;
Ayşegül Kibaroğlu, *Building a Regime for the Waters of the Euphrates and Tigris River Basin*, p. 197

[41] Natascha Beschorner, "Water and Instability in the Middle East" *Adelphi Paper* 273, (London: Brassey's for the International Institute for Strategic Studies, 1992), p.33
John F. Kolars, "Problems of the International River Management: The Case of the Euphrates" in Biswas Asit K. (ed.) *International Waters of the Middle East: From Euphrates to Nile* (New York: Oxford University Press, 1994), p 81-82;

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gather around state cooperatives and consequently became totally dependent on the state.[42]

Recognizing the potential of the Euphrates-Tigris Rivers in promoting the development and prosperity in the region and overall country, Turkey started its attempts to utilize the primarily waters of the Euphrates in the beginning of the 1960s after reconnaissance studies of DSI in 1957. The Euphrates and Tigris rivers provide almost one-third of Turkey's available surface water supply, and its potential was not been exploited until the 1960s. Different imperatives were instrumental for bringing about these remarkable changes, ranging from hydroelectric energy production, to irrigating fertile lands, and creating jobs to alleviate poverty.[43]

Keban Dam, initiated in 1965, was the first large-scale dam to be built by the DSI for the generation of hydroelectricity, and to prevent extreme fluctuations of the river flow by maintaining a minimum of 400 m^3/s, and a maximum flow of 1000 m^3/s.[44] With 17 BCM of active storage and 1240 MW of installed capacity, it was planned solely for hydroelectricity generation, thus the volumes of water flowing downstream remained constant and did not cause any serious reaction. To finance the dam, Turkey appealed for foreign aid, and finally started negotiations in 1963 with the United States Agency for International Development (USAID) acting on behalf of a larger

[42] Ayşegül Kibaroğlu, *Building a Regime for the Waters of the Euphrates and Tigris River Basin*, p.198
[43] Muserref Yetim, A Bargaining Framework for Explaining International Water Rights Conflicts : The Case of the Euphrates and Tigris, Thesis, DPhil The University of Texas at Austin, 2006, p.30
[44] *Ibid.*, p.172

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consortium consisting of the European Investment Bank, and the French, Italian, and German Governments. The consortium requested that Turkey negotiate with the downstream users who would be affected by the project, before consent could be given. Turkey held negotiations with Syria and Iraq, in order to win their consent for the project, however the negotiations ended without an agreement in place.[45] Although Turkey could not get the downstream riparians' consent for the Keban Dam construction, a loan was made possible according to a provision that stated 'in case Turkey was unable to secure the consent of the lower watercourse states by the impounding period of the dam, it would guarantee a flow of a minimum of 350 m^3/s for the needs of the lower watercourse states in accordance with the program submitted to the creditors'. According to this provision, Turkey delivered 350 m^3/s during the impounding period of the Keban Dam in 1974. Thus the Euphrates-Tigris conflict introduced trilateral negotiations and politics of international dam financing for the first time.[46] In addition to efforts concerning the Keban Dam, DSI released a comprehensive study for the 'Lower Euphrates Project' that evaluated the soil and water potential of the basin in 1966. A similar study was done for the Tigris basin, and these two studies then transformed into a mega-scale integrated development project of the Southeastern Anatolia Development Project (GAP being the Turkish acronym), in early the 1980s.

[45] Muserref Yetim, A Bargaining Framework for Explaining International Water Rights Conflicts : The Case of the Euphrates and Tigris, Thesis, DPhil The University of Texas at Austin, 2006, p.32
[46] *Ibid*., p.32

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The water question emerged on the regional agenda when upstream countries Turkey and Syria started to challenge the existing water balance, which was in favor of Iraq, by initiating, in the early 1960s, an ambitious hydropower and irrigation projects on the Euphrates. Historically, Iraq had been using these waters exclusively over a long period of time and these Turkish/Syrian large-scale projects caused great anxiety in Iraq as they had the potential to jeopardize Iraq's '*historic rights*'. The Baghdad regime was not ready for such a change in *status quo* in the basin, and perceived these efforts as a strategic challenge to its national security, and the context of the basin-wide relations became conflicting rather than cooperative, as it had been before. [47]Besides infrastructural developments, the introduction of bilateral and trilateral negotiations and politicking of international financing, were the innovations of this period.

The main theme of these negotiations was the downstream impacts of the construction and impounding of Keban Dam, in Turkey; and the Tabqa Dam in Syria. The first bilateral negotiations were started between Iraq and Syria in 1962 in order to exchange information on the Euphrates. In 1964, Turkish representatives visited both Baghdad and Damascus to share technical details about the Keban Dam, and attempted to gain Iraqi consent, in order to secure credit from USAID. Although Turkey's Keban Dam was designed for the purpose of hydropower and did not cause actual shortage of water, it still caused anxiety in downstream countries since the dam was

[47] Mehmet Ugur, *Strategic Factors In Developing Effective Transboundary Water Resources Regimes The Case of Tigris-Euphrates Basin*, p.83

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perceived as a demonstration of Turkish determination to control the river flow.[48] The first trilateral meeting took place in 1965 in accordance with the recommendations of the Turkish delegation, to discuss and exchange technical details about Keban and Tabqa dams and their filling schedules.[49]Each country officially brought forward their respective demands for the Euphrates River. Iraq claimed 14 BCM of water from the Euphrates while Syria was claiming 13 BCM, and Turkey 18 BCM. The total riparian demand was roughly one-and-a-half times the average flow of the river.[50] Besides the exchange of technical information, the negotiations were concentrated on another important issue i.e. the establishment of a permanent Joint Technical Committee that was proposed by Iraqi draft agreement, to supervise the formation of a trilateral water sharing agreement. However, there was a strong objection, particularly from the Turkish side, over the functions of the committee as well as the scope of its jurisdiction, and no agreement was reached.[51] After this first unproductive

[48] Mehmet Ugur, *Strategic Factors In Developing Effective Transboundary Water Resources Regimes The Case of Tigris-Euphrates Basin*, p.82

[49] Aysegul Kibaroglu, Settling The Dispute Over The Water Resources In The Euphrates Tigris River Basin. *From Conflict To Co-Operation In International Water Resources Management: Challenges And Opportunities*, 263–277.

[50] Adele J. Kirschner and Katrin Tiroch, *The Waters of Euphrates and Tigris: An International Law Perspective*, p.346

[51] The Turkish delegation strongly rejected the Iraqi draft agreement, and expressed that the JTC could only be authorized to maintain coordination of the current and future projects in the river basin. In line with the Turkish proposal, Syria suggested it would be convenient to include among the functions of the JTC a study of the water requirements of the irrigable lands in the three countries, and subsequently to examine the possibility of covering possible shortages of water supplied by the Euphrates through diverting a part of the Tigris River's water to the Euphrates. Iraq strongly opposed this proposal and insisted on negotiating only the waters of the Euphrates.

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trilateral attempt, riparian countries continued bilateral meetings on an ad hoc basis. Although they had made some progress during these meetings, it was not enough to prevent the serious crisis in the basin between the years 1974-1975, when two large-scale dams were being filled unilaterally.

Relations that had transformed from being harmonious to contentious post the 1960s, were deteriorated further by the time of the 1974-75 crisis. Although the 'visible' reason behind the crisis was a physical one, the simultaneous impounding of two large dams with storage capacities of 30 BCM and 11.7 BCM, drought conditions, the political role and ideological and other strategic factors should not be underestimated.

The simultaneous impounding of the two dams in 1974, with the coincidence of drought conditions, led to a serious crisis between Iraq and upstream riparians, particularly Syria. The bitter political rivalry between Iraqi and Syrian Ba'athist regimes over several regional issues such as Arab nationalism and oil trade, escalated the tension and brought them to the verge of armed conflict. Despite the tension between Syria and Iraq, Turkish-Iraqi relations were manageable at that time. Iraqi realization that the Turkish project would not result in any substantial loss of water for downstream riparians, and would indeed benefit Iraq by bringing about; a more regular flow[52], and an oil-pipeline construction agreement between

[52] Salih Korkutan, *The Sources Of Conflict In The Euphrates-Tigris Basın And its Strategic Consequences in The Middle East*, p.22

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two countries, had an important role in the direction of good relations.[53] The crisis was averted by Syria's consent to release 200 MCM of additional water in 1974, but in 1975 the situation further deteriorated during the second season of filling. Iraq claimed that the Euphrates flow dropped down from 920 m^3/s to 197 m^3/s, and accused Syria of using water as a political leverage, while Syria on the other hand put the blame on Turkey.[54] Iraq appealed to the Arab League, but the League was not able to mediate between two parties. Both Syria and Iraq closed their airspace to each other, cancelled diplomatic and economic relations, and deployed their armies near their mutual border. Eventually, the crisis was averted just in time, with the mediation of Saudi Arabia, before it transformed into violent conflict, and Syria agreed to release additional water as a '*gesture of goodwill*' to Iraqi people.

The 1960-1980s was the beginning of a period when the Euphrates-Tigris conflict began to be the by-product of regional political issues rather than a technical water allocation problem. Bilateral and trilateral negotiation efforts in the beginning of 1960s did not result in any formal permanent agreement, and divergent views and the interests of riparian countries paved the way for a more conflicting state of relations in 1980s and afterwards. Projects implemented in that period were large-scale, multi purpose, water

[53] Muserref Yetim, A Bargaining Framework for Explaining International Water Rights Conflicts : The Case of the Euphrates and Tigris, p.41
[54] Patrick MacQuarrie, *Water Security In The Middle East: Growing Conflict Over Development In The Euphrates-Tigris Basin*, p. 49

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consumptive, ambitious and had overestimated targets due to lack of adequate planning.

Conflict-Driven Nature of Relations

Riparian countries continued their unilateral development schemes, and the hydro-political atmosphere of the Euphrates-Tigris basin further deteriorated in the 1980s and afterwards as several regional tensions were added to an already fragile water balance.

Iraq suffered political and economic challenges (the Iran-Iraq War and the Gulf War) in 1980s and at the beginning of the 1990s, and its economic potential was seriously eroded by the destruction of infrastructure after these prolonged wars and an economic embargo imposed by the United Nations. Iraq therefore had to delay its development plans for a long time. After the Gulf War, owing to UN sanctions and political isolation, and the resulting need for self-sufficiency, Iraq constructed a water diversion canal. The canal completed in 1992, and named the Third-River, is 565 km long and was built to reduce salinity and reclaim additional land for agriculture in the lower Mesopotamian marshes. Environmental groups seriously criticized this project since it destroyed the ecosystem of the Mesopotamian marshes, and it was asserted to be a political move against local Shi'a opposition to the regime.[55] Iraq also built Mosul Dam on the Tigris River in 1995 for hydropower generation and irrigation.

[55] Natascha Beschorner, "Water and Instability in the Middle East" *Adelphi Paper* 273, p.36

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Syria constructed the Ba'ath Dam in 1986 to regulate the Euphrates flow below the Tabqa Dam, and also to provide water for irrigation and generate a small amount of electricity. The last consecutive dam on the Euphrates in Syria, Tishreen Dam, situated upstream of Tabqa Dam, was completed in 1991 primarily for hydroelectric production.

One of the most remarkable and game changing developments in the basin history occurred in this period. After years of technical studies and evaluations, the Turkish government decided to combine separate studies of the Euphrates and the Tigris Rivers in 1977, and create a single project in the name of 'Southeastern Anatolia Project', (GAP in Turkish acronym), to develop the land and water resources of southeastern Turkey. The project area lies in southeast Turkey between and around the Euphrates and Tigris rivers, and includes 9 provinces that cover approximately 10% of Turkey's total population and surface area. The project consists of 13 independent but related sub-projects, 7 on the Euphrates and 6 on the Tigris portion, and envisages construction of 22 dams, 19 hydroelectric power plants, and will provide water for irrigation of 1.8 million ha of land. Upon completion, the project will provide 27 billion kWh of energy production with the installed capacity of 7500 MW. The project's completion date is postponed to 2047 due to financial constraints with the estimated cost of US$32 billion.[56]

GAP was initially formulated as a package of water and land resources development project that aimed to provide electricity for the western regions

[56] Dogan Altinbilek, "Development and Management of the Euphrates-Tigris River Basin, p.24

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of Turkey. However, due to international criticism over the social and environmental impacts of dams and poor socio-economic conditions in the region that contributed to the Kurdish insurgency, the project has been transformed into an integrated, multi-sectoral, regional development project by the 1989 Master Plan, which covers all development-related sectors such as agriculture, industry, transportation, urban and rural infrastructure, health care and education.[57] GAP aims to transform a politically unstable, underdeveloped, semi-arid region into the 'breadbasket of the Middle East' whilst raising the living standards of the inhabitants and integrating them into 'modern' Turkey's economy and society. [58]

After framing the GAP project, Turkey intensified its utilization efforts particularly on the Euphrates River. The Karakaya Dam was the second largest dam constructed further downstream of Keban for hydropower generation, and became operational in 1987. The project was financed by the World Bank on condition that Turkey unilaterally guaranteed 450 m^3/s minimum flow during the impounding period. While Karakaya Dam was being constructed, Turkey initiated the construction of the Ataturk Dam in 1983, this was the centerpiece of the GAP project with its 48 BCM gigantic storage and 2400 MW installed capacity. The two previous dams, namely Keban and Karakaya, were solely designed for hydropower generation and did not cause any significant decrease in downstream flow; Turkish water

[57] Dogan Altinbilek, "Development and Management of the Euphrates-Tigris River Basin, p.25

[58] D.Hillel, *Rivers of Eden: The Struggle for Water and Quest for Peace in the Middle East* (OUP, Oxford, 1995), p. 104

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use pattern has shifted towards consumptive usage through the advent of Ataturk Dam. Turkey did not ask for international funding for the construction of Ataturk Dam, which was financed by internal sources and cost approximately US $3 billion. This was because of prior efforts by Syria and Iraq to block funding, and the previous experience from Keban and Karakaya dams, which left the impression that international funding agencies were in favor of the rights of lower watercourse states.[59]

Turkey had to confront stronger and more organized opposition at this time. The scale and ramifications of the project, as well as Turkey's ability to finance such a huge project with its own financial and technical capacity, created a great anxiety in the lower riparian states. The project was perceived as an instrument of Turkey's overall '*water imperialism*' efforts in the basin, and both Syria and Iraq tried to prevent progress by mobilizing the international community, particularly Arab states, against it.[60] The major concern of Syria and Iraq has been the historical fear that Turkey would once again become a super power in the region through the economic, social development and prosperity, which would be brought about by GAP. Another concern has been the fear of Turkey's ability to transform great hydraulic control over water that GAP provides, into political leverage.

Although the political atmosphere of the region was dominated by controversy with GAP, the growing exploitation of the Euphrates and the

[59] Muserref Yetim, A Bargaining Framework for Explaining International Water Rights Conflicts : The Case of the Euphrates and Tigris, p.49
[60] Ali Carkoglu, Mine Eder, "Domestic Concerns and the Water Conflict over the Euphrates-Tigris River Basin," Middle Eastern Studies, (January 2001), p.57

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complexities of development schemes forced the riparian countries to find a permanent solution through dialogue. These efforts were realized by the Joint Technical Committee.

Joint Technical Committee (1983-1992)

After the first meeting of the Joint Economic Commission between Turkey and Iraq in 1980, the two countries agreed on the formation of a Joint Technical Commission, which included members from all three riparian countries. They were assigned to lay down the methods and procedures that would lead to the definition of what would be a reasonable and appropriate amount of water for each country from both rivers.[61]The first meeting of the commission was held in 1982, and with the Syrian participation in 1983; the commission began its work on the basis of exchanging hydrologic and meteorological data, future development projects and initial plans for the impounding of the Karakaya and Ataturk dams. Turkey, Syria and Iraq held 16 meetings, two of which were at ministerial level, up to 1993. The Committee could not fulfill its objectives, and the talks became deadlocked after a Syrian decision not to attend meetings. Although the JTC was not successful in meeting its goals, it was a useful channel for communication; exchanging data and developing a negotiation practice. When bilateral relations were normalized in the beginning of the 2000s, JTC was revitalized and played an instrumental role in that rapprochement.

[61] Aysegul Kibaroglu, Waltina Scheumann, Evolution of Transboundary Politics in the Euphrates-Tigris River System, p.286

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The major issues of contention that led to the deadlock were related to both the subject and object of negotiations; whether the Euphrates and the Tigris be considered a single system, or whether the discussions should be exclusively limited to the Euphrates.[62] Iraq and Syria consider the Euphrates-Tigris Rivers as *'international rivers*', their waters to be apportioned out equally, based on a simple mathematical formula. Turkey, on the other hand, claims that international rivers are those that constitute a border between two or more riparians; the Euphrates-Tigris Rivers are '*transboundary watercourses*', since both rivers cross international borders. Another contentious issue has been the disagreement on which waters to negotiate.[63] Iraq and Syria insisted on limiting the negotiations exclusively to the Euphrates River, while Turkey claimed that the Euphrates-Tigris Rivers constitutes a '*single transboundary river system*', as both rivers emerge in one country and join again naturally before reaching the Gulf. Turkey's proposal was that in order to utilize the waters efficiently, the three countries share should be negotiated. In other words, the Joint Technical Committee could not agree on the framework as to whether the objective of committee was to formulate a proposal for the '*sharing*' of '*international rivers*', or if it was to achieve a regime based on '*optimal and rational utilization*' of '*transboundary watercourses*'.[64] Besides all these divergent views, the three riparians had

[62] Aysegul Kibaroglu, Settling The Dispute Over The Water Resources In The Euphrates-Tigris River Basin, p.5
[63] Mustafa Aydin, Fulya Ereker, *Water Scarcity and Political Wrangling: Security in the Euphrates and Tigris Basin*, p. 610
[64] Aysegul Kibaroglu, Waltina Scheumann, Evolution of Transboundary Politics in the Euphrates-Tigris River System, p.286

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different positions on the interpretation of sovereignty over waters. While Syria and Iraq asserted that the upper riparian was under obligation not to cause a change in the natural flow and claim 'acquired rights'; Turkey, by accepting relevance of these claims as only one of many factors that had to be taken into account, refused any co-sovereignty on the waters.

Turkey proposed a plan, *'Three-Stage Plan for Optimum, Equitable and Reasonable Utilization of the Transboundary Watercourses of the Tigris-Euphrates Basin*' in 1984, in response to downstream claims based on acquired rights and arithmetic sharing. The plan has two basic principles; first, the Euphrates-Tigris Rivers have to be considered as forming one single transboundary watercourse system, and secondly inventory studies for water and land resources of the whole basin had to be undertaken and evaluated jointly. Finally, necessary means and measures to attain the most reasonable and optimum allocation of resources would be defined.[65] The plan consisted of three stages. The first stage is an inventory study for water resources that aims to synchronize divergent interpretations stemming from conflicting water quality and quantity data; hence enabling the same understanding through a common data set, which would facilitate the solution of conflict during the negotiations. The second stage envisages inventory studies of land resources that aim to classify soil and drainage conditions in all of the basin according to the same criteria. The final stage is

65 http://www.mfa.gov.tr/data/DISPOLITIKA/WaterASourceofConflictofCoopintheMiddleEast.pdf

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the joint evaluation of the previous work, and developing the most suitable, efficient and economic methods for basin-wide, holistic water management.[66] Although the plan was based on scientific rationality, it was rejected by downstream riparian states as it appeared that inventory studies would result in favor of utilizing water in upstream regions, mostly in Turkish territories, as downstream soil and drainage conditions were not feasible for optimum utilization. Instead, both countries insisted on increasing minimum quota to 700 m^3/s, without considering seasonality and actual needs of each state.

The three-Stage Plan was not the only Turkish initiative during the Joint Technical Committees work. In 1988, Turkey proposed an outstanding plan, named '*Peace Pipeline*', based on supplying water, via two pipelines from the Seyhan and Ceyhan rivers in southern Turkey to Syria, Jordan, Israel and Saudi Arabia in the west, and to the Gulf sheikhdoms in the east. The project had the potential of addressing the chronic water problems of the Middle East, by building confidence and cooperation; however, it did not create much excitement in the Arab world. Arab countries feared being dependent on Turkey in such a critical resource, the highly volatile nature of the region that makes it vulnerable to any sabotage, and Israeli participation were the main reasons behind their reluctance.

The Kurdish Question has been another determing factor since 1984, in the water conflict, and has dominated bilateral relations among riparians,

[66] Muserref Yetim, A Bargaining Framework for Explaining International Water Rights Conflicts : The Case of the Euphrates and Tigris, p.56-57

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particularly between Turkey and Syria. The GAP has been integral to a paradigm shift in the Turkish water development agenda. It has moved Turkey from being a hydropower concentrating on integrated regional development, to raising the living standards, reducing tension, and encouraging economic growth in southeastern Turkey, which has a strong Kurdish separatist movement. This Kurdish quest for separatism was 'discovered' by Iraq and Syria, and both countries offered military and financial support to Kurdish guerillas in order to embarrass Turkey, by threatening its national security, and forcing it to release more water to downstream countries[67]. Syria, particularly, used the PKK (Partiya Karkaren Kurdistan) card as a bargaining chip in the Euphrates dispute, and tried to block upstream development schemes through the terrorist activities of the PKK. The Kurdish problem resulted in the linkage between water and border security and water problem to become intertwined with more complex regional security issues that made the solution appear impossible.

Although the Joint Technical Committee meetings were trilateral, its outcomes have emerged into a picture of two bilateral agreements. The first bilateral agreement was signed between Turkey and Syria during the Joint Economic Commission meeting on the 17 July, 1987. The Protocol was an interim agreement and was not solely devoted to water issues, but embodied

[67] Stephen Kinzer, "Water at the Heart of Turkey's Policies on Kurds and Mideast Neighbors," New York Times. February 28, 1999 (online article);
Salih Korkutan, *The Sources Of Conflict In The Euphrates-Tigris Basın And its Strategic Consequences in The Middle East*, p. 24;
Kevin Freeman, *Water Politics And National Security In The Tigris-Euphrates River Basin*, Thesis, DPhil, University of Alabama, 2000, p. 152

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several articles pertaining to water.[68] Turkey unilaterally committed to releasing a minimum annual average of 500 m^3/s at the Turkish-Syrian border during the filling period of Ataturk Dam, and in cases where monthly flow falls below that level, Turkey agreed to make up the difference during the following month.[69] The two countries also agreed on collaborating with Iraq to find a permanent solution for the Euphrates-Tigris Rivers (Article 7), accelerated work of the Joint Technical Committee (Article 8), and to jointly construct and operate irrigation and hydroelectric power projects (Article 9). Besides water, another important issue on the agenda was the security problem. It had been widely accepted that the main impetus of this agreement was Turkey's security concerns about the PKK, and Syria's logistic support to the group's activities. In the agreement, Syria pledged to end its support to the PKK and other anti-Turkey groups. Though agreement has been significant at providing a formalized share of flow, many analysts criticized this agreement since water was used in exchange for security, rather than divided on the basis of any concept of rights or shared needs.[70] However, this 'water for security' strategy did not work well and Syria continued harboring the PKK until 1998.

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[68] Ayşegül Kibaroğlu, *Building a Regime for the Waters of the Euphrates and Tigris River Basin*, p. 249

[69] *Max Planck Compilation of International Treaties and Other Documents Relative to the Euphrates and Tigris*, p. 24 (http://www.mpfpr.de/fileadmin/media/Water_Law/Globales_und_Regionales_Voelkerrecht/Compilation_ET_English_120801_SM.pdf)

[70] M. Nouar Shamout with Glada Lahn, *The Euphrates in Crisis Channels of Cooperation for a Threatened River*, Chatham House: Energy, Environment and Resources, April 2015, p.27

www.manaraa.com

The last bilateral agreement was signed between Syria and Iraq on 16 April 1990, after the 13th meeting of the JTC, which was held in Baghdad. The Ataturk Dam crises in early 1990, in which Turkey interrupted the flow of the Euphrates to fill the gigantic Ataturk Dam reservoir, caused great anxiety in downstream countries and unified Syria and Iraq, which resulted in a common stand against Turkish development projects. The two countries signed an agreement after this rapprochement period, and according to this agreement, whatever the volume of the river that crossed the Turkish-Syrian border was, Syria would keep 42 percent of the water for itself and would allow 58 percent of that quantity to cross its border to Iraq.[71]

Despite the lack of a basin wide agreement, these two, separate, bilateral, interim agreements created a *de facto* regime that obligates Turkey to release 500 m^3/s, and Syria to release 58 percent of that to Iraq. However, this *de facto* regime could not solve the water conflict as both agreements were predominantly concerned with quantity issues in a restrictive manner, rather than on the basis of comprehensive cooperation.

The second crisis in the basin occurred when Turkey informed its two downstream neighbors that after a 7-year construction period, Ataturk Dam reservoir would be ready for impounding in early January 1990.[72] Although this was expected, it caused great controversy between Turkey and the two

[71] Salih Korkutan, *The Sources Of Conflict In The Euphrates-Tigris Basın And its Strategic Consequences in The Middle East*, p. 26
[72] Mehmet Ugur, *Strategic Factors In Developing Effective Transboundary Water Resources Regimes The Case of Tigris-Euphrates Basin*, p. 91

www.manaraa.com

downstream riparians. Unlike with the Keban and Karakaya dams, Turkey was now for the first time going to consume large amounts of water from Ataturk dam, and this would become severely detrimental to the downstream countries.

Turkey notified its downstream neighbors in November 1989 about its plan to divert Euphrates water for one month, from 12th January to 13th February 1990, with a detailed program explaining the technical reasons behind the decision. Turkey took several measures to keep the adverse effects of the impounding period to a minimum level, such as: choosing the winter period when downstream water requirements were not at its highest levels, precipitation was plentiful, and evaporation was minimal. Furthermore, Turkey increased the discharge levels in order to allow downstream riparians to store extra water that would help them to compensate adverse conditions of the impounding period. This situation has been stated in an official document of the Ministry of Foreign Affairs;

"*Before the impounding period, Turkey released more water than the commitment of 500 m^3/s, which is undertaken by Turkey in accordance with the provisions of a Protocol, signed in 1987 with Syria. Turkey has thus created an opportunity for the downstream countries to accumulate this additional water in their own reservoirs. In this context 768 m^3/s of flow has been released at the Turkey-Syria border within the period starting on 23 November 1989 and ending at the beginning of the impounding process on 13 January 1990. Water coming from the tributaries, which join the Euphrates between the Atatürk Dam and the Turkish-Syrian border, has also continued to flow into Syria in the slice of time between 13 January and 12 February 1990, covering the impounding period. Thus, the total water amount crossing the border between 23 November 1989 and 12 February 1990 has amounted to 3.6 BCM, corresponding to an average value of 509 m^3/s. Therefore, even in this period of 82 days, which also covers the one month impounding period- Syria has received more water than the committed quantity of 500 m^3/s.*"[73]

[73] Republic of Turkey, Ministry of Foreign Affairs, Foreign Policy, Water Issues Between Turkey, Syria and Iraq, "The Water Problem in the Middle East: Water Disputes in the Euphrates-Tigris Basin," Para. i) Objections Directed Towards the Impounding of the Atatürk Dam, (http://www.mfa.gov.tr/grupa/ad/adg/adgb/Chap1c.htm).

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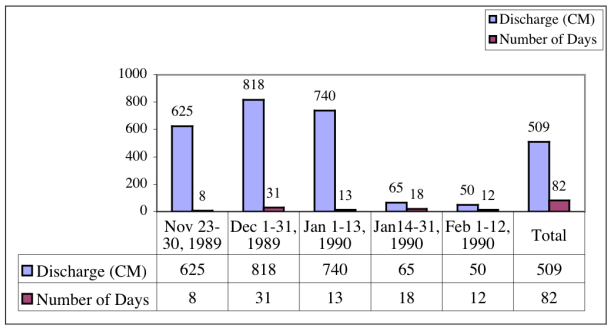

	Nov 23-30, 1989	Dec 1-31, 1989	Jan 1-13, 1990	Jan14-31, 1990	Feb 1-12, 1990	Total
Discharge (CM)	625	818	740	65	50	509
Number of Days	8	31	13	18	12	82

Figure 2: The Euphrates Discharge at the Turkish-Syrian Border during the Initial Impounding of the Atatürk Dam (Source: Muserref Yetim, A Bargaining Framework for Explaining International Water Rights Conflicts : The Case of the Euphrates and Tigris, p. 68)

Despite all these efforts, it was not surprising that filling such a colossal dam, which was one of the largest dams of its time, with a 48 BCM storage capacity, would be problematic. This decision had strained already tense relations between Turkey and the upstream states, and 'Water War' scenarios were revived in the basin. Syria and Iraq protested to Turkey, and accused it of using 'water weapons' to pressure both countries. According to Syrian and Iraqi claims, the decision to impound Ataturk dam, and its length was not a technical consideration. These countries regarded Turkey's one-month decision as unrealistic, and claimed that instead of one month; a two-week period would be sufficient to fill the reservoir. Both countries concurred on their positions against Turkey, and tried to mobilize the international community, particularly the Arab world, to take action. Syria and Iraq began to facilitate a strong campaign on all international platforms, and appealed to the Arab League to increase pressure over Turkey.

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Consequently, the Arab League requested that Turkey shorten the period, and supply downstream Syria and Iraq with more water during the cut-off. Aside from this statement, the Iraqi president, Saddam Hussein sent his oil minister Issam Abdul- Rahim al-Chalabi to Turkey to seek the possibility of shortening the period to reduce the impact of the diversion. Simultaneously, the Syrian foreign minister also complained to the Turkish Ambassador in Damascus about the effect on Syrian drinking water and electricity supplies, and he requested a shorter filling period. While pushing the limits of diplomacy, meanwhile, Syria increased its support to PKK guerillas to sabotage upstream developments and cause instability, despite a treaty that was signed with Turkey in 1987. In response to these claims, Turkey attempted to explain the technical necessities of the diversion, and declared its commitment to not use water as a political tool, to threat its neighbors. Turkey ended a month-long cut-off period that caused lots of tension among riparian countries on February 12th, and released the natural flow from the Ataturk Dam to its downstream neighbors.

The Ataturk Dam crisis was a harbinger of what is likely to happen in the future if a basin wide comprehensive water sharing agreement is not reached soon. It also brought the weakness of previous agreements to light. Especially pertaining to the 1987 agreement, which was poorly articulated, and failed to address annual and seasonal fluctuations in flow, becoming another source of tension, rather than enhancing a peaceful settlement of conflict. Another significant development during that crisis was the

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unification of Syrian and Iraqi opposition towards Turkey, which was a new phenomenon.[74] Unlike the 1975 crisis, in which each country acted unilaterally, this time Syria and Iraq harmonized their positions against Turkey and facilitated a strong international campaign that attracted considerable attention. Furthermore, both countries signed a water sharing agreement in 1990 to strengthen their common standing against Turkey since they perceived this crisis as the start of many such interruptions.

The tense political atmosphere of the region failed to cease in the aftermath of the Ataturk Dam crisis, rather, it was the harbinger of what would occur in the most complex decade of the basin. The water problem between Turkey and Syria was predominantly intertwined with the dynamics of the Kurdish Problem; later on the Gulf War and its sequential consequences redefined Turkish-Iraqi relations in that period.

The first counterattack of the Iraqi government was its refusal to renew a security protocol signed in 1984, under which Turkey had the right to follow Kurdish terrorists into Iraqi territory.[75] This refusal disrupted Turkey's fight against the separatist PKK guerillas. The Iraqi invasion of Kuwait, which was then followed by the Gulf War, further deteriorated relations between Turkey and Iraq. Turkey gave logistic support to the US-led coalition and played a significant role during this war. This participation strengthened Turkey's hand in the international community in the aftermath

[74] Mehmet Ugur, *Strategic Factors In Developing Effective Transboundary Water Resources Regimes The Case of Tigris-Euphrates Basin*, p.92
[75] Mustafa Aydin, Fulya Ereker, *Water Scarcity and Political Wrangling: Security in the Euphrates and Tigris Basin*, p. 612

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of the war and helped to get financial support for some GAP schemes. However, the cost of war to Turkey was much very significant. To begin with, Turkey lost Iraqi oil revenues and markets, which were estimated at between $9 billion to $40 billion and another drastic impact of the war had been the vast number of refugees, and increased activity of Kurdish separatists from the Iraqi border.[76] Undoubtedly, Iraq was the greatest loser of that war. Iraqi infrastructure, including water, was devastated by allied forces' air attacks.[77] UN sanctions and political isolation after the war further deteriorated economic and social conditions in the country, and the issue with water remained. In the absence of Iraq, the water conflict was driven by the course of Turkish-Syrian tension, which was mostly linked to security issues. In that period, the bilateral relations between Turkey and Syria became a political chess move. Each country applied any number of strategies available, whilst trying to avert the counterstrategies of the other riparian. Syria's main strategies were: supporting PKK terrorism to destabilize Turkey and block water development and activating the Arab League to increase pressure over Turkey. Turkey's counterstrategies, to deter Syrian support for the PKK, were to: give economic incentives, such as bringing the Orontes river onto the negotiation table, and cooperation with Israel. Several crises occurred, either when there was a significant flow reduction, or terrorist attacks in

[76] Muserref Yetim, A Bargaining Framework for Explaining International Water Rights Conflicts : The Case of the Euphrates and Tigris, p.75

[77] Cited in Muserref Yetim, A Bargaining Framework for Explaining International Water Rights Conflicts : The Case of the Euphrates and Tigris;
' According to official Iraqi estimate, repairing the damage to Iraqi infrastructure inflicted during the war would take an estimated $200 billion.'

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Turkish territories. [78] Both countries got through these crises, without further escalating tension, by declaring their commitment to the context of the 1987 agreement. Another crisis occurred in 1992, when Turkey initiated the construction of the Birecik dam which was further downstream from the Ataturk Dam. The purpose of this dam was for hydropower and flow regulation, with the financial support coming from an international consortium consisting of French, Italian, German, Austrian, British, and Belgium firms on a Built-Operate-Transfer basis.[79] Syria and Iraq started to lobby against Turkey both in the Arab League and in Western countries. They warned the companies involved in the construction of the dam to suspend their support until a basin wide agreement was reached on water sharing. Meanwhile construction work on the Birecik Dam, Turkey initiated the construction of the furthermost scheme on the Euphrates River, which was the Karkamis Dam, a mere 4.5 km north of the Turkish-Syrian border. Syria and Iraq protested to Turkey for unilaterally harnessing the Euphrates water without consideration of downstream user needs. Both countries sent official notes to Turkey in January 1996. On the other hand, Syrian and Iraqi efforts brought results in that the Arab League accepted a resolution concerning the Euphrates-Tigris Rivers, in favor of Syria and Iraq. According to the resolution, Turkey was asked to enter into trilateral negotiations with the other two riparians, which would lead to a final agreement on a more just

[78] Marwa Daoudy, Asymmetric Power: Negotiating Water in the Euphrates and Tigris, *International Negotiation*, *14*(2), p. 380
[79] Muserref Yetim, A Bargaining Framework for Explaining International Water Rights Conflicts : The Case of the Euphrates and Tigris, p. 77

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sharing of water, based on the essentials of international law.[80] The Arab League also tried to force international funding institutions to make their financial assistance conditional on a basin wide agreement with the participation of all parties. This Syrian and Iraqi alignment, and offensive Arab League actions drove Turkey to seek different policy alternatives. Fortunately, Turkey did not have to go far away; water-stressed Israel having tense relations with the Arab world had emerged as a good alternative policy option. Turkey's military cooperation with Israel created great anxiety to both Syria and Iraq, changing again the power balance for domination over water resources.

Despite all the efforts, Turkey could not effectively prevent Syrian support to terrorism effectively. Turkey toughened its diplomacy towards Syria and issued an ultimatum in 1998 that it was ready to use military force if Syria continued to support the PKK and other anti-Turkey organizations[81]. Turkey demanded that Syria to expel the leader of the PKK from its territories and close training camps in Bekaa Valley. Turkey mobilized its troops towards the Syrian border and the Turkish Air Forces was placed on red alert. Turkey's determination and extensive mediation efforts of the international community, particularly by President Hosni Mubarak of Egypt, Syria came into line and responded Turkish demands in a cooperative manner. Abdullah Ocalan, the leader of the PKK, was expelled from the Syria;

[80] Muserref Yetim, A Bargaining Framework for Explaining International Water Rights Conflicts : The Case of the Euphrates and Tigris, p. 81
[81] Mustafa Aydin, Fulya Ereker, *Water Scarcity and Political Wrangling: Security in the Euphrates and Tigris Basin*, p.612

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and he was eventually captured in Nairobi by Turkish agents in 1999. Syria's cooperative actions eased the tension, and the two neighbors signed a security protocol in 1998, which is known as Adana Accord. Syria guaranteed not to support PKK in any way and agreed to close anti-Turkish terrorist camps. Although the water issue was not on the agenda, this agreement marked the beginning of a period where both countries started with a clean slate after years of tension. Bilateral relations stabilized and desecuritization of water enabled countries to take more cooperative steps.

Cooperation-Oriented Nature of Relations

The Euphrates-Tigris basin witnessed a '*golden age*' in the first decade of 21st century. The 1998 Adana Accord that ended Syrian support to terrorism had been the turning point of that era, and transboundary water relations among basin countries moved from a hostile to a more cooperative relationship. Changes in domestic politics of riparian states, and some regional dynamics that created new opportunities for rapprochement had been important factors in this evolution. The basic distinction of this period was the political will in the highest decision-making levels, which was realized by great endeavors of water technocrats.[82] Unlike the earlier periods, water issues were handled in the realm of scientific realities and were de-linked from complex political problems.

The new century started with new hopes as well as new uncertainties in the Euphrates-Tigris basin. Iraq entered the new century with another war

[82] Aysegul Kibaroglu, Waltina Scheumann, Evolution of Transboundary Politics in the Euphrates-Tigris River System, p.289

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and had to cope with dramatic consequences. The United States and its coalition partners invaded Iraq in March 2003, in order to disarm this country as a part of its *Global War on Terrorism* strategy.[83] Iraq had to struggle against infrastructure destruction and political instability after the war.

The 2000s came up with a leadership change to Syria. After three decades of Hafiz Al-Assad presidency, his son Bashar Al-Assad came to power. Syria was also under international pressure due to its notorious support for terrorism. The US invasion of Iraq and fear of being the next target of military operation pushed this country to follow a more cooperative agenda, particularly with Turkey. Turkey, with its unique position and good relations with the western community, had been a safe harbor for Syria during this hard-pressed period.

Although end of the Syrian support to PKK terrorism was a significant development for Turkey, the US invasion of Iraq and its consequences did not allow Turkey to enjoy this situation much longer. Long lasting harmonious relations between Turkey and the United States were damaged by the veto of Turkish Parliament the use of military bases by the United States. Moreover, due to authority vacuum in Iraq, the PKK activities intensified in Iraqi territories.

These political challenges in the basin made cooperation critically necessary amongst riparian countries. Syrian and Turkish stood in

[83] Muserref Yetim, A Bargaining Framework for Explaining International Water Rights Conflicts : The Case of the Euphrates and Tigris, p. 87

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agreement against military intervention to Iraq, which enabled them to further cooperate on regional issues. In 2004, Syrian President Bashar Al-Assad paid a first top-level visit to Turkey since the independence of his country. Both countries signed several agreements during his visit, and also reached a consensus on how to jointly construct a dam on Orontes River and discuss the Syrian request of pumping water from Tigris River. During his visit, he gave an interview to Turkish CNN Turk; and commented as "… when we improve the relations more, we will see that our interests are the same, even on the water issue". This comment shows us how water conflict between two countries was intertwined with other regional issues. Turkey's new water policy has shifted its focus from sovereignty to the advocacy of *benefit sharing*, in the other words from distributive to integrative.[84]

One of the first initiatives of that cooperative period was the rapprochement between two institutions that were responsible for development of the Euphrates-Tigris Rivers in their own countries, the GAP-RDA of Turkey and GOLD of Syria. After several reciprocal visits, a Joint Communiqué was signed between the GOLD and the GAP-RDA on 23 August 2001.[85] The cooperative nature of relations manifested itself in the language of communiqué also; urban and rural water management, rural development, and participatory water management were the new themes of cooperation.

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[84] Marwa Daoudy, Asymmetric Power: Negotiating Water in the Euphrates and Tigris, p.381

[85] *Max Planck Compilation of International Treaties and Other Documents Relative to the Euphrates and Tigris*, p. 36 http://www.mpfpr.de/fileadmin/media/Water_Law/Globales_und_Regionales_Voelkerrecht/Compilation_ET_English_120801_SM.pdf

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In 2002, Syria and Iraq signed an agreement on the establishment of a Syrian pumping station on the Tigris River. This agreement was well structured and conformed to the basic principles of international law. Unlike the ambiguity in the previous agreements; the quantity of water to be withdrawn, water quality issues and dispute settlement mechanism has been specified clearly. Turkey also signed a Memorandum of Understanding under the same terms and conditions with Syria in 2009.[86]

In 2007, the Turkish Minister of Environment and Forestry, Veysel Eroglu; invited his Iraqi and Syrian counterparts to an international conference in Turkey to further discuss water issues.[87] After the meeting, the three ministers decided to revive the Joint Technical Committee meetings that had been suspended since 1992. They considered initiating training programs, expertise exchange, and data sharing for effective drought mitigation. Furthermore, Turkey agreed to increase the flow of the Euphrates to 550 m^3/s level during the dry season in 2009, after the request of the Iraqi delegation. Another significant outcome of these meetings was the agreement on establishing a joint water institute in Turkey with 15 appointed experts from each country to institutionalize this cooperation.

In 2008, cooperation among riparians acquired another dimension with the establishment of High-Level Strategic Cooperation Councils. By doing so, three neighbors aimed to broaden the scope of cooperation, to include the

[86] Aysegul Kibaroglu, Waltina Scheumann, Evolution of Transboundary Politics in the Euphrates-Tigris River System, p.294

[87] *Ibid.*, p.294

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water sector, and to enhance a comprehensive economic integration.[88] The first High-Level Strategic Cooperation Council was established between Turkey and Iraq on 10 July 2008, and the first ministerial meeting occurred in Istanbul on 17-18 September 2009. Turkish and Iraqi Foreign Ministers jointly led the meeting with the participation of several cabinet members from both sides, and at the end of the meeting a Strategic Partnership Agreement was signed between the all participating parties. According to the agreement; HSSC was to meet at least once a year, under the chairmanship of prime ministers of the two countries, in addition at least three times a year at ministerial level, with a four times a year meeting with technical delegations.[89] During the next Turkey-Iraq *High-Level Strategic Cooperation Council* meeting, 48 MoUs were signed between the two neighbors on 15 October 2009. One of these MoUs concerning water was: *Memorandum of Understanding between the Ministry of Environment and Forestry of the Republic of Turkey and the Ministry of Water Resources of the Republic of Iraq on Water.*[90] The purpose of the MoU was to strengthening friendly relations between two neighbors and enhance cooperation in water resources management on the basis of: equal reciprocity, and mutual benefits. Unlike

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[88] Aysegul Kibaroglu, Transboundary Water Relations in the Euphrates and Tigris Region, in *Water Law and Cooperation in the Euphrates-Tigris Region: A Comparative and Interdisciplinary Approach*, Chapter II, p. 75

[89] http://www.mfa.gov.tr/data/DISPOLITIKA/Bolgeler/ortadogu/iraq/ortak%20siyasi%20Bilirge%20%C4%B0

[90] *Max Planck Compilation of International Treaties and Other Documents Relative to the Euphrates and Tigris*, p. 51
http://www.mpfpr.de/fileadmin/media/Water_Law/Globales_und_Regionales_Voelkerrecht/Compilation_ET_English_120801_SM.pdf

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the agreements in the 1980s-1990s, both countries focused on cooperative water management policies instead of respective water sharing. The agreement was more inclusive than in past experiences since it envisaged the participation of non-governmental institutions, academia, and private firms. Moreover, decrease in the water supply had been recognized, and increased water use and climate change had been stressed as reasons behind this situation, which had been neglected for a long time. Both countries stressed the need for more frequent trilateral Joint Technical Committee meetings to tackle these challenges.

Similarly, a bilateral High-Level Strategic Cooperation Council was established between Turkey and Syria, and both parties met on 22-23 December 2009 in Damascus. Two ministerial meetings were held in Aleppo and Gaziantep. 50 MoUs were prepared during these meetings which were chaired by the Turkish minister of environment and the Syrian minister of irrigation, and a commission composed of technocrats and diplomats from each country.[91] Four of these 50 MoUs were related to water issues. The first MoU has been on *Establishment of a Pumping Station in the Territories of the Syrian Arab Republic for Water Withdrawal from the Tigris River*[92], in which Turkey accepted construction of pumping station in Syrian territories at the part of Tigris. The amount of water to be withdrawn was equal to 1.25

[91] Aysegul Kibaroglu, Waltina Scheumann, Evolution of Transboundary Politics in the Euphrates-Tigris River System, p.290

[92] *Max Planck Compilation of International Treaties and Other Documents Relative to the Euphrates and Tigris*, p. 41 http://www.mpfpr.de/fileadmin/media/Water_Law/Globales_und_Regionales_Voelkerrecht/Compilation_ET_English_120801_SM.pdf)

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BCM/year, which was stated in 2002 agreement signed between Iraq and Syria. Another MoU was signed *in the Field of Remediation of Water Quality*[93], in which both parties accepted the importance of sustainable development approach to protect water quantity and quality. The aim of the memorandum was to promote scientific, technical, and technological cooperation to promote the protection of water quality for the health and welfare of the basin. *Article 2* of the memorandum has specified areas of the cooperation while *Article 3* has framed the methodology for the cooperation in specified areas. The final MoU was signed *in the Field of Efficient Utilization of Water Resources and Combating Drought*[94] that was one of the best-designed agreements in the basin history as it included many modern concepts of cooperation. Drought mitigation measures were at the core of the agreement. On the other hand, climate change phenomenon was stressed for the first time in a legal context. Considering these three Memorandum of Understandings related to water issues, it can be claimed that one of the main reasons behind the shift in modalities of cooperation under the recent legal texts has been the Turkish experience in the European Union Water Framework Directive. In order to harmonize her water policy with EU standards, Turkey has been trying to implement principals of the Water Framework Directive in her national water management. Basin level, participatory water management principals have been applied in several

[93] *Max Planck Compilation of International Treaties and Other Documents Relative to the Euphrates and Tigris*, p. 44
[94] *Ibid*., p.47

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pilot projects in Turkey, and this experience has been instrumental in leading cooperation towards more comprehensive manner.

Undoubtedly, the first decade of the 2000s has been the most cooperative period in basin history. The main distinction of this period has been the desecuritization of water from regional conflicts, and the constructive role that state water bureaucracies played. The political will has been expressed at the highest level and this paved the way for cooperative initiatives in transboundary water issues.[95] Rather than focusing solely on water sharing, riparian countries preferred to broaden the agenda and share benefits derived from more comprehensive cooperation. Furthermore, advancements in global water management and international law have affected the context of cooperation. The High-Level Strategic Cooperation Councils established between Turkey-Iraq and Turkey-Syria have been an instrumental tool for framing and facilitating the cooperation. Iraqi Deputy Prime Minister Barham Ahmad Salih enthusiastically interpreted this cooperation as step that might well change the entire look of the Middle East, and he further likened the process to the German-French cooperation that took place in the 1950s and brought EU integration.[96]

[95] Aysegul Kibaroglu, Waltina Scheumann, Evolution of Transboundary Politics in the Euphrates-Tigris River System, p. 288
[96] http://www.hurriyet.com.tr/english/home/9414904.asp?gid=244&sz=63208

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Power-Water Nexus in the Euphrates-Tigris Basin

The next war in the Middle East will be over water, not politics.
Boutros Boutros-Ghali, 1991

It has been a long time since former Secretary General-UN, Boutros Boutros-Ghali, made this provocative statement. Actually, he was not alone in his thinking; 'water wars' was the dominant phenomenon at the beginning of the 1990s, which was expressed in several books and newspaper articles, albeit with sensational titles. Although water wars scenarios have not been realized yet, this does not mean water has always been, and will be, the source of cooperation. The uniqueness of water, as being an indispensable source of ecological and societal life, gives it a particular importance. Today, access to a reliable amount of water also means access to electrical power, irrigation facilities, job opportunities, and as a consequence of these, a social welfare and peace. However, every part of the world is not equally fortunate in having this precious resource. Freshwater resources are not evenly distributed, and some regions of the world have serious water scarcity in terms of quantity and quality. On the other hand, available fresh water resources are under the excessive pressure of population growth, climate change, and rapid urbanization. Given the strategic importance of this precious asset for the persistence of life, water has acquired a security dimension, which has brought it to the realm of power politics.

The Middle East has been one of the unfortunate regions in the world in terms of water availability due to its unfavorable climatic conditions and its chronic political instability that prevented even using this limited amount of

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water wisely. Although 7 percent of the world population lives in the Middle East, only 1.5 percent of the world's renewable freshwater supply is available, and per capita water availability in the region is projected to drop in half by mid-century.[97] This physical scarcity that coupled with lack of institutional capacity, and the highly turbulent nature of the region which is full of political, ethnic, and religious conflicts; has made the Middle East one of the flashing points of water wars scenarios.

"A Central Intelligence Agency risk assessment paper for the United States government has estimated that in at least ten places in the world war could erupt over dwindling shared water resources. The majority of those potential crisis spots are in the Middle East; it was no accident that when, in 1992, the Pentagon undertook a drastic review of possible future conflicts that might call for American intervention, one of the first contingencies studied was a war between Syria and Turkey."[98]

Although the war in the Euphrates-Tigris basin has yet to happen, the water conflict has climaxed rapidly from the 1980s to the late 1990s when three riparian countries embarked on extensive unilateral development projects in their lands. However, the game-changer in the basin has been the GAP project of Turkey, which was initiated in late 1970s. Syrian and Iraqi dependency on the Euphrates-Tigris rivers, respectively 70 percent and 98 percent, and the anticipated future impact from projects, is estimated to be 40 percent flow reduction for Syria and 90 percent for Iraq, further exacerbating the situation. [99]However, water scarcity was not the only

[97] David Michel et al., Water Challenges and Cooperative Response in the Middle East and North Africa, The Brookings Project on U.S. Relations with the Islamic World, U.S.-Islamic World Forum papers, 2012, p. iii
[98] John Bullock, and Adel Darwish. *Water Wars: Coming Conflicts in the Middle East*. London: St. Dedmundsbury Press, 1993, p. 16
[99] Mark Adams. "Water and Security Policy: The Case of Turkey." *Near East South Asia Center for Strategic Studies*. National Defense University, 2002, p.5

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reason that created a tense situation in the basin, but rather the complex and conflicting web of relations that has been stemmed from historical mistrust, ideological rivalry, and ethno-religious conflicts amongst the riparians. Therefore, rather than being a separate security issue, water has been another dynamic catalyst to an already complex interstate security relations.[100] In order to understand the scope of water-conflict-security nexus, identifying the distinction between *how water caused security problems*, and *how conflicts and security concerns caused water problems* is worthwhile.

Security is about survival, so does water. Securitization is defined by one of the foundational thinker on security theory, Barry Buzan, as to be the 'speech of act' that legitimizes a state taking exceptional measures over an issue by propelling it into the realm of security.[101] The Euphrates and Tigris rivers have become one of the major issues between Turkey, Syria, and Iraq since 1980s; and are intrinsically linked to these states' security policies. Sometimes water problem have been a catalyst to several security challenges while sometimes varying non-water issues have dominated water problem. This has caused the integration of water problem into the very complex regional power politics and has conditioned a basin-wide resolution on the course of these problems. Buzan (1998) has conceptualized this

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http://permanent.access.gpo.gov/websites/nduedu/www.ndu.edu/nesa/docs/marksadams-water.pdf

[100] Michael Schulz, Turkey, Syria and Iraq: A hydropolitical security complex. In L. Ohlsson (Ed.), *Hydropolitics. Conflicts over water as a development constraint* (pp 91-122). London: Zed Books. p. 96

[101] Barry Buzan, *Security-A New Framework for Analysis*. London, UK: Lynne Reinner Publishers, Inc.

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phenomenon as '*regional security complex*' that major processes of securitization, desecuritization, or both, are so interlinked that their major security problems can not be analyzed or resolved apart from one another.[102] Michael Schulz has developed his '*Hydropolitical Security Complex*' concept relying on Buzan's *regional security complex* framework, and applied it to the Euphrates-Tigris Basin to understand and analyze how water scarcity had been affecting the security situation in the basin countries.[103] First, we will try to identify the components of security, and then we will look at how water security and these regional security issues have intertwined during the three important crises.

The water securitization phenomenon in Turkish-Syrian relations cannot be well understood without a broader historical context. The collapse of the Ottoman Empire has created certain mistrust between Turkey and Syria, and this atmosphere was further exacerbated by their divergent positioning in the Cold-War framework. Turkey, as being an important NATO member and pro-western country with Muslim identity, was always perceived as a suspicious neighbor by Arabs. Moreover, Turkey's recognition of Israel as a first Muslim state increased the doubts in Arab World.[104]

Turkish-Syrian relations have been shaped by two historical and two realpolitik phenomenon. The first historical problem has been the Turkish-Arab enmity inherited from the breakup of the Ottoman Empire. The '*Arab*

[102] Barry Buzan, *Security-A New Framework for Analysis*, p. 201
[103] Michael Schulz, Turkey, Syria and Iraq: A hydropolitical security complex.
[104] Marwa Daoudy, *Back to the Conflict? The Securitization of Water in Syrian-Turkish Relations*, p. 136

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Revolt' has been a traumatic wound in the memories of Turkish society, and consequently Turkey followed an isolation policy from the Arab world until the 1980s.

The second issue has been the territorial dispute over Hatay province. Hatay (The Sandjak of Alexandretta) was an autonomous part of French mandated Syria and decided to join Turkey in 1939. Syria has long considered this annexation as arbitrary and illegitimate, and until recently Syrian official maps included Hatay as a part of Syrian territory.[105] Annexation of Hatay significantly impacted on the hydraulic and strategic relations between Turkey and Syria. Turkey has become a riparian country on the Orontes River, which flows through Hatay. Turkey tried to integrate Orontes River into the Euphrates River negotiations and claimed its share from this river. Turkey's attempt was not a basic right claim, rather a strategic move to drive Syria into a corner by displaying its contradicting position in Euphrates and Orontes Rivers[106] and to induce Syrian recognition of its sovereignty over the province of Hatay. However, Syria refused to discuss these claims and declared that the Orontes River could not be a subject to international negotiations as it is a national river running entirely within Syrian territory, by denying Turkish sovereignty in Hatay.

More important than the historical mistrust and territorial dispute, has been the *Kurdish Question*, which has become the dominant realpolitik issue

[105] Marwa Daoudy, *The Geopolitics of Water in the Middle East: Turkey as a Regional Power*, p. 399-400

[106] Syria is upstream riparian in Orontes and downstream country in Euphrates.

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between Turkey and Syria and determining factor of the course of relations. Since the Kurdish population is divided between three riparians and constitutes a security concern for each of the states in the basin,[107] it has been an ideal tool for the basin countries to conduct linkage politics. Having the biggest amount of Kurdish minority in the basin, Turkey transformed the GAP project into an integrated, multi-sectoral, regional development project, which covers all development-related sectors such as agriculture, industry, transportation, urban and rural infrastructure, health care and education in order to transform a politically unstable, underdeveloped, semi-arid Kurdish region into the 'breadbasket of the Middle East' region while raising the living standards of the inhabitants and integrating them into modern Turkey's economy and society. Thus, the GAP project can be considered as an economic response from the Turkish government to the *Kurdish Question*, and aims to prevent insurgency through economic and social prosperity. However, the Syrian President Hafiz al-Assad had already identified the potential of the Kurdish insurgency as a political leverage in the 1970s, and he provided logistic support to the separatist Kurdish organization PKK, as well as other anti-Turkey militant groups. The PKK was allowed to use Syrian territories, particularly the Bekaa Valley of Lebanon as a base for its guerilla training and logistic development. The Syrian government provided offices for PKK activities in Damascus, and its leader Abdullah Ocalan was sheltered until 1998. Since 1984, PKK began significant terrorist operations in

[107] Michael Schulz, *Turkey, Syria and Iraq: A hydropolitical security complex.*, p.107

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southeastern Turkey and caused a devastating loss of life and property. According to a recent Turkish government report published in 2013, more than 35,000 people have died in the fighting, and more than US$ 300 billion was spent for military expenses and rehabilitation of the region's infrastructure.[108] The instable atmosphere of the region impeded the realization of GAP projects and caused serious delays in project implementation. With the Syrian support to the PKK, the Euphrates-Tigris Rivers became intrinsically linked to interstate level security politics. Downstream riparians, particularly Syria, used this tool as an important political leverage to impact Turkey's security alternatives, and close the upstream-downstream power asymmetry.[109] President Ozal, who followed a proactive diplomacy in his presidency, realized how a continuing war atmosphere and securitization of hydro-development was blocking Turkey's regional interests. He paid a visit to Syria in 1987 to attempt to defuse the tension and convince Syria to cease her support to the PKK, thus securing the impounding period of Ataturk Dam. The visit resulted in an agreement whereby Turkey unilaterally guaranteed a minimum yearly average flow of 500 m^3/s at the Turkish-Syrian border during the impounding period of Ataturk Dam. In addition to that, the two countries signed another protocol, under which Syria pledged not to permit anti-Turkey organizations within

[108] TBMM Insan Haklarini Inceleme Komisyonu, *Teror ve Siddet Olaylari Kapsaminda Yasam Hakki Ihlallerini Inceleme Raporu*, p. 78

[109] Marwa Daoudy, *Back to the Conflict? The Securitization of Water in Syrian-Turkish Relations*, p. 139

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her borders, and to cooperate with Turkey on border security issues. By signing this agreement, Turkey used water in exchange for security issues, and this linkage was recurred later in 1992 and in 1993 Joint Communiqués. However, these bilateral security agreements failed to be effective, and Syrian support to the PKK continued. Syrian support for the PKK escalated the tension again, as well as the tone of public discourse. The Turkish side started to overtly blame Syria for promoting terrorism. President Suleyman Demirel once commented on this issue in a news conference in the United Arab Emirates and warned Syria sternly as:

" Syria is trying to use the PKK as a trump card in solving its problems with Turkey, especially in solving water problem."[110]

On another occasion, Turkish Foreign Minister Hikmet Çetin declared during his visit to Damascus that:

"It is not possible to make a bargain on water by provoking terrorism. Turkey can cope with terrorism even if it takes longer to (get) rid of it without Syrian cooperation, but Syria will never get the water deal it seeks by using terror as an instrument" and that "it is not possible to claim right (over the waters) and obtain this right by giving support to terrorism because the Republic of Turkey will sooner or later defeat terrorism."[111]

In 1998, Syrian support to the PKK has reached intolerable levels and Turkey issued an ultimatum that it was ready to use military force if Syria continues to support the PKK and other anti-Turkey organizations. Turkey demanded that Syria expel the PKK from its territories and close training camps in Bekaa Valley. Due to Turkey's determination and extensive mediation efforts of the international community, particularly by President Hosni Mubarak of

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[110] Cited in Mark Adams. "Water and Security Policy: The Case of Turkey." *Near East South Asia Center for Strategic Studies*. National Defense University, 2002, p. 27

[111] Muserref Yetim, A Bargaining Framework for Explaining International Water Rights Conflicts : The Case of the Euphrates and Tigris, p. 78

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Egypt, Syria came into line and responded to Turkish demands in a cooperative manner. Abdullah Ocalan, the leader of the PKK, was expelled from Syria; and he was eventually captured in Nairobi by Turkish agents in 1999. Turkey and Syria signed a security protocol in 1998, which is known as Adana Accord. Syria guaranteed not to support the PKK in any way and agreed to close terrorist camps. Since then water issue was delinked from security, and Syria lost its PKK card.

Besides bilateral relations, Turkey and Syria formed different alliances against each other during this period, which further complicated power politics by adding new dimensions. Turkey and Israel cooperated in several issues including military and agriculture. Syria approached to Greece, which had tense relations with Turkey, and they had concluded a military cooperation agreement.

Turkish-Syrian relations were very dynamic from the beginning of 1980s until the end of 1990s. In addition to the historical mistrust and territorial disputes, the main driving factor in that period was the interaction between water and security issues, which altogether formed a *hydropolitical security complex.* Syria actively supported terrorist activities against Turkey, which demonstrated how states utilize and manipulate ethnic groups to promote their own interests.

Turkish-Syrian relations were not the only battleground of complex power -dynamics in the Euphrates-Tigris basin linked around which water issues have played a significant role. Turkey and Iraq had similar intricate

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relations, but with less intensity due to the fact that Turkey's water development first aimed to harness the Euphrates River, which is not as strategic as the Tigris River for Iraq. Iraq tended to more concentrate more on Syria, as it is geographically positioned between Turkey and Iraq, and had an ideological rivalry between. When the GAP project has continued to grow and the strategic advantage that Turkey was gaining was realized, Iraqi concerns became more evident. However, Iraqi opposition to Turkey, was never been as strong as those of Syria, because Iraq was distracted by two devastating wars and UN sanctions, which eroded the economic and military capacity of the country.[112] The water issues between the two neighbors were significantly linked to ethnic conflicts and oil politics during the 1980s-1990s period and became an integral part of regional conflict during the Iran-Iraq war.

Transboundary water relations between Turkey and Iraq were harmonious until the 1980s. Iraqi need of upstream water resources, Turkey's booming energy demand that necessitate rich Iraqi oil resources, and Kurdish presence in both countries contributed to this alignment; and prevented active opposition to each other. However, when Turkey started to initiate large-scale development projects, relations deteriorated quickly. In 1977, Iraq decided to cut off its oil supply to Turkey by alleging an increasing Turkish oil debt as a pretext in order to force Turkey to guarantee a certain

[112] Mark Adams, *Water and Security Policy: The Case of Turkey*, p. 30

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amount of water.[113] This was the harbinger of a period when water issues intertwined with oil politics. During the Iran-Iraq war the Yumurtalik Pipeline, which linked oil rich Northern Iraq to the Mediterranean Sea via Iskenderun, a port of Turkey, was the only outlet for Iraqi oil. Since oil constituted 96 percent of Iraq's national income, and Turkey was a strategic partner in providing 75 percent of Iraq's food import[114]; Iraq was economically and politically dependent on its northern neighbor during these troubled times, and remained silent regarding the Turkish water projects, which left Syria on the opposing side. However, this compulsory composition did not last forever and has changed with the new realpolitik dynamics of the 1990s. Unlike its neutrality in the Iran-Iraq war, Turkey aligned itself with the allied forces due to securitize increasing Iraqi military threat and played a significant role during the Gulf war, which led to severing of ties between the two neighbors. This active involvement cost Turkey the loss of the Iraqi oil and market, and created a power vacuum in northern Iraq in which the PKK found an alternative home to operate terrorist attacks against Turkey. One of the significant incidents during the Gulf War that shows us how water can be perceived as a means of political leverage was the active campaign in the western media to convince Turkey to cut the water supply to Iraq off.[115] However, Turkey declined to do so, and President

[113] Mehmet Ugur, *Strategic Factors In Developing Effective Transboundary Water Resources Regimes The Case of Tigris-Euphrates Basin*, p. 86
[114] Muserref Yetim, A Bargaining Framework for Explaining International Water Rights Conflicts : The Case of the Euphrates and Tigris, p. 71
[115] Gleick, P.H. (ed.) 1993. Water in Crisis: A Guide to the World's Fresh Water Resources. Oxford University Press, New York.

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Ozal publicly stated that Turkey would not use water as a weapon against her neighbors.

Besides oil politics, ethnic conflict has also been another complex dimension of water-security nexus in Turkish-Iraqi relations. '*Stateless Nation*' of Middle East, Kurds, are located in water-rich southeastern Turkey and water and oil-reach northern Iraq. In order to secure their territorial integrity as well as water and oil development infrastructure against any ethnic Kurdish insurgency, Turkey and Iraq effectively cooperated over the Kurdish question. Turkey signed a treaty with Iraq in 1984, which enabled her 'hot pursuit' of PKK militants inside Iraqi territories.

However, the Ataturk Dam crisis in 1990 broke this alignment and as retaliation, Iraq refused to renew 1984 Security Accord that allowed cross-border military incursions.[116] Gulf War and Turkey's active involvement further deteriorated bilateral relations that were once based on mutual understanding and cooperation. Iraq began to support Kurdish dissidents in Turkey to block upstream water development projects by tolerating the active use of bases in her northern territories. More importantly, Turkey had to confront a serious Kurdish refugee crisis with an estimated number of 500,000-700,000.[117] A creation of the safe zone in northern Iraq caused a power vacuum, which enabled PKK to logistically accumulate power and conduct terrorist attacks against Turkey. Exploitation of the Kurdish card

[116] Muserref Yetim, A Bargaining Framework for Explaining International Water Rights Conflicts : The Case of the Euphrates and Tigris, p. 70
[117] *Ibid*., p. 75

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first by Syria, and then by Iraq limited the policy alternatives of Turkey and caused serious delays in implementation of the GAP project. The heavy toll of the Gulf War led Turkish politicians to follow a more precautious policy towards the US invasion of Iraq in 2003. The Turkish parliament vetoed the US aircraft operations from its bases and prevented the active involvement of country. Although this was not an easy decision for Turkey after decades of the US-oriented foreign policy, it became a starting point of warmed relations between Turkey and Iraq, which enabled cooperation over various regional issues, as well as water in the first decade of the 2000s.

When Turkish planners and politicians first designed the GAP project, probably they were more concerned about the possibility of a unified, strong opposition from the two downstream Arab countries, as it would have been advantageous for Iraq and Syria to combine their forces to block Turkish development projects. However, except some temporary periods, this unification did not occur. Syrian-Iraqi relations were very problematic; both countries were on the brink of the war in the 1975 crisis. Several historical and regional issues contributed to antagonism between the two Arab countries, but the main source of conflict was the ideological rivalry between two Ba'athist regimes.[118] The Ba'ath party first came to power in Iraq in 1963, and then in Syria in 1966. Although ideologically they were on the same continuum, both parties began to compete for *Arab legitimacy* and tried to dominate each other in regional issues. Ethno-religious differences in the

[118] Salih Korkutan, *The Sources Of Conflict In The Euphrates-Tigris Basın And its Strategic Consequences in The Middle East*, p. 22

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Party leadership caused divergence in their policies. Basically, the Syrian regime had been an Alawite, a sect of Shi'a Islam, in a Sunni-majority Syria; while the Iraqi Ba'ath Party was a tribal Sunni leadership, which has a great Shi'a population in the south. Both regimes used this structural asymmetry as a tool to destabilize other parties, and to exploit religious and ethnic dissident groups for political leverage. During the Iran-Iraq war, Syria overtly supported Iran and Shi'a dissidents in southern Iraq. Similarly, Syria organized a Kurdish opposition in Iraq and provided them with a permanent office in Damascus. As retaliation, Iraq supported the Islamic Sunni majority in Syria. These policies have further contributed to the existing tension and animosity between the leaders of Syria and Iraq, and they began to perceive each other as a threat to their survival.

The impounding period of Tabqa Dam in Syria and Keban Dam in Turkey coincided with the increasingly hostile political atmosphere, as well as one of the driest periods of the basin. When downstream flow decreased to intolerable levels due to filling upstream reservoirs, Iraq directed its protests towards Syria by complaining about the havoc that occurred. It's worth to mention that although Turkey was simultaneously filling the Keban Dam reservoir; Iraq's criticism targeted Syria, rather than Turkey. There were two reasons for this. Firstly, Iraq realized that the Turkish development was aimed at hydropower generation and would not consume water, whereas the Syrian Tabqa Dam, which was designed to irrigate substantial areas of land. Secondly, besides ideological rivalry and mistrust between Iraq

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and Syria, Turkey played a strategic importance in exporting Iraqi oil, since Turkey was the only export outlet, after Iraq had canceled oil transfer from Syrian territories. Thus, Iraq had to be moderate in her opposition towards Turkey in order to secure the country's life-blood, which was oil export. The dispute between the two rival regimes turned into a serious crisis when the reduction in the Euphrates flow led to the destruction of 70 percent of Iraq's winter crops and affected almost 3 million farmers.[119] The two countries appealed to the Arab League to help find a compromise, but the League remained incapable of mediating any crisis management. While Iraq blamed Syria of using water as a political leverage against the Iraqi people, Syria rejected these claims, and accused Iraq of betraying Arab nations by going ahead with Turkey. The two countries mobilized their troops to common borders in April 1975, and they were on the brink of the war if Saudi and Soviet mediation efforts did not result in compromise that Syria agreed to release additional water from Tabqa Dam as a *gesture of goodwill* to Iraqi people.

The Syrian-Iraqi relations continued to be tense during the 1980s due to the Syria's overt support to Iran. However, the 1990s started with an interesting political re-orientation. Impounding of Ataturk Dam, a centerpiece of GAP project with 48 BCM storage reservoir, caused great controversy between Turkey and its Arab neighbors, which resulted in a Syrian- Iraqi unification over the Euphrates River. Despite the tumultuous

[119] Muserref Yetim, A Bargaining Framework for Explaining International Water Rights Conflicts : The Case of the Euphrates and Tigris, p. 42

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past, Syria and Iraq managed to synchronize their standing and facilitated an effective domestic and international campaign against Turkey. Both countries saw the strategic hydraulic power that Turkey was gaining through GAP, and perceived this as a security threat to their future. They tried to mobilize the international community, particularly the Arab world, against upstream development projects in Turkey. As a result of aggressive efforts employed by Syria and Iraq, the Arab League decided to engage in the conflict more actively, by pressuring the international funding institutions to make as condition to their financial loans, the attainment of a basin wide agreement over the Euphrates-Tigris Rivers.[120] Additionally, Syria and Iraq further signed a treaty that allocated 58 percent of the Euphrates waters on the Turkish-Syrian border to Iraq. Lastly, a commonality in water-security nexus in Syrian-Iraqi relations was the meaning that both countries assigned to water. Both Ba'athist parties initiated major development projects to improve socioeconomic conditions in their countries, and further consolidated their regimes. They used agricultural development as a mean of extending their authority and controlling farmers.

The Euphrates and Tigris rivers dispute has been a dramatic example of how water issues can be integrated into a regional security balance, which encompasses a complex web of relations. Historical mistrust and territorial disputes inherited from the Ottoman past, coupled with the ethno-religious and oil conflicts in the political atmosphere of Cold War, led the three

[120] Muserref Yetim, A Bargaining Framework for Explaining International Water Rights Conflicts : The Case of the Euphrates and Tigris, p. 81

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neighbors to consider water as an important source of power. Thus, riparian countries initiated large-scale development projects to appropriate this strategic asset as much as possible. They perceived development in other countries as a threat risk to their national securities, and they tried to block these efforts by various means. This security-oriented perception promoted the concept of self-reliance that caused the prioritization of domestic projects and national interests. One of the important pillars of this policy has been food security, which played a significant role in the intensification of dispute as it caused over use of water in the irrigation sector despite poor economic returns. Within this context national security was translated into food security, and food security was translated into water security, so access to water resources has been a vital component of the national security of these riparian countries. Therefore, rather than being a separate security issue, water became another dynamic catalyst to an already strained and complex interstate security relations.[121]

The Kurdish question played a key role in this '*Water-Security Dilemma*' in the Euphrates-Tigris basin. Downstream riparian countries, particularly Syria, exploited the Kurdish card as a political leverage to destabilize Turkey and block water development. Besides the Kurdish question, Turkish-Syrian relations were shaped by historical mistrust and territorial dispute over Hatay province, while oil politics had a significant role in the course of Turkish-Iraqi relations. Syrian-Iraqi relations became dominated by the

[121] Michael Schulz, *Turkey, Syria and Iraq: A hydropolitical security complex*, p. 96

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ideological rivalry between the two Ba'ath Parties, and ethno-religious conflict stemming from structural asymmetry. Struggles over water have been an exacerbating factor and the battleground of these complex security problems.

Hydro-Hegemony

Upstreamers use water to get more power,
while downstreamers use power to get more water.
Jeroen Warner, 2004

The role of power in transboundary water relations has always been an appealing subject. From pure water engineering works to high-level diplomatic negotiations over water; from urban slums in Mumbai to California; from the first hydro-civilization, the Sumerians, to today's modern society; the narrative of water can not be well-understood without considering its interaction with *power*. The Realist school of International Relations Theory[122], which based its assumptions on power to describe political order, tried to frame the role of power in transboundary relations to address the conflict of *who decides who gets how much of the water, how and why*?

Before starting to dive into water-power puzzle, first we should set the basic principals, as well as the definition of power. Basically, Dahl (1957)

[122] Realism is a tradition of international relations theory centered upon four propositions:
- The international system is anarchic.
- States are the most important actors.
- All states within the system are unitary, rational actors
- The primary concern of all states is survival.

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defines power as A's ability to get B to do something that B would not do otherwise. However this pure definition is not sufficient to describe the complex web of relations[123]. Steven Lukes, in his seminal work *Power: A Radical View*, conceptualized the role of power in interstate relations by adding different facets of power; and has come up with an elegant framework: *Three Dimensions of Power*.[124] Several authors applied this concept to different transboundary water conflicts all over the world.[125] In particular the London Water Research Group, which is consists of academicians from King's College London, the London School of Economics, Oxford University, the University of East Anglia and SOAS, has substantially contributed to these efforts, which later paved the way for the *Hydro-Hegemony* concept.

Three Dimensions of Power

The first dimension of power in Lukes' systematization is in its most recognizable form that is based on the material capacity of one party to gain the compliance of the other.[126] This material capacity includes military might, economic strength, technological knowledge, and international political and financial support. Joseph Nye, a leading scholar in power studies, has conceptualized Lukes' first dimension of power as '*hard power*' while some other authors referred to this form as '*structural power*'. In addition to the

[123] Robert A. Dahl, The Concept of Power, *Behavioral Science 2*, 2, p. 201-215
[124] Steven Lukes, Power: A Radical View
[125] Ana Cascão, Mark Zeitoun, Power, Hegemony and Critical Hydropolitics, *Transboundary Water Management: Principles and Practice*
[126] Mark Zeitoun, Power and Water in the Middle East: The Hidden Politics of Palestinian-Israeli Water Conflict, p. 26

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above mentioned commonalities, riparian position and geopolitical position are important parameters regarding transboundary water conflicts. Asymmetries in *structural power* can be a determining factor, particularly when they are further combined with the other two dimensions of power. States with more structural power have more capability for unilateral actions, and they have more policy alternatives in any conflict.

The second dimension of power refers to the capability of actors to control the rules of the game or set the agenda; but unlike the concrete form of '*hard power*', rather by *authority* and *legitimacy*. Thus, this form of power is named as '*soft power*' by Nye (2004) in contrast to his hard power definition.[127] Basically, this dimension of power describes the capacity of a party to influence the terms of negotiations and agreements through various means that may encourage weaker parties to comply.[128] This dimension of power has also been referred to as '*bargaining power*' by Daoudy (2005) and some other authors. The relations between actors are a determining factor since the effectiveness of bargaining power is measured by the impact of one party's options on the counterpart. However, bargaining power opens the way for balancing any asymmetry in the structural power through practicing various strategies such as issue-linkage. By applying an issue-linkage strategy, and of course several other tactics that restrict the freedom of the stronger player, weaker players can exploit their potentials that help them to

[127] Mark Zeitoun, Power and Water in the Middle East: The Hidden Politics of Palestinian-Israeli Water Conflict, p.27
[128] Ana Cascão, Mark Zeitoun, Power, Hegemony and Critical Hydropolitics, *Transboundary Water Management: Principles and Practice*, p.31

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retain influence over stronger players, and compensate their weaknesses in the realm of structural power. This phenomenon has been described as '*power of the weak*', which illustrates that weaker parties may not be as weak as they may appear, or perceive themselves to be.[129] Issue-linkage strategies like regional security and political alliances have ben applied very successfully in the Euphrates-Tigris basin by downstream riparians to block upstream water development projects. However, using issue-linkage and other tactical maneuvers needs enabling conditions, institutional capacity, and strategic thinking.

Finally, the questions of *how do the powerful secure the compliance of those they dominate, and how do they secure their willing compliance*, lead us to the third dimension of power in Lukes' conceptualization.[130] He describes this dimension of power as " *power to prevent people, to whatever degree, from having grievances by shaping their perceptions, cognitions and preferences in such a way that they accept their role in the existing order of things*"[131] Similarly, a leading political economist, Susan Strange, very remarkably described this dimension of power as a "*level that the strong implant their ideas, even their self-serving ideology, in the minds of weak, so that the weak come to sincerely believe that the value-judgments of the strong really are the universally right and true ones.*"[132] Since this dimension of power is mostly described by cognitive notions such as perceptions, ideas,

[129] Marwa Daoudy, Asymmetric Power: Negotiating Water in the Euphrates and Tigris, p. 368
[130] Steven Lukes, Power: A Radical View, p. 12
[131] *Ibid*., p. 28
[132] Susan Strange, Who Governs? Network of Power in World Society, p. 176

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and ideologies; it has also been referred to as ' *ideational power*'.[133] Although ideational power seems to be the most abstract form of power; contrarily, it is a more effective form as it produces significant results with minimal efforts. It can be an instrumental tool for agenda setting, forging public opinion at the national and international level; thus, imposing and legitimizing particular ideas and narratives through methods such as knowledge structures, sanctioned discourse, use of time, silence or ambiguity and the imposition of narratives and storylines.[134]

Although Lukes' *Three Dimensions of Power* has been an elegant concept that describes *what power is*, it does not tell us much about the practicality of power, particularly when a great asymmetry is present. The concept of *Hegemony* can be a useful tool at that very moment to complement this deficit. Linguistically, *hegemon* means someone who guides the way in unchartered territory.[135] Antonio Gramsci[136] conceptualized the hegemony theory, for the first time, to explain the ideology used by the ruler class of fascist Italy to manipulate the other social classes and preclude revolution. Basically, *hegemony* is described as *leadership buttressed by authority,* and often times is mixed with dominance, which can be defined as *leadership*

[133] Mark Zeitoun, Power and Water in the Middle East: The Hidden Politics of Palestinian-Israeli Water Conflict, p.29

[134] Ana Cascão, Mark Zeitoun, Power, Hegemony and Critical Hydropolitics, *Transboundary Water Management: Principles and Practice*, p.32

[135] Mark Zeitoun, Power and Water in the Middle East: The Hidden Politics of Palestinian-Israeli Water Conflict, p. 30

[136] Antonio Gramsci is an Italian political theorist, who framed hegemony theory.

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buttressed by coercion.[137] Authority in this definition is acquired by a combination of different sources of power and creates attraction rather than coercion. On the other hand, dominance is only based on structural, or '*hard power*'.

Hydro-hegemony has been defined by Mark Zeitoun and Jeroen Warner (2006) as '*hegemony at the river basin level, achieved through water resource control strategies ... that are enabled by the exploitation of existing power asymmetries'*. This concept has been widely applied to several conflicting river basins in the world to analyse existing power asymmetries and identify ways for cooperation. A hydro-hegemony framework is based on the assumption that combining structural (coerce) and bargaining (consent) power in an ideational context is much more of a determining factor than international water law, water sharing ethics, and riparian positions.[138] This superiority in power balance allows the most powerful riparian, called hydro-hegemon, to set the rules and impose its own agenda on the other riparian countries. However, a question quickly comes to mind: *how does a hydro-hegemon not only gains the advantageous position, but also secures the consent of weaker riparians*. Zeitoun and Warner (2006) explain this phenomenon with the help of Lustick's theory of *Hegemonic Compliance*,

[137] Mark Zeitoun, Jeroen Warner, Hydro-hegemony: a Framework for Analysis of Transboundary Water Conflicts. Water Policy, 8(5), 435–460.
[138] M. Zeitoun, J.A. Allan, Applying hegemony and power theory to transboundary water analysis, Water Policy 10 Supplement 2 (2008), p. 10

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which assumes four compliance-producing mechanisms that are related to each dimension of power.[139]

A coercive compliance-producing mechanism is based on the mobilization of material resources. Military force, covert action, and coercion-pressure through trade embargoes, diplomatic isolation and threat of military action are among the strategic tactics that can be applied. Although these tactics may be useful, they are financially and politically costly.

The second category is the *utilitarian* form that refers to using incentives. This kind of action can be very effective, particularly in the short-term, if it is combined with coercive actions that could constitute a broader '*carrot-stick'* strategy together. Trade incentives, diplomatic recognitions, military protections, joint-infrastructure investments are among the alternative actions. In the Euphrates-Tigris conflict, this strategy was applied several times by riparian countries. Turkey's unilateral guarantee of 500 m^3/s flow from the Ataturk Dam was an incentive to stop Syrian support to PKK terrorism. Also Turkey's 'Peace Pipeline' project can be considered as an incentive to the Arab world, which would bring a great strategic superiority to Turkey.

Another form of the compliance-producing mechanism is referred to as '*normative agreement*', institutionalizes the status quo, and transforms

[139] Mark Zeitoun, Power and Water in the Middle East: The Hidden Politics of Palestinian-Israeli Water Conflict, p. 32

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weaker party compliance into an obligation. However, structural weaknesses and the exclusive nature of treaties and other legal texts might also prevent long-lasting resolutions. The 1987 agreement between Turkey and Syria caused a controversy during the impounding of Ataturk Dam because of its relatively poor design and use of vague language.

The last form of the compliance producing mechanism in Lustick's theory is the intersection of hegemony and ideational form of power, which is called *ideological hegemony*. *Securitization* is one of the most effective tactics that has been applied in water conflicts. Propelling water issues into the realm of national security legitimizes exceptional measures that are taken by states and forms a kind of hegemonic thought control. In the Euphrates-Tigris conflict, the 1980s and 1990s were the years when water issues were highly securitized. Each country prioritized its own projects while perceiving other riparian's developments as a threat risk. This securitization process paved the way for linking water issues to the more complex regional security problems that constituted an impediment for a basin wide solution. Besides securitization, sanctioned discourse has been another widely applied tactics to produce compliance. Through sanctioned discourse, speaking or thinking out of the prevailing hegemonic discourse is restricted.

In terms of efficiency, coercive methods are less efficient since they require greater financial and material capacity, while ideological compliance producing methods are more effective and do not need such a material

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resource. As Joseph Nye stated " *if you can get others to admire your ideas and what you want, you do not have to spend as much on sticks and carrots to move them in your direction. Seduction is always more effective than coercion*"[140]

Dimension of Power (*based on Lukes*)	**Features**	**Compliance-Producing-Mechanisms** (*Lustick*)	**Efficiency**
Hard Power	Force Capacity Riparian Position	(I) Coercive	LOW ↓ HIGH
Bargaining Power	Legitimacy	(II) Utilitarian (III) Normative Agreement	
Ideational Power	Perceptions	(IV) Ideological Hegemony	

Table 1: Main features of the three dimensions of power and their related Compliance-Producing-Mechanisms, showing the efficiency of each, source: Zeitoun (2006)

However, all this diversity in compliance producing methods should not lead us to the fallacy that weaker parties easily accept hegemon's agenda without any resistence. The reality is totally opposite; weaker parties are not as weak as they are seemed. States that perceiving a negative form of hydro-hegemony resort to counter-hegemony strategies, as diverse as compliance producing methods, to improve their position while limiting hegemons' degree of freedom. Non-hegemons can compensate any asymmetry in the material capacity by applying rigorous methods with strategic thinking. Issue linkage, tacit obstruction and boycott, recourse to international law, finding alternative funding sources, de-securitization of the problem, and active diplomacy in international organizations are some of the methods are widely applied by non-hegemon states to challenge hegemony. The Euphrates-Tigris

[140] Joseph Nye, Soft Power, p. x

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conflict has been one of the most remarkable examples of hegemonic and counter-hegemonic *strategic warfare.*

Euphrates-Tigris Conflict: A View Through the Lens of Hydro-Hegemony Framework

Although there is no physical scarcity of water in the Euphrates-Tigris basin, extensive unilateral water development projects that were mostly initiated in the 1980s have created a perceptional scarcity. Each riparian prioritized its own development efforts, which ultimately caused a competition over greater volumes of water. As a matter of course, under such a competitive atmosphere, each riparian's strengths and weaknesses have become prominent factors. Thus, power balances shaped interactions among the riparian countries of Turkey, Syria and Iraq; this became determining factor in water allocation. At this point, a *hydro-hegemony framework* appears to be a simple, but comprehensive analytical tool for examining the water-power-conflict nexus. The hydro-hegemony concept has been applied to several contentious river basins in the world from the Nile to the Mekong, the Jordan River, and the Ganges; it is also applicable to the Euphrates and Tigris rivers. With its different geographic setting, historical background, and unsteady political atmosphere; the Euphrates-Tigris basin has been a unique case. The main assumption of a hydro-hegemony framework is that power matters, and the key factor determining the course of water conflict is any asymmetries in power. Power is derived from geographical position, military

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and economic assets, as well as strategies and ideas. Lukes' three dimensions of power conceptualization has been the basis of hydro-hegemony theory. Although it is static, the geographic position has significant potential to influence power balance in any water conflict. Upstream riparians have a great geographical advantage in that they do not need to bother with downstream demands, and they can do as they please. Although this is not case in every river basin and other elements of power are also important also; in the Euphrates-Tigris basin, this phrase reflects the reality. The upstream riparian holds the most power, and has great technological capability to realize its development plans. The situation in the Euphrates-Tigris conflict differs from the other hot spots of the Middle East like the Nile and the Jordan River, in that the most powerful riparian is downstream. Both rivers originate in the mountains of eastern Turkey and flow into Syria and Iraq. Almost 90 percent of the Euphrates, and 50 percent of the Tigris flow originates in the Turkish territories. Considering the dependency of both downstream countries on the Euphrates-Tigris Rivers, Turkey's upstream position becomes even more important. Although Turkey committed itself to not use water as a weapon against its neighbors, even after Western recommendations in the Gulf war, some provocative statements from Turkish politicians made downstream neighbors anxious.

The policy alternatives of the downstream countries were further limited due to Turkey's strength in terms of military might and economic power. Turkey's membership of NATO and its key role during the Cold War

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as being a 'Northern Tier' of the organization,[141]and active participation of several regional crises in Post-Cold war era made it a critical partner. Turkey has the second largest army in NATO after the United States, and has been one of the first recipients of the US military aid, along with Egypt and Israel. Thus, Turkish military strength might have been a deterrent factor for the downstream countries to apply any military measure. Iraqi military strength was deteriorated through successive wars such as the Iran-Iraq war, the Gulf War, and finally the US occupation in 2003. Since Iraqis prolonged involvement in war, any military options were not feasible for it to force Turkey on any consent regarding the Euphrates-Tigris Rivers.

Although it is not reasonable to oversimplify a water conflict just by GDP values, economic situation can still tell us something useful about the context of the problem. Like other structural power components, economically Turkey shows similar superiority; Turkey, with its diverse and productive economy, is ranked 18th globally, with almost US $800 billion GDP and US $10,542 GDP per capita value.[142] The share of agriculture in GDP has been 8.2 percent, which is relatively low compared with its neighbors. On the other hand, after years of war and prolonged political instability, the Iraqi economy has deteriorated significantly, despite its substantial amount of oil revenues. Iraq has US $220 billion GDP and US $6432 of GDP per capita value. The Syrian economy is more based on agriculture with almost 20

[141] Marwa Daoudy, *The Geopolitics of Water in the Middle East: Turkey as a Regional Power*, p.396
[142] http://data.worldbank.org/indicator/NY.GDP.PCAP.CD

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percent share in US $40 billion GDP. Turkey's economic strength allowed her to finance the GAP project even without international funding. Although it caused time delays, having political leverage due to economic power has helped Turkey to unilaterally utilize both rivers.

Having strong friends is always beneficial. Riparian countries of the Euphrates-Tigris basin periodically enjoyed their political, military, economic and ethnic networks and alliances. One of the misfortunes of the basin that impeded cooperative relations among neighbors was the tense, polarizing political atmosphere of the Cold War structure that positioned upstream and downstream countries in different blocks. Turkey, since its establishment as a young republic, preferred to be part of a western strategy and joined the US-led coalition; while Syria and Iraq positioned themselves with the Soviet Union. Water development in the basin became one of the several battlegrounds of greater political reckoning between two opposing worlds. Thus, upstream-downstream relations remained limited in that era. International alliances of riparian states helped them to collaborate with their partners on the financial and technical issues. The United States' financial support to Turkey through USAID helped this country to build two large hydropower projects in the 1970s. Similarly, Iraq and Syria realized several projects with financial and technical assistance of the Soviet Union. Arab League, on the other hand, was used very effectively by Syria and Iraq during the Atatürk Dam crisis to pressurize Turkey on its decision and block financial support from the western institutions.

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Institutional capacities to carry out their '*hydraulic mission*' were another factor that created the difference among riparians. Turkey's DSI, which was established in 1953, have played an immense role in Turkish water development efforts. Although until 1950s only three dams were constructed in Turkey; by operationalizing the DSI, 6 more dams in 1950s, 26 in 1960s, 31 in 1970s, 69 in 1980s, and 37 dams in 1990s were constructed.[143] Ataturk Dam, which is the centerpiece of GAP project and one of the largest dams in its kind with 48 BCM storage and 27 billion kWh hydropower capacities, was constructed and financed totally by national resources. One of the sources of anxiety that downstream countries had was the technical and financial capability of Turkey achieved. Although Iraq and Syria suffered from ill-designed projects that caused loss of resources; the DSI, with years of *know-how* experience, has designed and implemented very well-conceived projects. In terms of institutional capacity, Syria and Iraq relied on previous works of British and French mandates. Although this readily-prepared inventory studies were useful and provided an advantage to both countries; they could not take the pace of development and had to appeal for international assistance to utilize the Euphrates and Tigris Rivers.

This brief analysis indicates that Turkey has an upper hand in each component of structural power. Its geographic, military, economic, diplomatic, and institutional superiority have allowed her to develop a well-

[143] Andrew Langer, Hydro Wars: The Struggle for Water and Survival in the Euphrates-Tigris River Basin, Columbia University Academic Commons, 2014, p. 4

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grounded strategy over water issues. Considering this great asymmetry in structural power, Turkey's unilateral development would not surprise anyone and the lack of a basin-wide agreement would be more comprehensible. Freeman (2007) rightfully asks *what benefits besides being a 'good neighbor', does Turkey gain by guaranteeing a constant and uninterrupted supply of water to Syria and Iraq*.[144] However, the missing point in this question is that: power does not constitute of only one dimension. Applying several counter strategies, which was the case in the Euphrates-Tigris conflict, can compensate any asymmetry in structural power. Syria and Iraq applied different strategies in the context of regional and temporal conjuncture. Turkey had to unilaterally commit itself to release 500 m^3/s to Syria according to the 1987 agreement. So, why did powerful, upstream country Turkey, despite all the strategic superiority it had, agreed to a minimal allocation to downstream Syria? We can find answer to this question in the realm of bargaining power.

Issue-Linkage Strategies

Powerful states in contested river basins can be found in upstream, midstream, and downstream positions. Each geographical setting brings different dynamics in its wake. It has been observed that a greater risk of conflict is possible when downstream riparians are more powerful and suffer from upstream development, which is the case in Nile River basin. However,

[144] Kevin Freeman, Water wars? Inequalities in the Tigris-Euphrates river basin. *Geopolitics*, *6*(2), p. 134

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this does not mean vice versa guarantees peaceful relations. Daoudy (2009) characterized interaction in the Euphrates-Tigris basin as a '*structural dilemma*', by which the relatively more vulnerable party, Syria, paradoxically reached a satisfactory outcome in negotiating with the relatively more powerful upstream riparian, Turkey; under the prevailing power asymmetry. So, *what have been the main drivers that forced Turkey to agree to a minimal flow release*? *Was it the success of downstream riparian, or rather a farseeing action that was part of a broader strategy of upstream Turkey*? To answer these questions, we need to have a closer look at the counter strategies that downstream riparians resorted to, particularly the most effective one: *issue-linkage*. Le Marquand (1977) defines the issue-linkage as a situation, in which an upstream issue is linked to another issue that results in cooperation through mutual concessions.[145] Water's diverse functionality in development and its principal role as a life-sustaining resource enable linking it to several other issues effectively. However, the success of the method is really contingent upon the ability of the implementer to comprehend the problem and realize its policy alternatives through a strategic thinking. Thus, while issue-linkage strategies were an effective source of bargaining power that narrowed the power gap among riparians in the Euphrates-Tigris basin, it was not really an effective instrument in the Nile basin due to lack of capacity of the upstream riparians. Table 2 summarizes the issue-linkage strategies

[145] David G. LeMarquand, International Rivers: The Politics Of Cooperation, Westwater Research Centre, University of British Colombia (1977), p. 21

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that were resorted in the Euphrates-Tigris basin with respect to their relative weights. Although each strategy played a unique role in the context of problem, the first two of them came into prominence. Supporting the PKK has been the most dominant and the most effective strategy applied by the downstream riparians in the Euphrates-Tigris conflict. Whilst Iraq periodically engaged in this strategy, Syria was actively involved in the Kurdish issue until the Adana Accord in 1998. Syria provided a base for anti-Turkey terrorist organizations, particularly Kurdish separatist organization PKK, since the 1980s. Syria's extensive logistical support to the PKK, which enabled it to conduct military operations within Turkey, had been an important bargaining chip. By linking water issue to national security, Syria was expecting to create a water-security dilemma, and get more water concessions from upstream Turkey. However, Turkey's first reaction was not what Syria was expecting. Turkey responded to the regional Kurdish insurgency by launching unarmed measures such as transforming GAP from an energy-irrigation oriented hydro-development project to human-centered regional development project, which would promote societal security through socio-economic development.[146] In addition to this transformation, another significant counter-strategy that Turkey resorted to has been the Turkish-Israeli military alliance, which would undermine Syria's bargaining power and policy alternatives.[147]

[146] Marwa Daoudy, Asymmetric Power: Negotiating Water in the Euphrates and Tigris, p. 379
[147] *Ibid.*, p.380

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Linkage Strategies	Weight	Objectives	Counter-strategy	Results	Interests
Support to PKK (1984–1998)	I	*Link any security agreement to a minimal allocation by Turkey of the Euphrates waters	* Transforming GAP from energy-irrigation centered to human development project * Cooperation with Israel	*Security Protocol of 1987 (special clause 500 m^3/second) *Treaty of Adana on Cooperation over Security (1998) – end of Kurdish card *Bilateral treaties with Israel (1996)	*Water Security *Impact on Turkey's national, societal and border security
Block international investments in GAP (appeal made to European Export credit agencies, World Bank) (1993–2002)	II	*Impede the completion of the GAP by limiting İnternational investments *Make international İnvestments conditional on other riparians' consent	*Finance GAP project from domestic resources.	*Support 'International Campaign against the Ilisu Dam on the Tigris" *External allies (NGOs, World Commission on Dams) *Withdrawal of British and Swiss Investors	*International Exposure as Co-Riparian *Impact on Turkey's economic development
International Law (1997 Convention on Non-Navigational uses of Transboundary Watercourses)	III	*Legitimize downstream theses *Enhance bargaining power	*Vetoing the convention *Three Stage Plan *Dispute Orontes river	*Convention has come into force in August 2014 after approval of 35 signatory states. However, since Turkey vetoed the convention, it is not responsible for the enforcement.	* To strengthen their legal positions *Gain international support
Link made with peace process in the Jordan Basin (1991–2000)	IV	*Link the agreement on the Jordan waters with a pressure put on Turkey over the Euphrates waters	*Proposing 'Peace Pipeline' Project *Manavgat Project	*Link made by the Americans during the Syria/Israel negotiations	*Wider regional negotiation and security concerns
Historical claims on the Sandjak of Alexandretta (re-named Hatay Province by Turkey)	V	*Link negotiations on the Orontes waters with a resolution of the Euphrates dispute	-	*Exclude Turkey from the Syria/Lebanon agreement on the Orontes waters (1994)	*Territorial and historical claims

Table 2: Issue Linkage Strategies in Euphrates-Tigris Basin, source: Table is adopted from Marwa Daoudy, Asymmetric Power: Negotiating Water in the Euphrates and Tigris, *International Negotiation*, *14*(2), p. 378

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Although these strategies had been useful to some extent, Turkey became more willing to collaborate with Syria on security issues after intensified PKK attacks. President Ozal, who followed a proactive diplomacy in his presidency, realized how continuing war atmosphere and securitization of hydro-development had been blocking Turkey's regional interests. He paid a visit to Syria in 1987 to defuse the tension and convince Syria to cease her support to PKK, thus secure the impounding period of Ataturk Dam. The visit resulted in an agreement whereby Turkey unilaterally guaranteed a minimum yearly average flow of 500 m^3/s at the Turkish-Syrian border during the impounding period of Ataturk Dam. Moreover, the two countries signed another protocol, under which Syria pledged not to permit anti-Turkey organizations within its borders, and to cooperate with Turkey on border security issues. By signing this agreement, Turkey used water in exchange for security issues, and this linkage was recurred later in 1992 and 1993 Joint Communiqués. The 1987 agreement was the concrete example of how a relatively vulnerable actor paradoxically can reach a satisfactory outcome by applying an effective issue-linkage strategy. However, the situation was not promising for Turkey. The water for security strategy did not work well and Syria continued harboring PKK until 1998, when Turkey issued an ultimatum and declared its determination to end Syrian support to the PKK even with military action. Syria responded to Turkish demands cooperatively and expelled the PKK leader from Syria, as well as closing military camps in her territories. This was the end of the 'Kurdish Card',

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which was the most important part of Syria's active issue-linkage strategy against Turkey. Although Iraq did not use the '*Kurdish Card*' as eloquently as Syria did, it had been an instrumental tool when wanting to punish Turkey. Iraq started to use the Kurdish card more actively after the Ataturk Dam crisis by vetoing Turkish demands to extend the security protocol that allowed Turkey to follow terrorists into the Iraqi territories. The Gulf war and Turkey's active involvement therein were another reason that led Iraq to resort Kurdish insurgency. Iraqi support to the PKK, particularly by refusing to renew security agreement, disrupted Turkey's fight against separatist guerillas. However, this support was limited compared to the situation with Syria, as Iraq itself had a large Kurdish minority in the northern part and she was suffering similar separatist activism.

Besides Kurdish separatism, blocking international investments in GAP was the second effective strategy that was resorted to by downstream riparians. Syria and Iraq started an active campaign against Turkey by appealing to international donors and financial institutions to stop financing GAP projects.[148] The Arab League had been an instrumental diplomatic channel to conduct these operations. In addition to that, both countries supported the international NGOs that were protesting against Turkey, because of the detrimental effects of the dam projects on environment and historical places. They sent letters to the World Bank and other international donors, as well as creditors that were planning to support projects such as

[148] Marwa Daoudy, Asymmetric Power: Negotiating Water in the Euphrates and Tigris, p. 379

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Swiss and British governments. This strategy worked affectively, since the World Bank conditioned its financial support on a mutual basin-wide agreement, while several European companies and creditors had to withdraw their support. This financial blockage has put enormous pressure on Turkey's national budget. Turkey had to finance GAP through domestic resources, and spent almost 8.5 percent of its national budget on GAP investments between the years 1990-2014.[149] These financial difficulties not only caused pressure on the national budget, but also serious delays in project implementation. Although GAP was projected to be completed by the early 2000s, due to the financial constraints the completion date has been postponed to 2047.

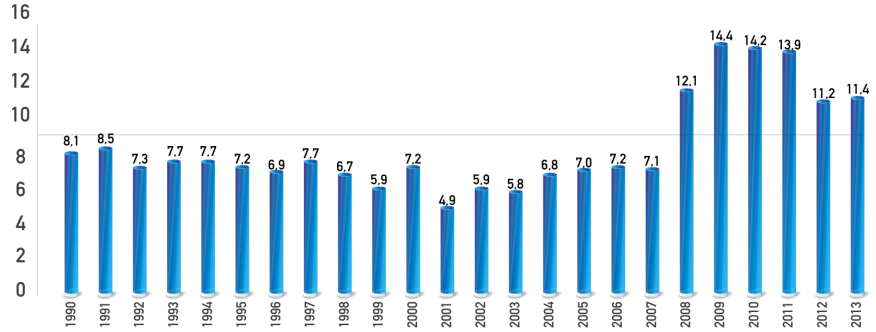

Figure 3: Share of GAP investments in proportion to national budget, Source:

http://gap.gov.tr/dosya_ekleri/Finansman_Tablosu.pdf

[149] http://gap.gov.tr/dosya_ekleri/Finansman_Tablosu.pdf

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Turkish Hydro-Hegemony: Reality or Illusion?

The Euphrates-Tigris Rivers were the subject of '*water wars*' scenarios, particularly during the 1990s. Although water conflict reached peak levels in certain crises, this war has not happened yet. The Twin Rivers started to be associated with another concept at the beginning of 2000s: hydro-hegemony. Turkey has been labeled as a water hegemon along with its counterparts Egypt in the Nile basin, and Israel in the Jordan River basin. However, narrative of the three basins reveals something different. Despite its great dependency on the Nile River, and its extremely unfavorable uppermost downstream position in a ten-riparian conflict; Egypt can be described as hydro-hegemon since it has been able to turn the tide and get 75 percent of Nile flows, and retain the status quo for a long time. The Israeli case is not much different. Despite its downstream position, Israel has been able to guarantee substantial amount of water from the Jordan River, as well as other aquifers. When we look at the Euphrates-Tigris case, the picture is not as clear as the other basins. Despite its geographic, military, and economic superiority, or '*structural power*' in hegemony notion, Turkey could not create a '*hegemonic order*'. Paradoxically, it had to unilaterally guarantee Syria, a minimum yearly average flow of 500 m^3/s at the Turkish-Syrian border by the 1987 agreement with Syria. In addition to that, Turkey could not get financial support from the international donors for its mega-projects, and had to finance them from domestic resources, which created a huge burden on the national budget. Worst of all, Turkey could not successfully

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impede downstream countries' support to terrorism, and lost almost 35,000 people with hundreds of billions dollars property and opportunity cost. So, *why did this happen*? *Given its great superiority in material power, why did Turkey could not set the rules of game in the Euphrates-Tigris basin*? A careful analysis will introduce us the limitations of Turkish policy making.

The first constraint of Turkish policy-making has been its integration into the international community and its norms. Turkey is a EU candidate and has been an active member of several other international and regional organizations. Unlike the dictatorial regimes of Syria and Iraq, Turkish democracy has always had to be accountable to the international community and taken care of its public-image. Consequently, Turkey's coercive power measures were limited, unlike downstream riparians. Although the overt support of Syria and Iraq to terrorism was well known, Turkey avoided any military operation until 1998 when it issued an ultimatum to Syria.

Turkey's second weak spot, has been its socio-political diversity that coupled with the geographic complexities, which makes Turkey vulnerable to any manipulation. The Kurdish insurgency in the heart of Turkey has been a great source of manipulation for outsiders. In addition regional crises, such as the Gulf war, and the US invasion of Iraq always forced Turkey to select one side and thereafter bear the consequences.

Finally, the most important constraint has been the lack of *ideational power* in Turkish water policy, which is the decisive factor in hydro-hegemony. Unlike Egypt and Israel, Turkey could not develop a hegemonic

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discourse over the Euphrates-Tigris Rivers to impose her thesis. Since Turkey did not have a sound representation in international organizations like Egypt and Israel, the Turkish thesis did not gain acceptance neither from the international community nor from the riparian countries, although some of them were very creative and rational.

Although Turkey actualized its superiority in several cases, it has not been enough to be able to define Turkey as a hydro-hegemon in the Euphrates-Tigris basin.

The Euphrates and Tigris: An International Law Perspective

Legal Framework Doctrines

One of the most challenging features of water conflicts has been finding a common legal ground for the sovereignty-based claims of riparian countries. However, the claims and counter claims of riparian countries over transboundary rivers, based particularly based on geographic positions, paved the way for four outstanding framework doctrines, namely absolute territorial sovereignty, absolute territorial integrity, limited territorial sovereignty, and community theory in the last century. Basically, upper riparian states claimed absolute territorial sovereignty, which gives them a full control in their boundaries; while downstream riparians claimed territorial integrity, a doctrine justifying the demand of undisturbed flow

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from upstream.[150] The mutual exclusive nature of these two extreme views theories directed the international community to find more reasonable approaches.

Absolute Territorial Sovereignty

The emergence of *absolute territorial sovereignty* doctrine dates back to the late 19th century, in a dispute between the United States and Mexico over the Rio Grande. US General Attorney J. Harmon who was appointed to investigate the dispute, conceptualized US official position by declaring that a sovereign nation has the right to do whatever it chooses through its borders. However this doctrine was not widely accepted in the international community since it envisages an unlimited control of such a vital source of life. Mostly, upstream riparian countries adopt absolute territorial sovereignty, particularly when they are capable of complementing this concept with their material power. In the Euphrates-Tigris basin, Turkey has adopted the Harmon doctrine for a long time, by claiming its sovereign rights over the Twin Rivers in her territories.

Absolute Territorial Integrity

In response, downstream countries claimed *absolute territorial integrity*, which is in some ways the polar opposite of absolute territorial sovereignty.[151] According to theory, a downstream riparian is entitled to

[150] Ayşegül Kibaroğlu, *Building a Regime for the Waters of the Euphrates and Tigris River Basin*, p.121

[151] Scott L. Cunningham, Do Brothers Divide Shares Forever: Obstacles to the Effective Use of International Law in Euphrates River Basin Water Issues, 21 J. Int'l L. 131 (2014), p. 146

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demand the continuation of the uninterrupted flow from an upper riparian state, and has veto power against water development in upstream territories. Absolute territorial integrity is generally invoked by lower riparians on a river system, such as the most famous example being that of Egypt in the Nile Basin. However, likewise the doctrine of absolute territorial sovereignty, has been another extreme view that received much legal support in the international community. In the Euphrates-Tigris basin, the Iraqi and Syrian '*historical rights*' thesis are based on a doctrine of absolute territorial integrity. Both downstream riparians criticized Turkey due to the implementation of GAP, which is capable of reducing downstream flow. Since upstream and downstream riparians have rigorously relied on diametrically opposed concepts, the hydropolitical atmosphere of the Euphrates-Tigris basin remained tense enough to prevent any cooperative action.

Limited Territorial Sovereignty

The ineffectiveness of these two mutually exclusive and extreme views in solving conflict resolution, has led the international community towards more reasonable approaches that are capable of mutually meeting both upstream and downstream riparians' expectations. The *Limited territorial sovereignty* concept has emerged after such a quest, and is based on the assumption that each riparian state has a right to utilize the waters of the shared watercourse within its boundaries. However, this utilization should be in a reasonable manner that must not cause significant harm to

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downstream riparians. Limited territorial sovereignty gives equal rights to each riparian, so that each riparian's sovereignty is limited by the rights of other riparians. In addition, an equal right does not translate to sharing water equally based on simple mathematical quota. This doctrine has been promoted by the international community, particularly by UN agencies; it is further complemented by some international norms such as equitable and reasonable use, and an obligation not to cause significant harm. Although this doctrine ameliorated some problems of previous doctrines, it requires far more to address the complexities of water conflicts. The main arguments against the doctrine have been concentrated on ambiguity on the practicality of some basic principles. For example, it is not clear where a nations sovereignty limits should be; what does reasonable utilization means, and what criteria should be used to determine what is reasonable.

Community Theorem

Recently, another concept has started to be widely accepted, parallel to the development in international legal context. The idea of communal management of transboundary waters is basically based on the notion that since water is an essential human need, human access to this vital resource must be the ultimate goal in water management.[152] There are three pre-conditions for achieving a functional community management system: (1) *Developing and managing the water basin as a unit without regard to international borders, ideally through a joint transnational institutional*

[152] Mehmet Ugur, *Strategic Factors In Developing Effective Transboundary Water Resources Regimes The Case of Tigris-Euphrates Basin*, p. 139

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structure; (2) *Sharing the benefits of that development and management according to an agreed formula or procedure*; (3) *Establishing a procedure for constructive investigation and peaceful resolution of disputes.*[153]

Codification of International Law

Helsinki Rules

The first international codification efforts in modern times dates back to 1966, when International Law Association (ILA)- a non-governmental epistemic community- created a document that established the first principals of international law on transboundary watercourses. This document, *Helsinki Rules on the Uses of Waters of International Rivers*, then started to be referred as *Helsinki Rules* in the international community. The Helsinki Rules have been a remarkable development in terms of transboundary water governance since it introduced some important principals to water management. First of all, the concept of *limited territorial sovereignty* was adopted by the statement, which entitled each basin state a reasonable and equitable share within its territory. A series of relevant factors stated in Article V to be considered while determining 'reasonable and equitable share', such as geography, hydrology, climate, past utilization, economic and social needs, population, cost of alternative means, availability of other resources, avoidance of unnecessary waste, practicability of compensation of other riparians, and harm caused to downstream

[153] Scott L. Cunningham, Do Brothers Divide Shares Forever: Obstacles to the Effective Use of International Law in Euphrates River Basin Water Issues, p. 149

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riparians.[154] However, these rules still fall short since their relative weights are too subjective. Another significant contribution of the Helsinki Rules to international law literature was the prior notification principal, which has been embodied in further legal documents, and has become an important norm in transboundary water management.

The Watercourse Convention

The preliminary efforts of ILA further complemented by International Law Commission's (ILC), a U.N. commission established in 1947 for the codification of international law, work on non-navigational uses of international rivers.[155] ILC issued a set of thirty-three draft articles in 1994, which has been the basis of Watercourse Convention. In 1997, U.N. General Assembly adopted the Convention on the Law of the Non-navigational Uses of International Watercourses by a vote of 103 in favor, and 3 against, with a high number of abstentions. Turkey was among the three countries that vetoed the convention, and is not bounded by it; while Syria and Iraq were among the first countries that signed the convention. The contention over convention focused on several articles. Articles 5, 6, 7, and 33 were at the center of criticism. The main concern about the convention was the lack of clarity. Article 5 of the convention entitles watercourse states to equitable and reasonable utilization of the water resource within their respective

[154] Scott L. Cunningham, Do Brothers Divide Shares Forever: Obstacles to the Effective Use of International Law in Euphrates River Basin Water Issues, p. 149
[155] *Ibid.*, p. 150

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territories in an optimal manner.[156] This article favors the Turkish thesis, which proposes that the most optimal utilization of Euphrates-Tigris Rivers can be enhanced by using water in upstream Turkish territories. Since Turkish dams appeared to be more effective and Turkish agricultural lands are more productive, it is possible to create more benefits from river utilization.

Article 6 of the convention provides relevant factors to determine the extent of '*equitable and reasonable*' utilization in Article 5. These factors are[157]:

a) Geographic, hydrographical, hydrological, climatic, ecological, and other factors of a natural character;
b) The social and economic needs of the watercourse states concerned;
c) The population dependent on the watercourse in each watercourse state;
d) The effects of use or uses of the watercourses in one watercourse state on the other watercourse states;
e) Existing and potential uses of the watercourse;
f) Conservation, protection, development, and economy of use of the water resources of the watercourse and costs of measures taken to that effect;
g) The availability of alternatives, of comparable value, to a particular or existing use.

However, these rules still fall short since their relative weights are too subjective. Different factors can be used to legitimize different actors'

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[156] *Still Thirsting: Prospects For A Multilateral Treaty On The Euphrates And Tigris Rivers Following The Adoption Of The United Nations Convention On International Watercourses*, p. 298

[157] Adopted by the General Assembly of the United Nations on 21 May 1997. Entered into force on 17 August 2014. See General Assembly resolution 51/229, annex, Official Records of the General Assembly, Fifty-first Session, Supplement No. 49 (A/51/49). http://legal.un.org/ilc/texts/instruments/english/conventions/8_3_1997.pdf

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actions; it is not easy to determine any superiority between factors. For instance, Turkey can defend its mega-project GAP by claiming favorable geographic and climatic conditions (a), as well as the social and economic needs of its less-developed southeastern region (b). On the other hand Syria and Iraq can rely on their relative dependency on the Euphrates-Tigris waters (b). Iraq, additionally, can claim the large population that depends on the Euphrates and Tigris rivers (c). Therefore, it is not an easy task to determine which country has greater priority in water use.

Article 7 of the convention, which introduces *no significant harm* rule, adds another controversy. It is not clear what is the definition of significant harm is.

Article 33, which describes the dispute resolution mechanism of the convention, is another criticized issue. Third party intervention in any dispute resolution was highly criticized, particularly by countries vetoing the convention due to violation of national sovereignty.

Although the Water Convention complemented the developing international law efforts, it still needs improvement. Many experts and states criticized convention for the ambiguity of several articles.

Legal Arguments of Riparians

Turkey

As an upstream riparian in the Euphrates-Tigris basin with favorable asymmetric structural power, Turkey followed an *absolute territorial*

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sovereignty doctrine until the beginning of the new millennia. Turkey defined the Euphrates and Tigris rivers as '*Turkish Rivers*' and rejected any co-sovereignty claims over these rivers. The Public discourse in Ankara was parallel to this perception. Top Turkish officials made some provocative statements about Turkish identity of the Euphrates and Tigris Rivers. President Suleyman Demirel once clearly stated that:

"This is a matter of sovereignty. This is our land. We have the right to do anything we like. The water resources are Turkey's. The oil resources are theirs. We do not say we share their oil resources. They cannot say they share our water resources."

One of the major issues between riparian countries has been the question of whether the Euphrates and Tigris rivers can be considered as an integrated system or they should be separately considered. Turkish stance in this question has been although artificially connected to each other by Lake Thartar; the two rivers arise in the same lands and converge at Shat-al Arab, and should therefore be considered as a single watercourse. This approach is parallel to international water law norms, which consider rivers a single unit if they share a common terminus and their waters are to a certain extent interconnected, or constitute by virtue of their relationship a unitary whole.[158]

Another significant difference of opinion has been the status of rivers, whether they are '*international rivers*' as Syria and Iraq claims, or '*transboundary watercourses*' as Turkey claims. Turkey accepts *international rivers* to be those that form a boundary between two and more states; and

[158] Adele J. Kirschner and Katrina Tiroch, *The Waters of Euphrates and Tigris: An International Law Perspective* p. 376-377

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claims thus that the Euphrates and Tigris rivers are 'transboundary watercourses', which guarantees its exclusive sovereignty over them. This is not a simple semantic confusion, but rather an important distinction that determines rights and obligations of riparian countries. According to the *international river* concept water should be shared through a simple mathematical quota, while *transboundary watercourse* notion is based on equitable and reasonable allocation of water, consequently this notion favors Turkey.

However, these are not the only controversial issues of the water conflict in Euphrates-Tigris basin. The three riparians could also not agree on how to weight the different norms to determine equitable and reasonable utilization of water. The ambiguous language of international law further complicated the matter, as it could not refer its thesis to any universally acceptable reference point. Although international water law identifies several factors to be considered when determining equitable and reasonable utilization, it does not mention any superiority among them and leaves it up to states to decide. Turkey suggests joint management of rivers; in a rational and optimal utilization manner. This optimal utilization is based on using water where it is more efficient and more beneficial. Turkey criticizes Syria and Iraq over their outdated irrigation methods, which waste water, and claims that with more efficient methods, the amount of water that they receive would be sufficient to meet their demands. Turkey has embodied its claims in concrete form, and presented its *Three-Stage Plan for Optimum,*

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Equitable, and Reasonable Utilization of Transboundary Watercourses of the Tigris-Euphrates Basin in 1984, in response to downstream claims based on acquired rights and arithmetic sharing. The plan has two basic principles; first, the Euphrates-Tigris Rivers have to be considered as forming one single transboundary watercourse system, and secondly, inventory studies for water and land resources of the whole basin should be undertaken and jointly evaluated. Finally, all necessary means and measures to attain the most reasonable and optimum allocation of resources need to be defined.[159] The plan consisted of three stages. The first stage is an inventory study for water resources that aims to synchronize divergent interpretations stemming from conflicting water quality and quantity data; hence enabling same understanding through a common data set, which would facilitate the solution of conflict during the negotiations. The second stage envisages inventory studies of land resources that aims to classify soil and drainage conditions in the entire basin according to the same criteria. The final stage is the joint evaluation of the previous work, and developing the most suitable, efficient and economic methods for basin-wide, holistic water management.[160] Although the plan has been based on scientific rationality, it was rejected by downstream riparian states as it appeared that inventory studies would result in favor of utilizing water in upstream regions, mostly in

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159 http://www.mfa.gov.tr/data/DISPOLITIKA/WaterASourceofConflictofCoopintheMiddleEast.pdf

160 Muserref Yetim, A Bargaining Framework for Explaining International Water Rights Conflicts : The Case of the Euphrates and Tigris, p.56-57

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Turkish territories, as downstream soil and drainage conditions are not feasible for optimum utilization.

Syria

Syria's position has been the most challenging in the basin. Since it has mid-stream riparian position, it is a downstream riparian according to Turkey, while upstream for Iraq. Therefore, Syria most of the time, could not develop a sound water policy, and had to contradict herself on several issues. Besides that, Syria shares the Orontes River with Turkey, in which Syria is an upstream country while Turkey is in a downstream position. Syria's unilateral developments in the Orontes basin has strengthened Turkey's hand in the Euphrates River.

Despite its upstream position according to Iraq, Syria followed an *absolute territorial integrity* doctrine, and likewise Iraq, claimed historical rights over the Euphrates River waters. Unlike Turkey, Syria believes the Euphrates and Tigris Rivers to be *international rivers* that should be shared amongst riparian states, according to a mathematical quota.[161] Syria proposed an allocation based on the following principals;

(1) Each state shall declare its water demands separately.
(2) *The water capacities of both rivers shall be calculated in each state.*
(3) *If demand exceeds supply, amounts should be deducted accordingly.*
(4) *If supply exceeds demand, the water shall be deducted proportionately from the demand of each state*.[162]

[161] Kevin Freeman, *Water Politics And National Security In The Tigris-Euphrates River Basin*, p. 148
[162] Turkish Ministry of Foreign Affairs, "Arguments of Syria,' <http://www.turkey.org/groupc/Water/CHAPTER2/CHAP2B.HTM>, November 1999.

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However, this methodology was highly criticized by Turkey since water needs of states were based only on a declaration, and not on any internationally accepted rational method. Syria regards the Euphrates and Tigris as two separate basins, and has mostly concentrated on the Euphrates River to guarantee a greater share from this river.

Iraq

The Iraqi position is similar to that of Syria on many issues. Iraq claims that it has *historical rights* relating to its ancient irrigations systems that have provided life and livelihood to the people of Mesopotamia for thousands of years.[163] Referencing to *Article V* of the *Helsinki Rules*, Iraq argues that this ancient-old utilization practice entitles her an acquired rights for future use. Therefore, Iraq claims continuation of flow, which has been reduced by upstream development projects. Iraq also claims that upstream development projects, particularly GAP, are violating international law by causing significant, irreparable harm to its citizens and agricultural production.

Like Syria, Iraq has been a vigorous advocate of absolute territorial integrity doctrine, and considered the Euphrates-Tigris Rivers as *international rivers* that constitutes two separate basins. Iraqi proposal for resolving conflict has shown similarities to those of Syria, such as basing water requirements on simple mathematical quota rather than the needs-based approach of Turkey. Iraq's proposal constitutes of three steps:

(1) Each state must notify others when it plans to undertake a water project;

[163] Kevin Freeman, *Water Politics And National Security In The Tigris-Euphrates River Basin*, p. 150

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(2) Each state must exchange hydrological data concerning the two rivers;
(3) An independent committee of some sort should calculate water demands of each state and divide the water accordingly[164]

Iraq suggests establishment of a Joint Technical Committee to facilitate this process. Its proposal on quantitative allocation of water differs slightly from the Syrian plan, as Iraq prioritized water demands of existing structures. According to Iraqi plan, the first water demand of completed projects should be met, and if there is enough water, ongoing and planned projects then should be considered.

However, the Iraqi plan has a similar erroneous logic. Both plans allow each country to determine their water needs independently, without referencing any internationally accepted rational methodology. Considering the lack of reliable data, and mistrust among riparians, water demands can be manipulated to gain a larger share from rivers.

[164] Turkish Ministry of Foreign Affairs, "Arguments of Iraq," <http: //www. turkey.org/groupc/Water/CHAPTER2/CHAP2A.HTM>, November 1999 .

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CHAPTER 2

Water Availability in the Euphrates-Tigris Basin

In the first chapter, we became acquainted with the unique narrative of the Euphrates-Tigris Basin, from early civilizational to modern times, and tried to understand the evolution of hydropolitics, particularly in the last 100 years. The second half of the 20th century has witnessed the turning point in this evolution as riparian countries embarked on hydro-development contestation by implementing extensive multi-purpose water resources development projects one after another. However, the most important difference at this time has been the shift in location of water management activity and the type of water controls introduced. Since then emphasis has switched from downstream water diversions to large-scale upstream storage facilities, and that paradigm shift in the pattern of water utilization had a profound effect on political relations, as well as on basin hydrology. In the first chapter, we mostly tried to look at the impacts of these hydro-development efforts on hydropolitics through the lens of water-power-conflict nexus. However, this conflict cannot be well understood independently from the hydrology of the basin.

Managing water resources among competing demands has always been challenging. This situation has been further complicated by adverse climatic conditions in arid and semi-arid regions such as the Middle East. The Euphrates-Tigris Rivers have had a similar fate; high seasonality and multi-

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annual fluctuations in the river flow make water management an extremely difficult task even within the borders of a single nation. This natural adversity, coupled with extensive unilateral development projects, has resulted in great tension occurring in water availability in the basin. In the Euphrates basin alone, 32 dams and barrages have been built in last 50 years, which has enabled a storage capacity 5-times greater than the annual flow of the Euphrates River.[165] These extensive damming and irrigation projects have also changed the rivers' flow regimes; propelling water issues into the security realm which has impeded cooperation among riparians to correctly interpret that change, and address it with appropriate means. A lack of reliable data further complicated the situation. Each riparian based their understanding on the different set of data that caused contradicting views over the basic characteristics of the river. Therefore, there is no common understanding of the state and development of water availability, use and trends in the basin.

In this chapter, we would like to have a closer look at the water availability in the basin considering development in the last century. The main theme of the chapter will be defining respective water needs and projected water demands of each country. Chapter has been divided into three separate sections.

In the first section, we will examine basic river characteristics, from climatic conditions to hydrology for pre and post-development times. Since

[165] M.Nouar Shamout with Glada Lahn, The Euphrates in Crisis: Channels of Cooperation for a Threatened River, p. 2

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the Euphrates and Tigris rivers have different set of characteristics in terms of riparian countries, tributaries, discharge contributions, they will be examined separately. The second section is based on the quest of finding an answer for the question of *what are the water development projects that have been constructed in last 100 years, and what have been their impacts on the general characteristics of river hydrology*. More emphasize will be on Turkey's GAP project since it is an upstream development project and has a capability of modifying flow regime. In the third and last section, our aim is to combine previous two sections, and define respective water needs and future water demands of each country considering current and future level of developments.

Geography

The Euphrates River has its sources from the highlands of eastern Turkey, the city of Erzurum and Lake Van, where altitude is 3000 m and precipitation is plentiful. It takes its tributaries also from the eastern part of the country, flows through mountainous geography, and enters the Syria after the 900 km flowing. The river drops 2 m/km during its journey in Turkish territories, which makes it very suitable for hydropower development. After entering Syria, the Euphrates follows a south-eastward course and gets a few tributaries, one from the right hand namely Sajur; and two from the left hand, namely Balikh and Khabur. Particularly Balikh and Khabur are the last remarkable sources of the united Euphrates, and it doesn't get any contribution from downstream territories after its

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confluence with Khabur at Deir ez-Zor, unless there are unusual hydrologic events.

After flowing 661 km inside Syria with the southeastward route, the Euphrates enters Iraqi territories at Al-Bukamal with an elevation of 165 m above sea level. In Iraq, river crosses desert uplands and narrow wadis, and enters the alluvial lowlands near the city of Hit, while splitting into channels. From Hit to Persian Gulf, Euphrates flows through this flat alluvial area for 735 km, and only drops 53 m. Euphrates confluence with its twin, Tigris, at Al-Qurna, and this unified river is named Shatt-al Arab until its discharge into Persian Gulf. Euphrates is the longest river of the western Asia with 3000 km total length.[166]

Figure 4: The Euphrates and Tigris Basin

The Tigris river rises from the lake Hazar, only 30 km away from the Euphrates and flows more than 500 km inside Turkey while it constitutes the Turkish-Syrian border for 32 km before entering Iraq. Unlike the Euphrates, the Tigris River flows directly into Iraq from Turkey. It follows smoother and less

[166] John F. Kolars and William A. Mitchell, *The Euphrates River and the Southeast Anatolia Development Project* (Southern Illinois University Press, 1991), p. 3

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circuitous path than the Euphrates. Its total length is 1900 km and forms the Shatt-al-Arab with the Euphrates.

The Euphrates-Tigris River Basin is generally considered as one single basin. The two rivers rise very close to each other, only 30 km, and flow through the same territories. They join each other naturally before the Persian Gulf, but also through the Thartar channel, which is another man-made connection of the system.

Climate

Similar to other topographic regions that it resembles, the Euphrates-Tigris basin experiences three distinct climate zones over course of the basin.[167] The first prevailing climate type is *temperate cold and humid climate with dry summers* that has been encountered in mountainous headwater districts in northern part of the basin, particularly in Turkish territories where both rivers have their sources. In this region precipitation is plentiful, topography is very rugged and mean elevation is around 3000 m. Average winter precipitation ranges between 1500 mm to 800 mm annually, and much of the precipitation falls in the form of snow. As the snow melts in spring, the rivers reach their maximum flow between March and May, and they may carry a torrent 10 times as great as during the low-flow period.[168] The Euphrates-Tigris Rivers pass through a *sub-type Mediterranean climate characterized by rainy winters and dry warm summers*. These climatic

[167] N.Kliot, *Water Resources and Conflict in the Middle East* (Routledge, London), p. 104-105
[168] D.Hillel, *Rivers of Eden: The Struggle for Water and Quest for Peace in the Middle East*, p. 97.

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conditions prevail in southeastern Turkey, and the upper lands of Syria and Iraq. Mean precipitation ranges between 300-mm to 800-mm.

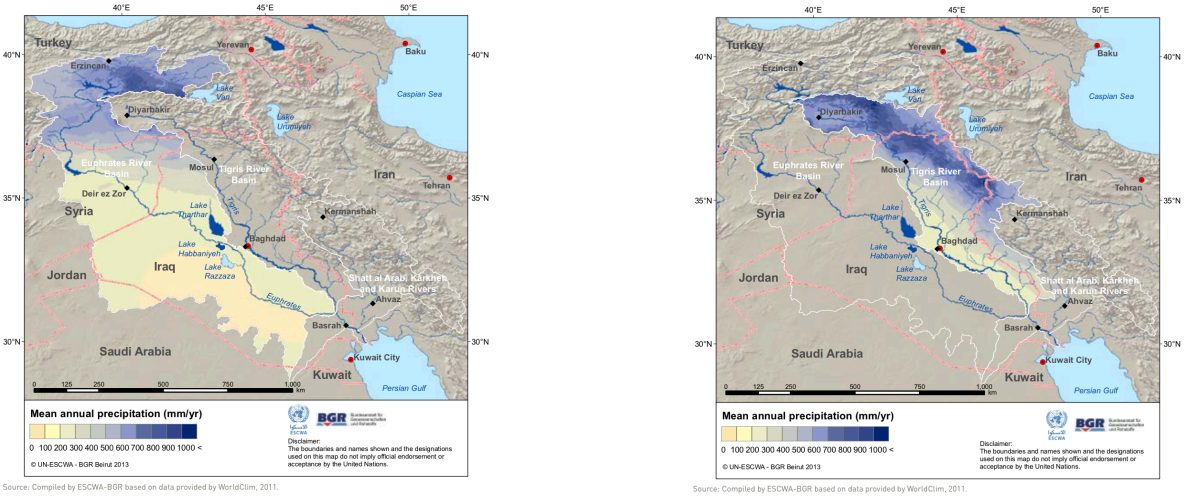

Figure 5: Mean annual precipitation in Euphrates and Tigris Basin. Source: UN-ESCWA and BGR. 2013. *Inventory of Shared Water Resources in Western Asia*

The lower part of the basin shows *arid and warm climate* with no more than 200-mm of rainfall. Most of Iraq and about half of the Syrian territory are under these type of climatic conditions.[169]

Temperature is another important climatic feature that should be considered in understanding climate phenomenon in the basin. Spatial and temporal variation in temperature is as great as rainfall. The northern part of the basin, where humid climate prevails, shows lower mean temperatures, which increase from north to south. The July mean temperature over half of Iraq is 30°C, as it is over about 40 percent of Iran's territory. Only Turkey has somewhat lower summer temperatures. Because of higher summer

[169] N.Kliot, *Water Resources and Conflict in the Middle East,* p. 105.

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temperatures, resultant potential evapotranspiration is also higher and ranges between 570-mm to 1140-mm for all four riparian countries, which makes rain-fed irrigation difficult in most of the year.[170] On the other hand, the evaporation that increases soil salinization and water loss from the surface areas of dams is also relatively high particularly in the southern part of the basin.

Since elevation increases from south to north in basin wide, the mean annual precipitation is also increases. Syria and Iraq have very low annual precipitation levels and higher evapotranspiration losses due to topographic and climatic conditions. Considering the total areas of the riparian countries, it is clear that the annual rainfall is less than 250-mm in 60 percent of the territories of Syria while 70 percent of the territories of Iraq receives less than 400-mm per year.[171] Since 90 percent of the Euphrates and 50 percent of the Tigris flow is being generated from Turkish territories, Syria and Iraq are vulnerable to any adverse climatic events and water resources development in Turkey.

Conversely, the temperature decreases in a south-north direction, and so does evapotranspiration and evaporation from the surface of water bodies. The northern parts of the basin are convenient for rain-fed agriculture whilst agricultural lands in the southern parts require very intensive irrigation due to the highly evaporative demand.

[170] N.Kliot, *Water Resources and Conflict in the Middle East,* p. 108.
[171] *Ibid.*, p. 108.

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The climate diagrams from selected stations in the three riparians, *Erzincan* (Turkey), *Deir ez-Zor* (Syria) and *Basrah* (Iraq) for the Euphrates; and *Diyarbakir* (Turkey), *Mosul* (Iraq), and *Baghdad* (Iraq) for the Tigris rivers illustrate the spatial-temporal distribution of temperature and precipitation. Evident also in the diagrams is the shift from a more humid Mediterranean climate to a hot and dry climate as rivers progress to the sea.[172]

In terms of precipitation pattern, it can be stated that the Tigris basin has a more favorable situation than the Euphrates, particularly for the southern parts. Spatial-temporal distribution of precipitation along the basin has significantly influenced flow regime and water utilization in irrigation. Since winter snowfall and spring rainfall are the main sources of water flow in the basin, almost 70 percent of the water supply of both rivers comes during this period providing an abundance of water for irrigation. However, this abundance of water is not favorable in terms of time for the most crops, due to the fact that it is too late for winter crops and too early to sustain summer crops. The summer-autumn period, which is the most favorable time for irrigating very profitable winter crops, is the driest time in terms of river flow. Thus, water for irrigation is limited and agricultural production falls short of the mark, which causes loss of productivity. In order to eliminate the

[172] UN-ESCWA and BGR (United Nations Economic and Social Commission for Western Asia; Bundesanstalt für Geowissenschaften und Rohstoffe). 2013. *Inventory of Shared Water Resources in Western Asia*. Beirut.

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timing problem of flow regime, riparian countries have initiated large-scale water storage facilities to divert river flow for the period of high crop demand.

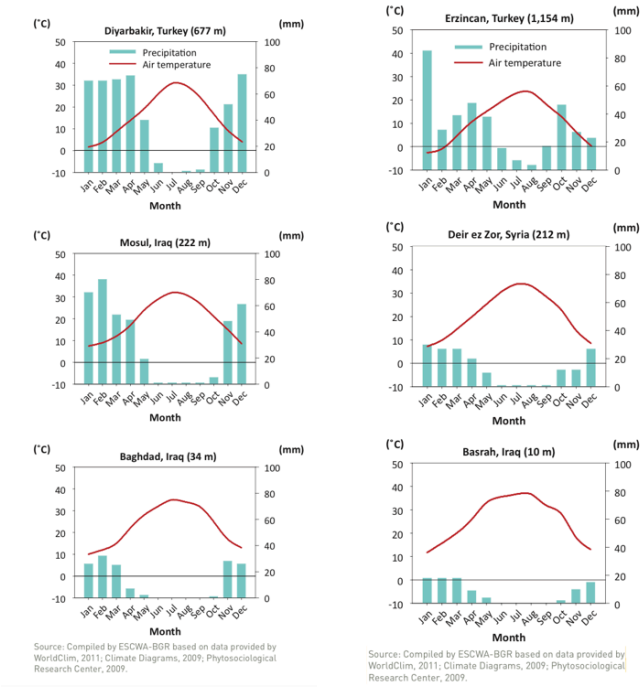

Figure 6: Climate Diagrams for Tigris and Euphrates Rivers

Hydrology

The success of a sustainable, basin-wide water allocation agreement in the Euphrates-Tigris basin strongly depends upon a clear understanding of the hydrological characteristics of the basin. However, a lack of reliable data when coupled with political mistrust among riparians impeded having a common understanding over hydrology. Mean annual discharge, which would be the main reference point for any water allocation since it determines the quantity available at any given time, has been a matter of dispute among riparian countries and academia.

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The Euphrates River originates from the precipitation in the Anatolian Highlands in Turkey. In Syria, the Sajur, Balikh, and Khabour tributaries contribute to the flow of the mainstream with varying amounts depending on the climate variability and water utilization in upstream. The Euphrates doesn't receive any flow contribution from the Iraqi territories, except for rare runoff events generated by heavy storms.[173]

There is great asymmetry in flow contributions. Turkey provides almost 90 percent of the total Euphrates flow, while Syrian territories provide the rest of 10 percent. However, some of the tributaries in Syria have most of their sources from Turkish territories, and some scholars proposed Turkey's contribution to be 98 percent.[174]

The Tigris River flow is more uniform in terms of riparian contributions. Although it receives its mainstream from Turkey, there are several tributaries from Iranian and Iraqi territories that have a significant contribution. Syria doesn't have any significant contribution to river flow; however, since it shares a 44 km border with Turkey formed by the Tigris, she acquires a riparian position in that basin too. Unlike the Euphrates basin, the flow contributions of the riparians are not very clear since tributary flows take an important role and they are highly depended on climatic variability. Therefore, riparian contributions are expressed as ranges, in

[173] UN-ESCWA and BGR (United Nations Economic and Social Commission for Western Asia; Bundesanstalt für Geowissenschaften und Rohstoffe). 2013. *Inventory of Shared Water Resources in Western Asia*. Beirut. p. 58.
[174] J. Kolars, *Problems of International River Management*, International Waters of the Middle East, 1994, p. 51.

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which upstream Turkey is estimated to contribute 40-65 percent of the river's annual flow while Iraqi and Iranian contributions are 10-40 percent and 5-20 percent respectively.

The seasonal character of the Euphrates-Tigris Rivers can be identified in three distinct periods.[175]

- Period of high discharge, March to June;
- Period of low discharge, July to October;
- Period of average discharge, November to February

Both the Euphrates and Tigris are characterized by river regimes that exhibit strong snowmelt peaks. The large proportion of total precipitation falls as snow during the winter months from October to April on the uplands, particularly in the northeastern part of basin where rivers rise. With the increasing temperatures both rivers experience their highest flows in April-May period. Figure 4 illustrates the seasonal behavior of the Euphrates flow for the period of 1930-1973, which is accepted to be a *near natural flow* period by several authors (Kibaroglu 2002, Kolars 1992, Beaumont 1998, Kliot 1994, Al Hadithi 1978).

This seasonal character of the flow regime does not coincide with the timing of irrigation water demand, which causes decreases in agricultural production. During the summer season when high-profit winter crops have the greatest need for irrigation water, the water supply is at the lowest level. However, during spring, when water is abundant, and even causes floods that

[175] N.Kliot, *Water Resources and Conflict in the Middle East*, p. 108

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destroy crops, irrigation water need is not as much. Because of that timing discrepancy, riparian countries have embarked on storage facilities in order to regulate stream-flow.

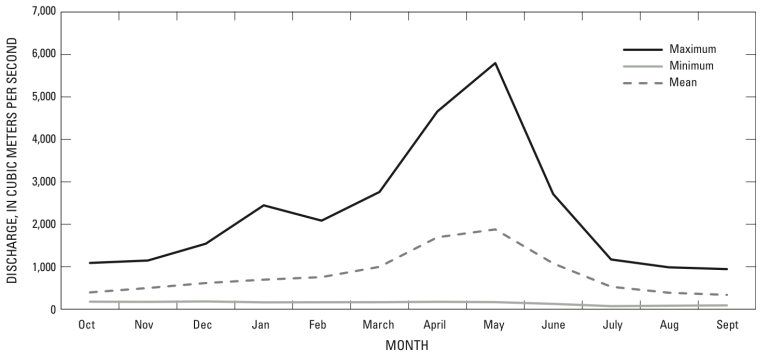

Figure 7: Monthly discharge of Euphrates River at Hit, Iraq, water years 1932–97. (Source: USGS, Stream Gage descriptions and Stream flow Statistics for Sites in the Tigris River and Euphrates River Basins, Iraq. In data series 540. Available at: http://pubs.usgs.gov/ds/540/pdf/ds540.pdf)

Maximum mean monthly discharge in the Euphrates has been measured as 4658 m^3/s at Hit station during April 1969, while minimum mean monthly discharge has been 71.50 m^3/s in July 1976. Mean monthly discharge of the Euphrates varied between 27 and 245 percent of the annual mean flow, which is sufficient evidence of the extent of seasonality. The months of March, April, May and June account for almost 60 percent of the mean annual flow of the Euphrates. Figure 5 shows the annual flow duration curve of the Euphrates River. Median value of the curve is 557.8 m^3/s, which is lower than annual average flow, 817.65 m^3/s.

Mean annual flow of the Euphrates has occurred about 35 percent of the years, which is below the median value. This is most likely due to stream

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regulations through water abstractions, storage activities after the post-development period, and also prolonged drought cycles that occurred.[176]

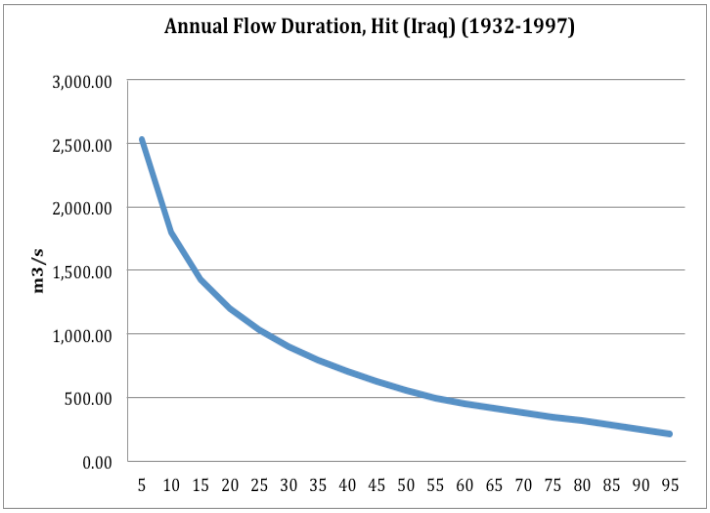

Figure 8: Annual Flow Duration Curve for Euphrates at Hit, Iraq: 1932-1997

The actual annual flow of both rivers is still controversial. Each riparian country has based their own thesis on different data sets; therefore, the negotiation process during the meetings of Joint Technical Committee to reach a basin-wide water allocation agreement remained inconclusive. A similar controversy has been present in academia also. Different reports and evaluations quoted different sets of figures. However, these values tend to reflect different observation periods, rather than fundamental disagreements as to how much water is present within the two river systems.[177]

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[176] UN-ESCWA and BGR (United Nations Economic and Social Commission for Western Asia; Bundesanstalt für Geowissenschaften und Rohstoffe). 2013. *Inventory of Shared Water Resources in Western Asia*. Beirut. p. 59.

[177] P.Beaumont, *Restructuring of Water Usage in the Tigris-Euphrates Basin: The Impact of Modern Water Management Policies*. Yale School of Forestry & Environmental Studies Bulletin, 1998, 103: p. 169.

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The total flow of the Euphrates at Hit is given as 31.820 BCM by Beaumont (1985), however, Kolars (1992) gives the Euphrates flow at Hit, Iraq, as 32.7 BCM, and Ubell (1971) used mean flow as 31.8 BCM. Al Khashab (1958) who has studied basin-wide water balance gives the discharge flow of 25-years in Hit as 26.4 BCM. Although the time period is very short to have a sound understanding of the flow pattern; on the other hand, it shows the discharge for the time period when large water development projects had not yet been initiated.

Mean Flows of the Euphrates: 1937-1964 (billion m3)

	1924-1951(a)	1937-1964(b)	1933-1972©	1931-1969(d)	1934-1973(e)
Euphrates, Keban (TUR)		19.9			
Euphrates, Hit (IRQ)	26.4		30.25	31.8	32.7

Sources:
a Al-Khashab (1958)
b Saleh (1985)
c Ubell (1971)
d Kolars&Mitchell (1991)
e Kolars (1992)

Figure 9: Mean Flows of the Euphrates, source: N.Kliot, *Water Resources and Conflict in the Middle East* (Routledge, London), p. 108.

Some scholars such as Kibaroglu (2002), preferred to take 32 BCM considering varying estimations between different studies.

One of the most recent and comprehensive studies has been done by a consortium of ESCWA (United Nations Economic and Social Commission for Western Asia) and BGR (Federal Institute for Geosciences and Natural Resources). This study was conducted by various scientist, academicians, and policy makers from the member countries, and covers the available data up to 2011 from different stations.

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Since the discharge of the Euphrates varies annually corresponding to the climate variability and post-development impacts, the study has been built on the measurements of different stations that have the longest available data such as Jarablus in Syria (1938-2010), and Hussaybah (1981-2011), Hit (1932-1998) and Hindiyah (1930-1999) in Iraq.[178] In order to separate natural flow from the post-development period and therefore understand the impact of river utilization and its own dynamics, the time frame has been divided into three periods, namely;

- Near-natural flow period (1938-1974)
- I. Phase Infrastructure development period (1974-1998)
- II. Phase Infrastructure development period (1990-2010).

Figure 9 illustrates the summary of annual flow volume statistics for the Euphrates River: the mean, maximum, and minimum flow, as well as the coefficient of variation (CV). [179]

There is a great variation in the mean discharge flow of the Euphrates. The mean annual flow for the entire period of record has been 26.6 BCM at Jarablus, in Turkish-Syrian border; while 27.1 BCM at Hit, in Iraq; and 17.6 BCM at Hindiyah, in Iraq. Although the Euphrates flow does not change significantly between Jarablus and Hit, the flow decreases significantly

[178] UN-ESCWA and BGR (United Nations Economic and Social Commission for Western Asia; Bundesanstalt für Geowissenschaften und Rohstoffe). 2013. *Inventory of Shared Water Resources in Western Asia*. Beirut. p. 58.

[179] The CV is a statistical measure to describe the variability of annual discharge inherent in a time series of flow data with respect to the mean and standard deviation. Greater CV values mean greater standard deviation, so greater variability in flow.

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between Hit and Hindiyah, in Iraq, due to irrigation water usage in the Ramadi alluvial plains. Maximum annual flow for the entire period of record has been measured as 56.8 BCM at Jarablus and 63 BCM at Hit in 1969, which were recorded in the wettest year in the basin history. Minimum flow levels were recorded as 12.7 BCM at Jarablus, 9 BCM at Hit, and 3.1 BCM at Hindiyah.

STATION (DRAINAGE AREA, km²)	PERIOD	MEAN (BCM)	MINIMUM (BCM)	MAXIMUM (BCM)	CV[a] (-)
Jarablus, Syria (120,000)	1938-2010	26.6	12.7	56.8	0.33
	1938-1973	**30.0**	**15.0**	**56.8**	**0.29**
	1974-1987	24.9	12.7	34.1	0.27
	1988-1998	25.5	14.4	50.1	0.42
	1974-1998	**25.1**	**12.7**	**50.1**	**0.34**
	1990-2010	**22.8**	**14.4**	**32.6**	**0.34**
Hussaybah, Iraq (221,000)	1981-2011	20.0	8.9	47.6	0.44
	1988-1998	22.8	8.9	47.6	0.54
	1999-2010	15.5	9.3	20.7	0.27
	1990-2010	**16.8**	**8.9**	**30.7**	**0.39**
Hit, Iraq (264,000)	1932-1998	27.1	9.0	63.0	0.36
	1938-1973	**30.6**	**15.1**	**63.0**	**0.30**
	1974-1987	23.1	9.3	31.2	0.32
	1988-1998	22.4	9.0	46.6	0.51
	1974-1998	**22.8**	**9.0**	**46.6**	**0.40**
Hindiyah, Iraq (274,100)	1930-1999	17.6	3.1	40.0	0.4
	1938-1973	**19.8**	**6.6**	**40.0**	**0.35**
	1974-1987	15.3	3.1	24.1	0.45
	1988-1998	13.8	7.7	27.9	0.48
	1974-1998	**14.7**	**3.1**	**27.9**	**0.46**

Source: Compiled by ESCWA-BGR based on Ministry of Irrigation in the Syrian Arab Republic in ACSAD and UNEP-ROWA, 2001; USGS, 2012; Ministry of Irrigation in the Syrian Arab Republic, 2012.
(a) Coefficient of Variation. For information on the definition and calculation of the CV see 'Overview & Methodology: Surface Water' chapter.

Figure 10: Summary of annual flow volume statistics for the Euphrates River (1930-2011)

According to Figure 10, before 1973, the period that water infrastructure development has not started yet, the mean annual flow of the Euphrates at the Jarablus was around 30 BCM. However, discharge has

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dropped to 25.1 BCM between the years 1974 to 1998, during the first phase of the development, and further decreased to 22.8 BCM between the years 1990-2010, the II. Phase of the development. The main reason for this variability can not only be attributed to the impacts of development projects in the three riparians, but also natural climate variability, frequent and prolonged drought periods, and inefficient agricultural practices that wasted water.

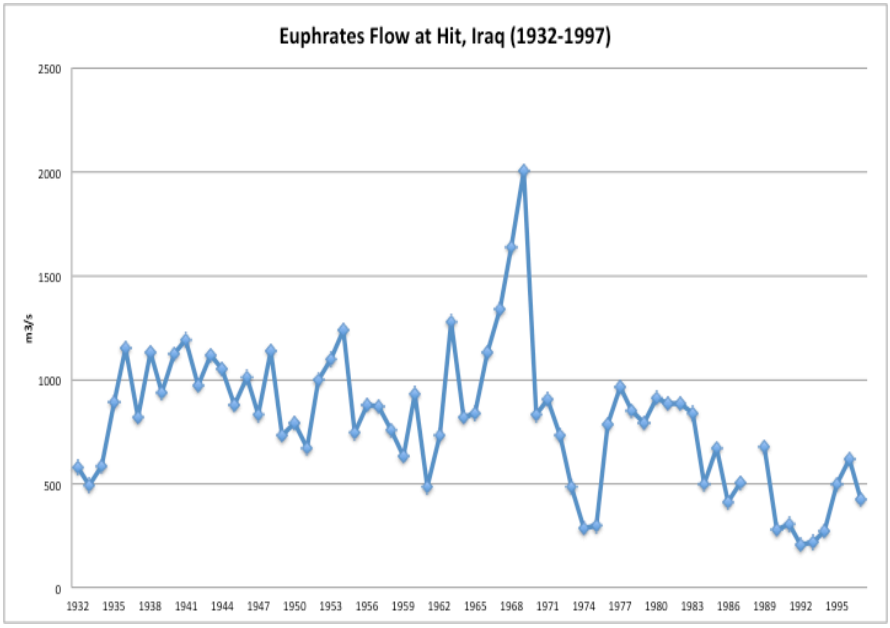

Figure 11: Annual mean discharge of Euphrates River at Hit, Iraq (1932-1997)

Figure 12 also illustrates the mean annual discharge anomaly in terms of water surplus and deficit, compared to the long term mean-discharge over the period of record from 1937-2010 at different stations.[180]

[180] The discharge anomaly is shown as a deviation from the long-term mean to assess periods of water surplus or deficit, reflecting wet or dry conditions.

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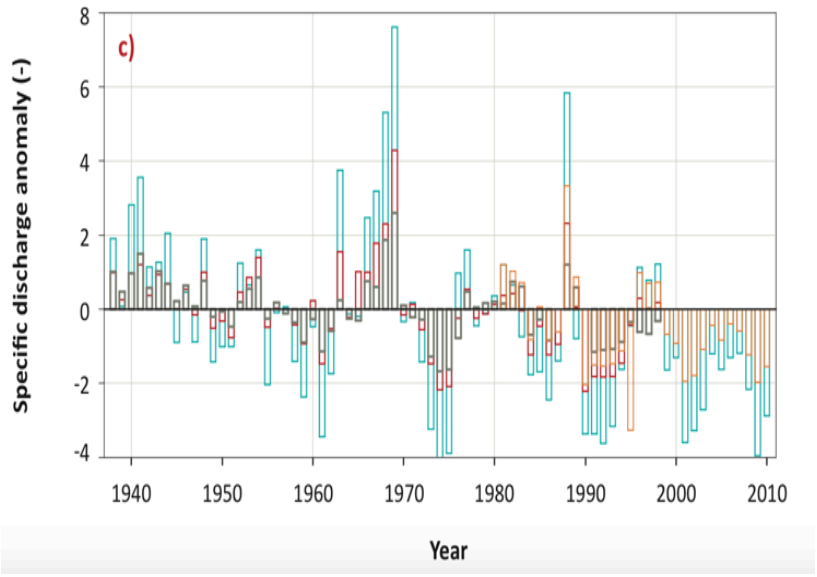

Figure 12: Discharge anomaly time series of the Euphrates (1937-2010) Source: *Compiled by ESCWA-BGR based on data provided by the Ministry of Irrigation in the Syrian Arab Republic in ACSAD and UNEP-ROWA, 2001; USGS, 2012; Ministry of Irrigation in the Syrian Arab Republic, 2012.*

From the illustration, we understand that the Euphrates river has seen four prolonged drought periods in 1958-1962, 1972-1976, 1983-1995, and finally in 1999-2011. The 1983-1995-drought cycle has been the longest cycle and interrupted only by the abundant precipitation in 1989 that naturally prevented a huge possible conflict among riparians when the massive Ataturk Dam reservoir was being impounded. The latest drought cycle between the years 1999-2011 has played a crucial role in the deterioration of socio-economic dynamics in Syria. According to various authors, loss of property after climatic variability and improper policies played a significant role in the 2011 revolt, which is still going on and has already resulted in devastating

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consequences.[181]

Looking at the impacts of water development over seasonality of the Euphrates flow would help to understand flow regime of the river. The Euphrates flow has shown great variations and seasonal character before 1973, which has been recognized as near-natural flow. There were limited regulative infrastructure and irrigation diversion until that time, particularly in the Turkish territories where both rivers originate. March to June was high discharge period mostly generated by snowmelt, while July to October was the low discharge period.[182] This seasonality in flow was not suitable for agricultural practice in the basin. Water was limited during the low flow period when the need for irrigating high-profit winter crops was the greatest. However, it was abundant in spring, which was early to irrigate summer crops and late for winter crops during the high flow period. On the other hand, frequent floods put the harvest at risk during the flood season. So, in order to remove this mismatch between timing and crop needs in river flow, engineering works have been prioritized in all riparian countries to regulate and control the river flow to provide irrigation water throughout the year. Figure 13 compares the monthly flow of the Euphrates at different stations for the natural flow period and post-development period. The impact of storage infrastructures is very profound.

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[181] Peter H. Gleick, 2014: Water, Drought, Climate Change, and Conflict in Syria. *Wea. Climate Soc.*, **6**, 331–340. doi: http://dx.doi.org/10.1175/WCAS-D-13-00059.1

[182] N.Kliot, *Water Resources and Conflict in the Middle East* (Routledge, London), p. 109.

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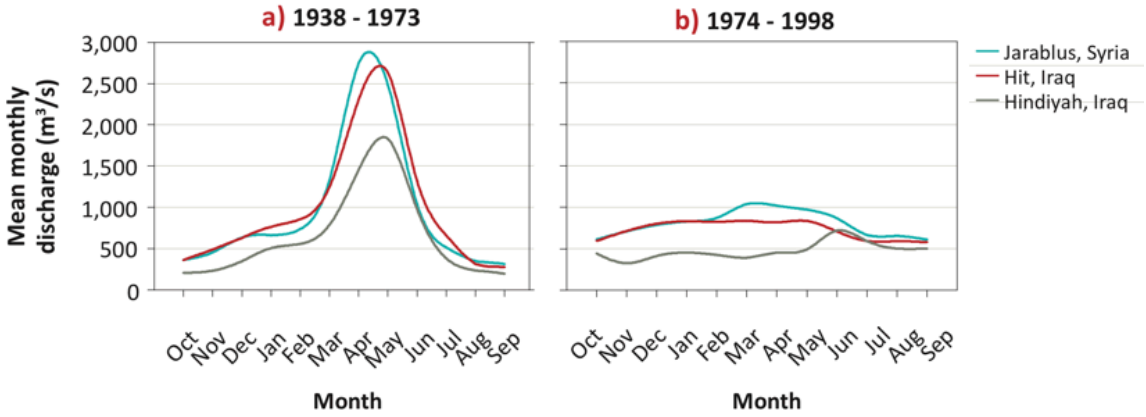

Source: Compiled by ESCWA-BGR based on data provided by the Ministry of Irrigation in the Syrian Arab Republic in ACSAD and UNEP-ROWA, 2001; USGS, 2012; Ministry of Irrigation in the Syrian Arab Republic, 2012.

Figure 13: Mean monthly flow regime of the Euphrates River at different gauging stations for different time periods.

The Euphrates flow has been highly regulated and discharge remains constant for almost the entire year, which makes irrigation water available during the low-flow period. Snowmelt driven flow regime has shifted towards less pronounced seasonal flow variation. Flood risk in high-flow period is also reduced by huge upstream storage facilities.

The Tigris River also originates through precipitation that falls in the southeastern Anatolian highlands and the Zagros Mountains in Turkey, Iran, and Iraq. Syria does not contribute any significant discharge to the river. The main difference between the Tigris and the Euphrates in terms of flow generation is that in contrast to the Euphrates, the Tigris has numerous left-bank tributaries such as the Greater Zab, the Lesser Zab, the Diyala and the Adhaim in the mid-portion of its course; the Tigris is therefore sensitive to any upstream development and climatic conditions. Mean annual data of the Tigris River is also controversial, as it is for the Euphrates. With the Tigris

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River, since its tributaries are contributing significantly to the discharge of water, variability in tributary flow is also an important part of understanding the river flow pattern.

For the observation period of 1946-1985, mean annual discharge of the main Tigris branch has been measured as 16.8 BCM at Cizre Gauging station in Turkey (Beaumont 1985). In 1961, when there was a devastating drought in the whole basin, mean annual discharge was 7.391 BCM. In 1969, during the wettest year of the basin, annual mean discharge of the Tigris River was 34.340 BCM, corresponding to 204 percent of the annual average flow.[183] The Tigris mean discharge at Mosul also varied significantly. Data records between the years 1931-2011 indicates that the average flow of the river in that period was 20 BCM and varied between 6.5 BCM to 43.1 BCM.[184] Kliot has proposed mean annual discharge range between 21.8-23.2 BCM in her calculations.[185] The contribution of the Tigris tributaries is very remarkable and roughly estimated to be 27 BCM at Baghdad.[186] The main contribution to the discharge originates from the Greater and Lesser Zab Rivers, which

[183] P.Beaumont, *Restructuring of Water Usage in the Tigris-Euphrates Basin: The Impact of Modern Water Management Policies*. Yale School of Forestry & Environmental Studies Bulletin, 1998, 103: p. 170.
[184] UN-ESCWA and BGR (United Nations Economic and Social Commission for Western Asia; Bundesanstalt für Geowissenschaften und Rohstoffe). 2013. *Inventory of Shared Water Resources in Western Asia*. Beirut. p. 110.

[185] N.Kliot, *Water Resources and Conflict in the Middle East* (Routledge, London), p. 110.
[186] UN-ESCWA and BGR (United Nations Economic and Social Commission for Western Asia; Bundesanstalt für Geowissenschaften und Rohstoffe). 2013. *Inventory of Shared Water Resources in Western Asia*. Beirut. p. 128.

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contribute 40-60 percent of total Tigris flow in Baghdad. [187]

RIVER (DRAINAGE AREA, km²)	STATION (DRAINAGE AREA, km²)	PERIOD	MEAN (BCM)	MINIMUM (BCM)	MAXIMUM (BCM)	CV* (-)
Feesh Khabour (6,143)	Zakho (3,500)	1958-1989	2.0	0.9	4.3	0.41
Greater Zab (26,310)	Eski Kalak (20,500)	1931-2011	12.7	3.7	23.6	0.31
Lesser Zab (19,780)	Dukan (11,500)	1931-2011	6.0	1.7	15.1	0.42
Diyala (33,240)	Derbendikhan (17,800)	1931-2011	4.6	1.2	14.4	0.48

Source: Compiled by ESCWA-BGR based on data provided by USGS, 2012; Ministry of Water Resources in Iraq, 2012.

Figure 14: Summary of annual flow volume statistics for the main Tigris River tributaries in Iraq

Likewise the Euphrates, the Tigris shows highly seasonal character and annual flow pattern can be classified in to three periods;

- Period of high discharge, February to June;
- Period of low discharge, July to October;
- Period of average discharge, November to January

Compared with the Euphrates flow regime, the Tigris high-flow season is much longer and more pronounced due to higher winter precipitation over a much greater basin area.[188]

[187] *Ibid.*, p.128
[188] UN-ESCWA and BGR (United Nations Economic and Social Commission for Western Asia; Bundesanstalt für Geowissenschaften und Rohstoffe). 2013. *Inventory of Shared Water Resources in Western Asia*. Beirut. p. 112.

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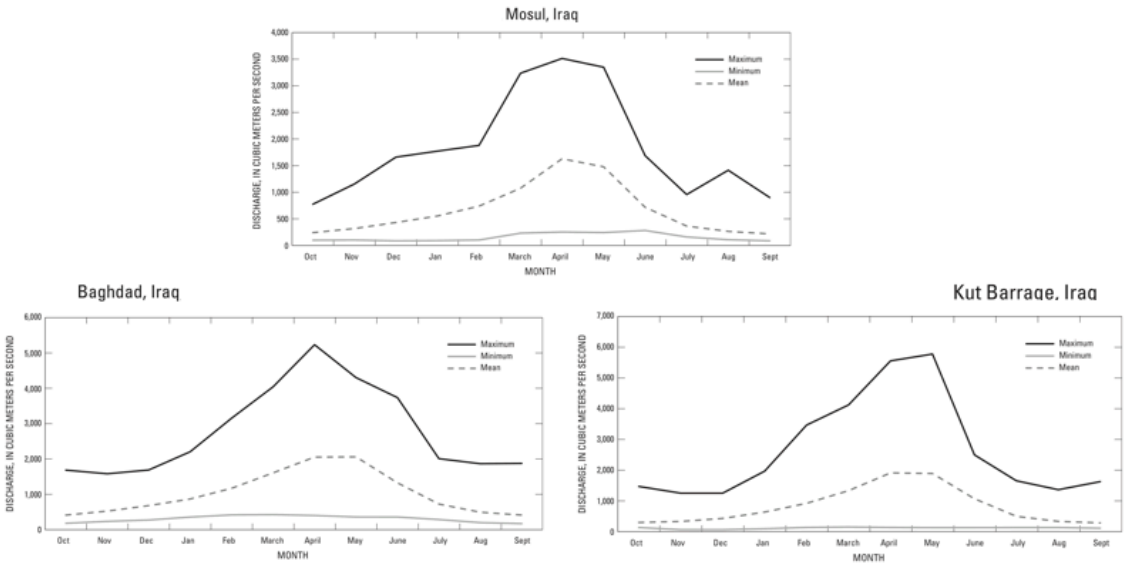

Figure 15: Monthly discharge of Tigris River at streamflow-gaging stations Mosul, Baghdad, and Kut, Iraq, water years 1931–97.

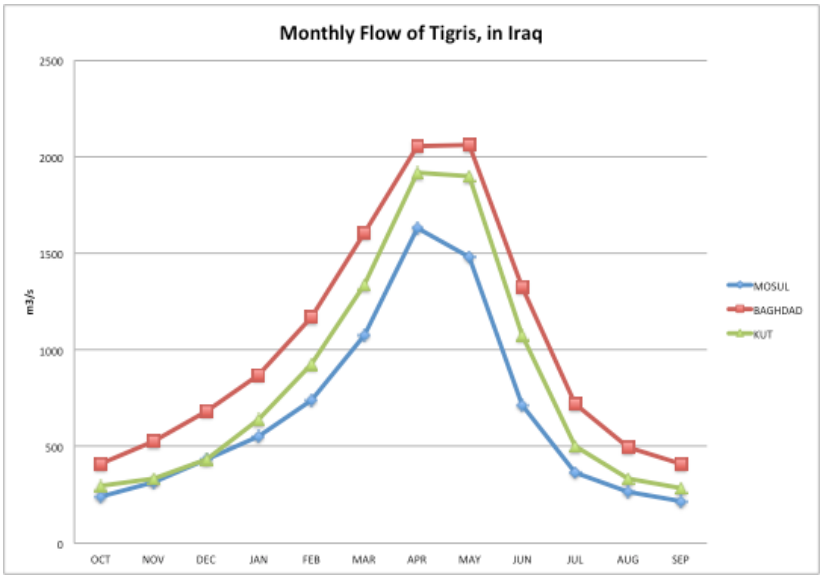

Figure 16: Monthly mean discharge at streamflow-gaging stations of Mosul, Baghdad, and Kut in Iraq. Source: USGS, Stream Gage descriptions and Streamflow Statistics for Sites in the Tigris River and Euphrates River Basins, Iraq. Available at: http://pubs.usgs.gov/ds/540/pdf/ds540.pdf)

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Figure 15 illustrates monthly mean discharge of the Tigris River at different stations. The gradual melting of snow cover in the headwater and main tributary areas increases the water level at the beginning of high-flow season and peak discharge generally occurs in April, a month before the peak of the Euphrates River. Measurements at Kut station between the years 1931-2006 indicates that the March-June period accounts for more than 63 percent of the mean annual flow volume of the Tigris. The minimum flow generally occurs in September at all three stations. Although downstream Baghdad, there is another significant contribution to the Tigris, mean flow at Kut has been less than the amount at Baghdad, mostly because of the intense irrigation. Variation in flow is much higher in the Tigris River. The maximum instantaneous flow that has been recorded in the Tigris river was 14,000 m^3/s, and the minimum flow was measured in 1935 in Mosul as 87.7 m^3/s.

The water inventory study of ESCWA and BGR applied the same methodology to investigate the annual flow variability of the Tigris River. Unlike the Euphrates River, the Tigris has numerous left-bank tributaries that contribute river flow significantly; thus, each tributary and its flow regimes also require understanding.

In order to look at the regime of the Tigris mainstream, available data between the years 1931-2011 has been selected for the Mosul and Kut stations. Looking at Mosul station data will help to understand the upstream development impact, while looking at Kut station data may help to explain

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the water utilization impacts of the Iraqi projects. Likewise, the period of 1931-1973 has been selected as the period that river flow expected to be near natural. The period 1974-2005 has been selected to examine impact of the major water infrastructure projects over river flow. The mean annual flow for the entire period of record is 20 BCM at Mosul and 25.7 BCM at Kut. The maximum flow levels were recorded in 1969 as 43.1 BCM at Mosul and 59.2 BCM at Kut in 1946. The lowest annual flow has occurred in 1999 at Mosul as 6.5 BCM and at Kut as 4.2 BCM in 2001, which was only 16 percent of the mean annual flow.[189]

STATION (DRAINAGE AREA, km²)	PERIOD	MEAN (BCM)	MINIMUM (BCM)	MAXIMUM (BCM)	CV[a] (-)
Mosul (56,000)	1931-2011	20.0	6.5	43.1	0.36
	1931-1973	**21.3**	**11.7**	**43.1**	**0.34**
	1931-1952	19.4	12.2	27.6	0.25
	1953-1984	22.0	11.7	43.1	0.35
	1974-2005	**19.5**	**6.5**	**41.7**	**0.38**
	1985-2005	**19.1**	**6.5**	**41.7**	**0.45**
Kut (173,000)	1931-2005	25.7	4.2	59.2	0.51
	1931-1973	**32.0**	**15.2**	**59.2**	**0.36**
	1931-1952	36.8	15.2	59.2	0.29
	1953-1984	24.5	13.2	50.3	0.37
	1974-2005	**16.7**	**4.2**	**47.5**	**0.58**
	1985-2005	**13.9**	**4.2**	**47.5**	**0.76**

Source: Compiled by ESCWA-BGR based on USGS, 2012; Ministry of Water Resources in Iraq, 2012.
[a] Coefficient of Variation. For information on the definition and calculation of the CV see 'Overview & Methodology: Surface Water' chapter.

Figure 17: Summary of annual flow volume statistics for the Tigris River in Iraq (1931-2011)

[189] UN-ESCWA and BGR (United Nations Economic and Social Commission for Western Asia; Bundesanstalt für Geowissenschaften und Rohstoffe). 2013. *Inventory of Shared Water Resources in Western Asia*. Beirut. p. 110.

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All the significant tributary contributions to the Tigris river occurs between the Mosul and Kut barrage; therefore, the tributary contribution can be identified by comparison of these two stations. In general terms, flow contribution to the mainstream is estimated to be 25 BCM and referred to as 50 percent of the Tigris flow at Baghdad.[190] Kliot (1994) ranged that contribution as 26.7-29.4 BCM.[191] When we consider this contribution, flow volume at Kut becomes controversial. In addition to 21 BCM of the mainstream flow at Mosul, the total flow of the united Tigris would expected to be around 46 BCM, but has only been 32 BCM. The main reason for this difference could have been large abstractions of irrigation water, flood control, and evaporation from the surface water bodies.

The mean annual flow of the Tigris River was 21.3 BCM at Mosul, for the period of 1931-1973, which is accepted as a near-natural flow, then 19.5 BCM for the period of 1974-2005, which includes the impacts of upstream development projects. However, the difference between these two periods is not significant, and therefore cannot be easily separated from the natural variability. The Figure 18 that has been prepared by the study group to examine annual flow variation of the Tigris River confirms that any trend cannot be observed in the time series data of the Tigris at Mosul.[192] This can

[190] UN-ESCWA and BGR (United Nations Economic and Social Commission for Western Asia; Bundesanstalt für Geowissenschaften und Rohstoffe). 2013. *Inventory of Shared Water Resources in Western Asia*. Beirut. p. 110.
[191] N.Kliot, *Water Resources and Conflict in the Middle East* (Routledge, London), p. 110.
[192] UN-ESCWA and BGR (United Nations Economic and Social Commission for Western Asia; Bundesanstalt für Geowissenschaften und Rohstoffe). 2013. *Inventory of Shared Water Resources in Western Asia*. Beirut. p. 111.

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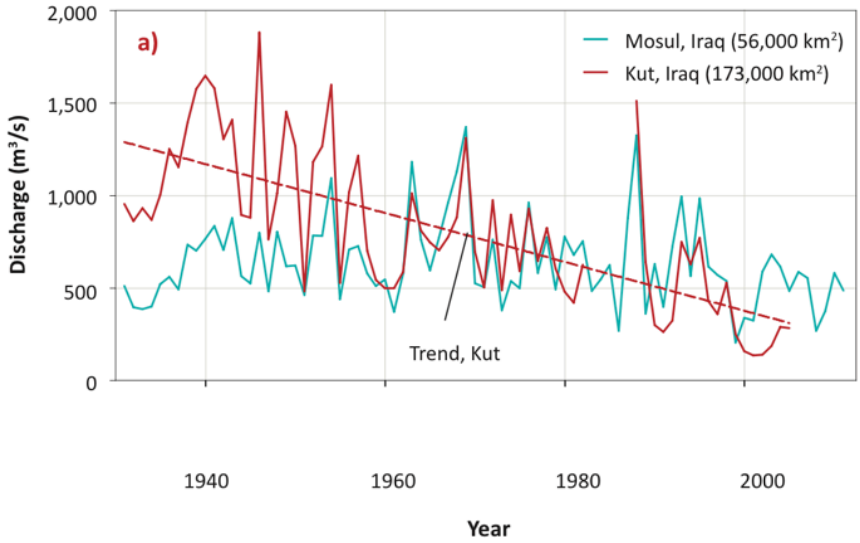
be interpreted as, since upstream development projects in Turkey are prioritized to harness the hydropower potential of the river, rather than irrigation purposes as in the case of the Euphrates; the impact of infrastructure has been limited and insignificant.



Source: Compiled by ESCWA-BGR based on data provided by Hydrological Survey of Iraq, 1958; Ministry of Irrigation in Iraq in ACSAD and UNEP-ROWA, 2001; USGS, 2012; Ministry of Water Resources in Iraq, 2012.

Figure 18: Mean annual discharge time series of the Tigris (1931-2011)

However, the situation is more complicated at the Kut station. Although there are several significant contributions from the tributaries, which amount to 25 BCM; the mean annual flow of the river has been 32 BCM for the period 1931-1973, which is accepted as a near natural period. This means that almost 14 BCM of water was diverted for: irrigation purposes, flood protection or channeled to the Thartar canal to fed Euphrates or store

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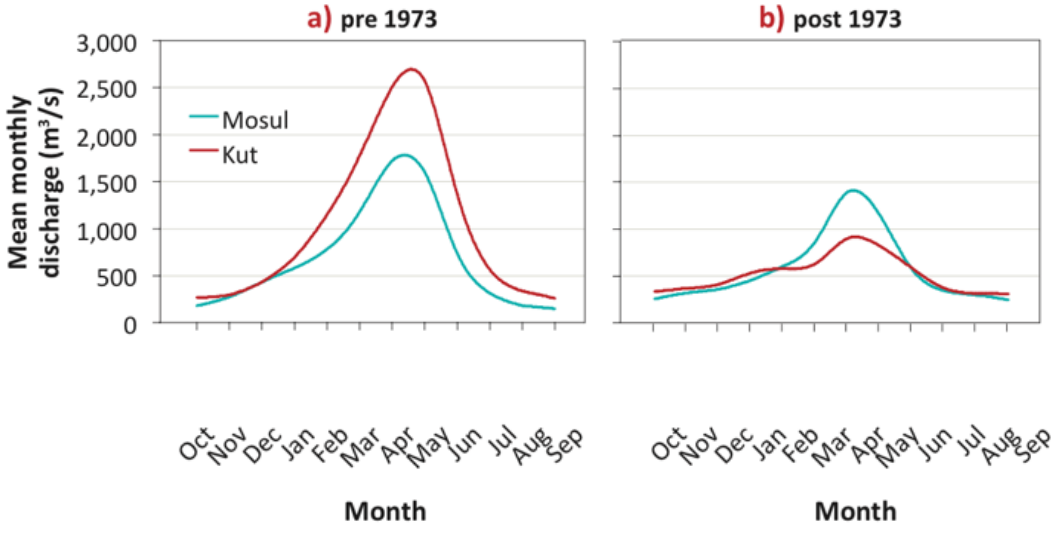
water in Lake Thartar. For the period of 1973-2005, the mean annual flow has decreased to 16.7 BCM and shows a significant negative trend. Since there has not been any trend in flow at Mosul, that decrease can be attributed to large-scale water development projects and land reclamation efforts between the Mosul and Kut.

The flow regime of the Tigris River shows highly seasonal character both at Mosul and Kut stations for the period of natural flow, 1931-1973. Figure 19 illustrates that this seasonal character has maintained its characteristics for the post-development period of 1974-2005 at the Mosul station. However, at the Kut, the river regime has become much more regular with reduced high flows and increased low flow.



Source: Compiled by ESCWA-BGR based on data provided by Hydrological Survey of Iraq, 1958 and Ministry of Irrigation in Iraq, 1999 in ACSAD and UNEP-ROWA, 2001, p. 59; USGS, 2012; Ministry of Water Resources in Iraq, 2012.

Figure 19: Mean monthly flow regime of the Tigris River at different gauging stations for different time periods (1931-2011)

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The total flow of the Tigris and its tributaries is estimated to be as 48.7-52.6 BCM by Kliot (1994), 42.230 BCM by Naff and Matson (1984), and 49.2 BCM according to Kolars (1992). Water inventory studies that were done by ESCWA and BGR has estimated annual flow of the united Tigris as 46 BCM at Mosul.

Water Resources Development in the Euphrates-Tigris Basin

Water resources development for irrigation and flood protection started in the lower parts of the basin, particularly in today's Iraqi territories. Habbaniya and Abu Dibbis Lakes were the first examples of ancient water development in the basin that later became the basis of longstanding Iraqi claims of '*historical rights*' to utilize the waters of the Twin Rivers.

In the 20th century, particularly in the second half, the Euphrates-Tigris basin has witnessed the implementation of extensive multi-purpose water resources development projects such as dams, reservoirs, hydropower plants, and flood protection schemes. However, the most important difference has been the shift in location of water management activity and the type of water controls introduced. Since then emphasis has switched from downstream water diversions to large-scale upstream storage facilities. This paradigm shift in the pattern of water utilization has had a profound

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effect on all aspects of development within the basin.[193]

Major water projects in the Euphrates-Tigris basin were carried out during the late 1970s, 1980s, 1990s, and some are still under construction. The most important feature of this era is the separate planning, unilateral developments, and lack of coordination and mutual trust among the riparians that have impeded integrated planning and development of the basin. Thus, this uncoordinated development contention caused the construction of over-capacity in storage, which reached 5-times the natural flow in the Euphrates basin and 2-times the flow in the Tigris basin. Riparian claims are based on the capacity of these schemes, and finally it was finally that there is no water to meet every project of each country.

Water Resources Development In Turkey

Water resources development in Turkey started in the 1950s after the establishment of the State Hydraulic Works (DSI). First reconnaissance studies were carried out in the Euphrates basin by former president Turgut Ozal when he was a young engineer at the State Electric Works (EIEI), in order to understand the hydroelectric potential of the river. Likewise Turgut Ozal, another former president, Suleyman Demirel, has also made great contributions to water development of the basin. The involvement of these two presidents, and also two engineers, is remarkable in various aspects. They had a long-lasting political career in contemporary Turkish politics, and

[193] P.Beaumont, *Restructuring of Water Usage in the Tigris-Euphrates Basin: The Impact of Modern Water Management Policies*. Yale School of Forestry & Environmental Studies Bulletin, 1998, 103: p. 171.

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political discourse over water resources has been highly influenced by their opinions. GAP had the first priority in their political agenda, and they pragmatically used it as a propaganda tool in domestic politics.

Recognizing the potential of the Euphrates-Tigris Rivers in promoting development and prosperity in the region and overall in the country, Turkey started its attempts to utilize primarily waters of the Euphrates in the beginning of the 1960s when DSI released a comprehensive study of 'Lower Euphrates Project' that evaluated the soil and water potential of the basin. A similar study was done for the Tigris basin and, these two studies then transformed into a mega-scale integrated development project of '*Southeastern Anatolia Development Project*', GAP in Turkish acronym, in the early 1980s.

GAP has been one of the most remarkable developments in the basin not only in modern times, but also for the all-times development of the basin. The project consists of 13 independent but related sub-projects, seven on the Euphrates and six on the Tigris portion, and envisages construction of 22 dams and 19 hydroelectric power plants. Upon the completion, project will provide water for irrigation of 1.8 million ha of land, while generating 27 billion kWh of energy with the installed capacity of 7500 MW.

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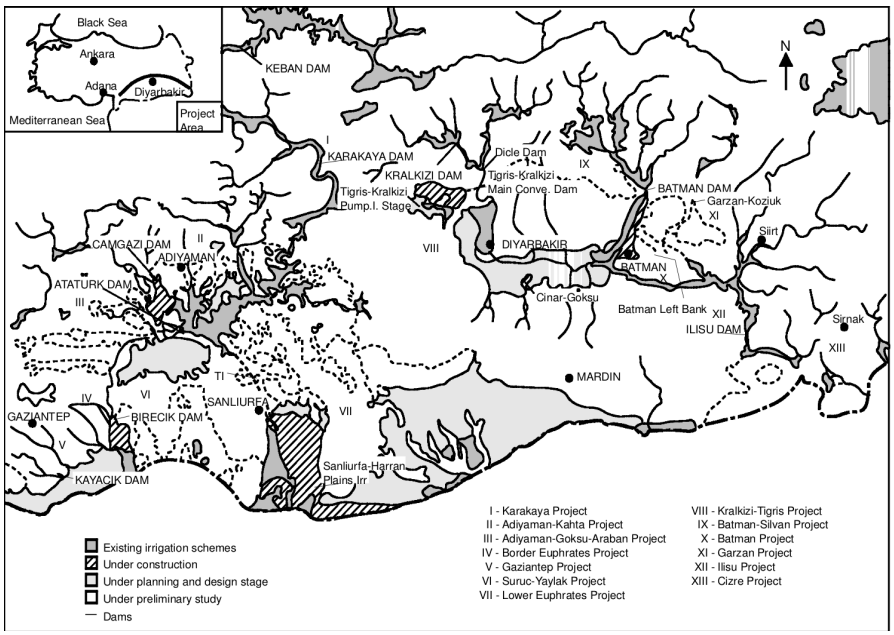

Figure 20: Layout of GAP projects

The project area lies in southeastern Turkey, between and around the Euphrates and Tigris Rivers, and includes 9 provinces that cover approximately 10 percent of Turkey's total population and surface area. The GAP project area includes 41.5 percent of the total watersheds of the Euphrates and Tigris rivers. The total project area is 75 358 km^2, of which 42.2 percent is cultivated. Upon the completion, GAP will provide irrigation for 1.8 million ha of land corresponding to 20 percent of the economically irrigable land of Turkey. The population of the GAP Region in the 1990 census was 5.15 million. Despite a significant out-migration phenomenon, the region's population has shown an increasing trend, and reached 8.25 million in 2014.

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The Natural Resources Potential of GAP			
	Turkey	GAP	GAP/Turkey (%)
Area (km2)	779452	75358	9.7
Population (millions)	77.69	8.25	10.6
Irrigable land	8.5	1.8	20
Surface waters (BCM)	186	52.9	26.5
Hydroelectric Energy (kWh)	122	27	22

Figure 21: GAP provinces and its natural resources potential

Population	1990	2000	2010	2013
GAP	5 158 013	6 608 619	7 592 772	8 096 352
Turkey	56 473 035	67 803 927	73 722 988	76 667 864

Population Growth Rate (%)	1990-2000	2000-2010	2010-2013
GAP	2.48	1.39	2.14
Turkey	1.83	0.84	1.31

Table 3: Increase in Population and population growth rate of GAP region in years

The Euphrates and Tigris rivers provide almost one-third of the available surface water supply of Turkey, and that potential was not exploited until the late 1960s. So, *why did upstream Turkey, with her advantageous position, wait such a long time to utilize this precious resource?* Different imperatives were, and still are, instrumental for bringing about this remarkable change.

The main impetus for harnessing the Euphrates and Tigris rivers was the *hydroelectric imperative* of newly established modern Turkey. Without understanding the change in the energy balance of Turkey, it would not be easy to comprehend why Turkey has been financing such a herculean-task despite its political, environmental and financial burden. Unlike its southern neighbors, Turkey finds itself a petroleum & natural gas-poor country experiencing rapid development. In 1983, almost 39 percent of the energy consumed in the country was derived from imported petroleum, which was a

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drain on the resources.[194] The petroleum crisis in the mid-1970s can be defined as a turning point with respect to Turkey's approach to water development, as the cost of oil imports went from 8 percent of total imports in 1972 to 41 percent in 1982.[195]

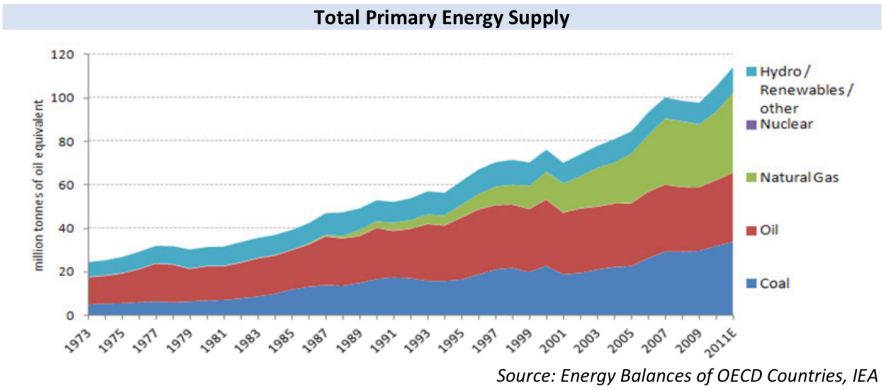

Figure 22: Turkey's Total Primary Energy Supply

This trend in energy demand is continuing. With a rapidly growing economy, Turkey has become one of the fastest growing energy markets. Figure 20 illustrates steadily increasing energy consumption of Turkey within the years. Turkey's energy supply has risen from 24.4 million tonnes of oil equivalent (Mtoe) in 1973 to 114.1 Mtoe in 2011 at a compound annual growth rate of 4 percent. According to official estimates, this number will reach as much as 237 Mtoe in 2030.[196] In addition to that, Turkey's energy dependence rate rose from 51 percent in 1990 to 72 percent in 2008, which cost approximately $ USD 50 billion.

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[194] John Kolars, *The Hydro-Imperative of Turkey's Search for Energy*, Middle East Journal, Vol. 40, No. 1 (Winter, 1986), p. 53
[195] Ibid., p. 54
[196] International Energy Agency, Oil and Gas Security: Emergency Response of IEA Countries: Turkey, p. 4

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There are three reasons behind the increase in energy demand; absolute population growth, from 21 million in 1950 to 45 million in 1980, and then to 77 million in 2014; rapid urbanization, and industrialization that resulted in 600 percent increase in the GNP in the same period.[197]

Turkish planners and politicians found a solution in diversifying the energy production and turning towards alternative sources. Hydropower came to the rescue at that problematic time. Turkey embarked on large-scale water development projects to realize, in particular, the hydropower potential of the Euphrates and Tigris Rivers. Turkey has a total gross hydropower potential of 433 GWh/year, but only 125 GWh/year of that potential can be economically used. The economically exploitable energy-potential of the Euphrates has been estimated at 40 billion kWh per year, which represents about 45% of the country's hydroelectric power potential.[198] The benefits of an increasing share of hydropower production are various. Energy demand could be met without importing costly petroleum, a reduction in petroleum imports would be possible, and in addition, by integrating irrigation components to dam projects additional agricultural benefits could be enhanced.[199] Considering all these benefits, Turkey prioritized hydropower projects, and GAP has reached 74 percent of a hydropower infrastructure realization rate. Up until 2013, hydropower

[197] John Kolars, *The Hydro-Imperative of Turkey's Search for Energy*, p. 54

[198] P.Beaumont, *The Euphrates River: An International Problem of Water Resources Development*. Environmental Conservation, vol. 5, no. 1.

[199] John Kolars, *The Hydro-Imperative of Turkey's Search for Energy*, p. 54

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plants that are operational in the GAP scheme has produced 392.1 billion kWh of electricity, which is worth $ USD 23.5 billion.[200] For instance, Karakaya (1987) and Ataturk (1992) dams have already fully recovered their cost in an average time span of four to nine years after their construction.[201]

Initially formulated as a package of water and land resources development project in the 1970s, and seeking to provide power for the western regions of Turkey; GAP has since expanded to include nearly every type of development projects. This paradigm shift has added another dimension to the mega project, which is *poverty alleviation*. By broadening the scope of the GAP, Turkish planners intended to develop the long-ignored southeastern Turkey, where a major outflow of the population has been combined with high levels of unemployment and political instability. Southeastern Turkey has been lagged behind in all development indicators since the establishment of the republic. The region's contribution to Turkey's gross domestic product was only 4 percent before GAP while GDP per capita was 47 percent of national average. Agriculture was the main activity in the region, and almost 70 percent of the active population was engaged in agriculture. However, the agricultural output was disappointing since it only generated 9 percent of agricultural value-added of Turkey.[202] Besides, medical services, literacy levels, and infrastructure were inadequate

[200] GAP Action Plan (2014-2018), p. 18: http://www.gap.gov.tr/dosya_ekleri/pdf/GAP_EYLEM_PLANI.pdf
[201] Aristotelis Varsamidis, An Assessment of the Water Development Project (GAP) of Turkey: Meeting Its Objectives and EU Criteria For Turkey's Accession, MSc. Thesis, Naval Postgraduate School, 2010
[202] Olcay Unver, Southeastern Anatolia Project (GAP), p.455

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compared with the rest of the country. So, GAP aimed to turn all these negative tables by improving income levels and living standards of people through utilizing regional resources, and finally removing interregional development disparity. By the establishment of the GAP Regional Administration, the project was re-framed on the basis of basic principles of '*sustainable development*' phenomenon. Since then GAP began to emphasize "the need for community participation, improved basic education, health and social services, the advancement of women, the creation of more employment opportunities, efficient use of resources, and environmental preservation." GAP has thus grown into a catchall development project that aims to transform a politically unstable, underdeveloped, semi-arid region into the 'breadbasket of the Middle East' region while raising the living standards of the inhabitants and integrating them into modern Turkey's economy and society.[203] The GAP master plan was prepared in 1989, by a consortium of Turkish and Japanese companies, to identify guidelines and tools to implement the project. The master plan envisaged a 209 percent increase in GDP per capita in addition to development of other social indicators.

The last but the most interesting driving factor has been the *GAP-Kurdish Problem nexus*. The Kurdish insurgency has been a significant factor both in Turkish domestic affairs, as well as foreign affairs. Turkey

[203] D.Hillel, Rivers of Eden: The Struggle for Water and Quest for Peace in the Middle East (OUP, Oxford, 1995), p. 104

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transformed GAP into an integrated multi-sectoral, regional development project, which covers all development-related sectors such as agriculture, industry, transportation, urban and rural infrastructure, health care and education to transform a politically unstable, underdeveloped, semi-arid Kurdish region into a 'breadbasket of the Middle East', as well as raising the living standards of the inhabitants and integrating them into modern Turkey's economy and societal life. Thus, GAP can be considered as an economic response from the Turkish government to the Kurdish Question, and aims to prevent insurgency by economic and social prosperity.

After the reconnaissance studies of the State Hydraulic Works were completed, Turkey began in the 1960s, to attempt to primarily utilize the waters of the Euphrates. Keban Dam that was the first large-scale dam to be built by DSI was initiated in 1965 for the generation of hydroelectricity and to prevent extreme fluctuations of the river flow by maintaining a minimum of 400 m^3/s and a maximum flow of 1000 m^3/s.[204]

With 17 BCM of active storage and 1240 MW of installed capacity, Keban Dam was planned solely for hydroelectricity generation, thus the volumes of water flowing downstream remained constant and did not cause any serious reaction. Karakaya Dam was the second largest dam constructed further downstream of the Keban for hydropower generation, and became operational in 1987. Turkey initiated construction of the very controversial

[204] P.Beaumont, *Restructuring of Water Usage in the Tigris-Euphrates Basin: The Impact of Modern Water Management Policies*. Yale School of Forestry & Environmental Studies Bulletin, 1998, 103: p. 172.

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Ataturk Dam in 1983, which is the centerpiece of the GAP with its 48 BCM storage and 2400 MW installed capacity. Although the previously mentioned large dams were solely designed for hydropower generation and did not cause any significant decrease in downstream flow, Turkish water use pattern has shifted towards a consumptive character by the advent of the Ataturk Dam. Birecik and Karkamis Dams were built further downstream of Ataturk Dam with the purpose of regulating flow downstream. One of the most significant works was the construction of the Sanliurfa Tunnels, which has been designed to discharge water from the reservoir of Ataturk dam to the Sanliurfa-Harran plains. It is the longest irrigation system in the world at 26.4 km, and has a diameter of 7.62 m. With the Tunnel becoming operational, 48,000 ha and 99,866 ha of land are estimated to be irrigated.[205]

Water development in the Tigris basin has started later, as geographically it has a more rugged terrain. GAP envisages six sub-projects in the basin, and some of the schemes such as Dicle Dam, Kralkizi Dam, and Batman Dam are operational and producing electricity. The most controversial scheme in the Tigris Basin, Ilisu Dam with 10.6 BCM storage capacity and 1200 MW installed capacity, is under the construction and 75 percent realization has been made since the beginning. Although it is solely devoted to hydroelectricity generation, its environmental and historical consequences created lots of tension in the international community.

[205] N.Kliot, *Water Resources and Conflict in the Middle East*, p. 129

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To date, 19 dams, and 13 hydroelectric power plants have been constructed, and 74 percent realization has been accomplished in energy infrastructure. This rate will reach 90 percent when 1200 MW Ilisu Dam is completed by 2016, and will further reach 93 percent when Cizre Dam is operational. The installed capacity of operational dams has been 5530 MW, and their annual electricity production capacity has reached 20.6 billion kWh. Up until 2013, hydropower plants that are operational in the GAP scheme has produced 392.1 billion kWh of electricity, which is worth $ USD 23.5 billion (1 kWh=6 cent).[206]

[206] GAP Action Plan (2014-2018), p. 18: http://www.gap.gov.tr/dosya_ekleri/pdf/GAP_EYLEM_PLANI.pdf

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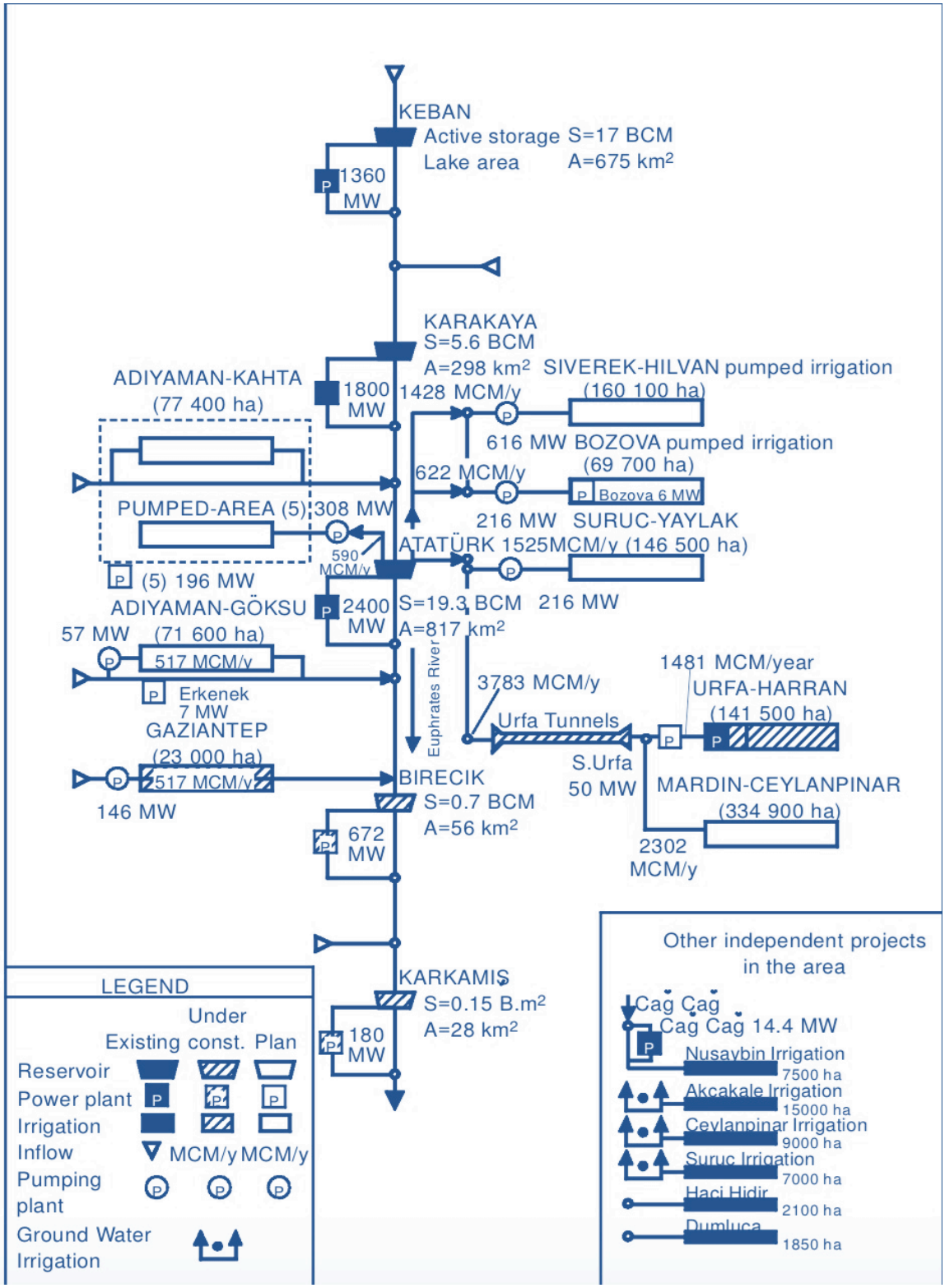

Figure 23: Schematic layout of the main GAP project components, Euphrates branch.

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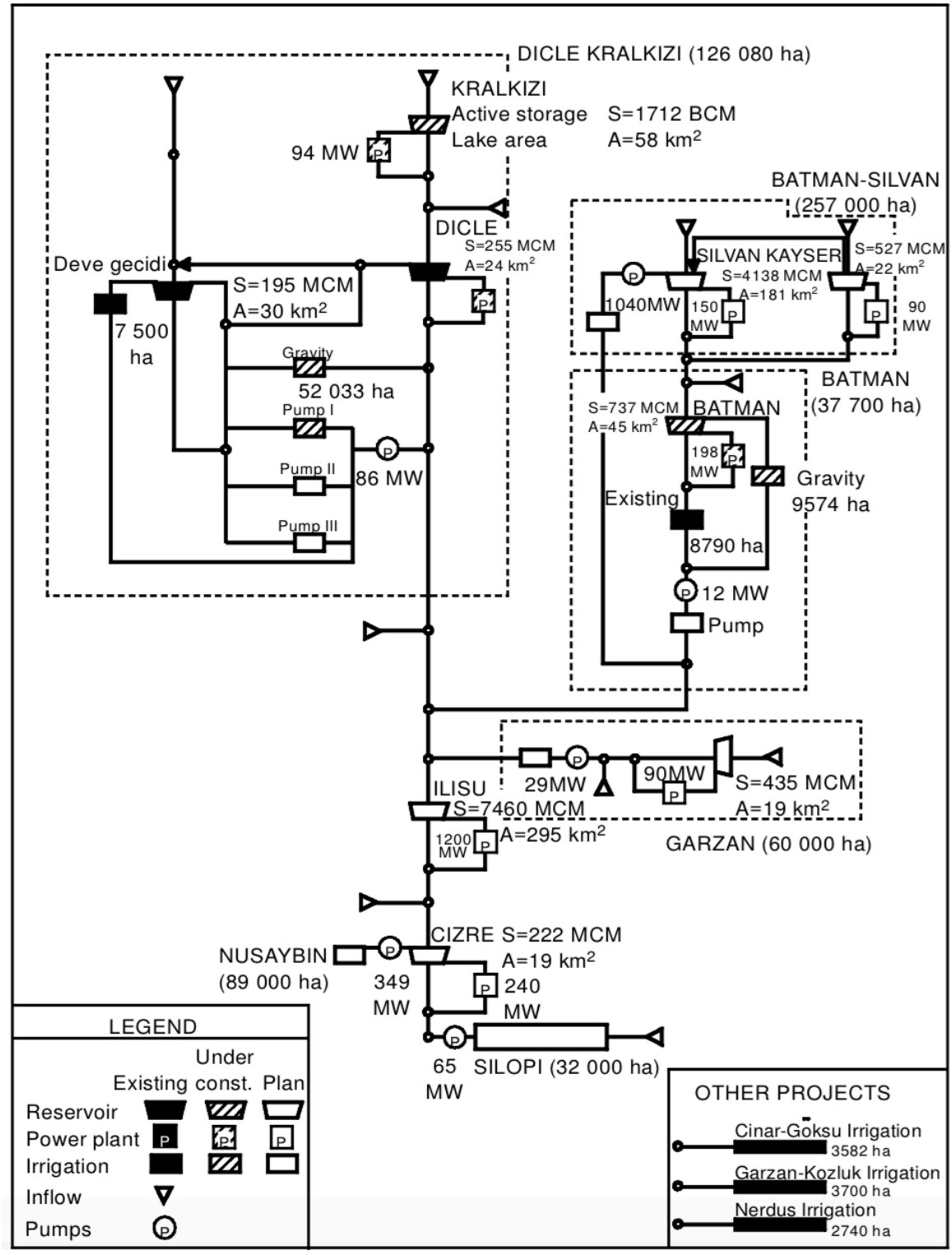

Figure 24: Schematic layout of the main GAP project components, Tigris branch.

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A controversial issue concerning GAP is that it is not clear how much water will be consumed to irrigate all the projected areas. Several authors and official figures from the governments have come up with divergent values. Hillel (1995) stated the 12-15 BCM of water per year to irrigate more than 1 million hectares for the Euphrates portion of GAP, and additional 5-7 BCM per year for the Tigris portion of project that aims to irrigate almost 550,000 hectares.[207] Altinbilek (2007) has estimated that the project will consume 22.5 BCM of waters per year corresponding to about 27 percent of the average annual virgin runoff volume of the Euphrates and Tigris branches of the Shatt-al Arab. Turkish official proposal is 9 BCM of water consumption for utilization of the Euphrates portion, while 3.7 BCM for the Tigris portion. However, one of the leading experts on issues of the basin issues Peter Beaumont, has suggested 10,000m^3/ha water usage based on field experience, and he has proposed 10 BCM for the Euphrates portion, and 5, 580 BCM for the Tigris branch.[208] Beaumont's evaluation seems reasonable since comparison of water usage per hectare among riparians states justifies these numbers.

The GAP Master Plan foresees three development scenarios based on different combinations of irrigation and electricity production alternatives. In the first scenario, irrigation projects are prioritized and electricity

[207] D.Hillel, *Rivers of Eden: The Struggle for Water and Quest for Peace in the Middle East* (OUP, Oxford, 1995), p. 106
[208] P.Beaumont, *Restructuring of Water Usage in the Tigris-Euphrates Basin: The Impact of Modern Water Management Policies*. Yale School of Forestry & Environmental Studies Bulletin, 1998, 103: p. 172.

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production is estimated to be 25 billion kWh. This scenario envisages consumption of 10 BCM from the Euphrates River, with 5.195 BCM from the Tigris River.[209] Under the second development scenario, all the hydropower projects are given priority with the aim being 29.8 billion kWh, and irrigated area limited to 894 459 ha. Thus, water consumption is expected to drop accordingly to the half of the first option.[210] The last development scenario envisages limitation of irrigated areas and hydropower production.

Water Resources Development in Syria

Syria crucially depends on the Euphrates to develop its agricultural economy. The total surface waters of Syria are estimated to be around 34-35 BCM, of which 26-28 BCM is provided by the Euphrates.[211] Water resources development efforts have started in 1960s in Syria. Since its economy was based on agricultural production, expansion of irrigation and domestic food production were prioritized in order to sustain an increasing population. [212] Although Syria was late compared with Iraq, irrigated areas increased significantly from 295,000 ha to 657,000 ha between the years 1945 and 1960. However, any amount of water that Syria was extracting remained small, around 2-3 BCM, and was not matter of dispute with downstream Iraq. Prior to completion of the Tabqa Dam, in 1974, available estimates claims

[209] GAP Master Plan, http://www.gap.gov.tr/dosya_ekleri/pdf/gap_master_cilt1.pdf

[210] Aysegul Kibaroglu, Building a Regime for the Waters of the Euphrates-Tigris River Basin, p. 182

[211] N.Kliot, *Water Resources and Conflict in the Middle East* (Routledge, London), p. 138.

[212] Aysegul Kibaroglu, Building a Regime for the Waters of the Euphrates-Tigris River Basin, p. 193

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that Syria extracted almost 3 BCM/year for irrigation and domestic purposes.

Syrian experience with water development schemes regarding the Euphrates started in the early 1960s with the Euphrates Valley Project when the Ba'ath Party came to power. The Syrian economy has been based on agriculture and in order to increase the share of agricultural output in GNP so as to meet the challenges of rapidly rising energy and food demand; the government of Syria decided to build a large dam on the Euphrates River as a response to this imperative in the first 5-year development plan.[213] Although the project was first envisaged by the French in 1927, realization of the project was possible through technical and financial assistance of the Soviet Union in 1963. The Euphrates-Tabqa, later renamed al-Thawra that means 'revolution' in Arabic, became operational in 1973.[214] Tabqa Dam was designed to be the centerpiece of the Euphrates Valley Project with 11.7 BCM storage capacity, to irrigate 640,000 ha of land, generate 60 percent of countries electricity needs, and prevent seasonal flooding. However, these objectives could not been totally realized even after more than 40 years because of the inappropriate design of the infrastructure and over-estimated irrigation targets. One of the main reasons behind that failure was the unexpectedly high cost of reclamation, which was $10,000 per hectare, due to highly salinized-low quality soils. Besides technical reasons, the over-

[213] Ibid., p.194
[214] Patrick McQuarrie, *Water Security In The Middle East: Growing Conflict Over Development In The Euphrates-Tigris Basin*, Thesis, M.Phil International Peace Studies Trinity College, Dublin, Ireland, 2003, p. 30;
Ayşegül Kibaroğlu, *Building a Regime for the Waters of the Euphrates and Tigris River Basin*, p. 197

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ambitious targets were a result of justification efforts of government to enhance public support on project. However, after realizing that schemes were being adversely affected by high gypsum levels in the soil, and salinization being caused by over-pumping and collapse of canals due to seepage[215]; the Syrian government rescheduled its irrigation targets to 370,000 ha, which is still controversial.[216] Syria constructed the Ba'ath Dam in 1986 to regulate the Euphrates flow below Tabqa Dam, and also to provide water for irrigation and generate small amount of electricity. The last consecutive dam on Euphrates in Syria, Tishreen Dam was completed in 1991 primarily for hydroelectric production, situated on the upstream of Tabqa Dam. Besides mainstream, there have been ambitious plans for major irrigation projects along the tributaries of the Euphrates River, particularly in the lower reaches of the Balikh and Khabour rivers. The Great Khabour Project that has been initiated to produce hydropower and to store water for irrigation, comprised construction of three dams; and in the end, 59,500 ha of land were started to be irrigated in 2010.[217]

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[215] Natascha Beschorner, "Water and Instability in the Middle East" *Adelphi Paper* 273, (London: Brassey's for the International Institute for Strategic Studies, 1992), p.33

[216] John F. Kolars, "Problems of the International River Management: The Case of the Euphrates" in Biswas Asit K. (ed.) *International Waters of the Middle East: From Euphrates to Nile* (New York: Oxford University Press, 1994), p 81-82;
John F. Kolars, William A. Mitchell, The Euphrates River and the Southeast Anatolia Development Project, (Illinois: Southern Illinois University Press, 1991)

[217] UN-ESCWA and BGR (United Nations Economic and Social Commission for Western Asia; Bundesanstalt für Geowissenschaften und Rohstoffe). 2013. *Inventory of Shared Water Resources in Western Asia*. Beirut. p. 64.

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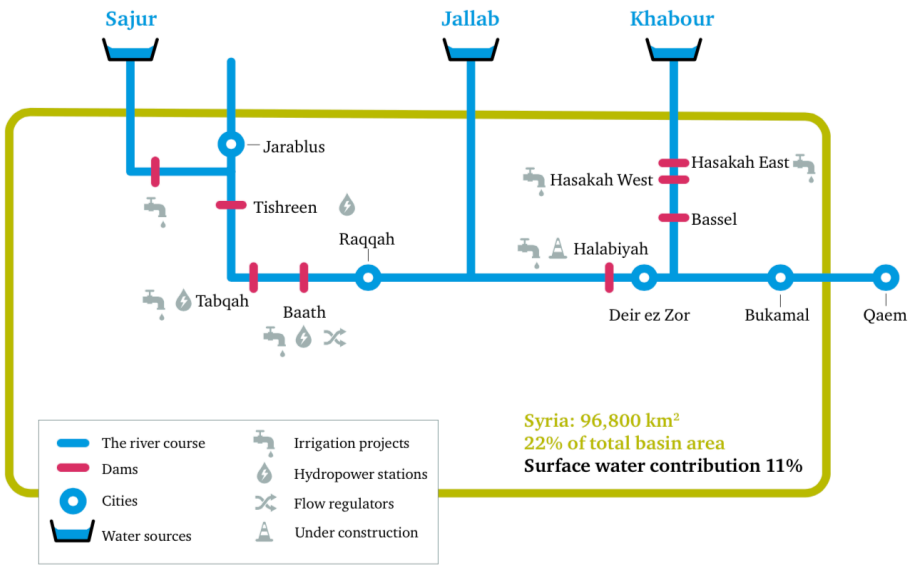

Note: The figure is not intended to represent the hydrological system of the Euphrates.
Sources: Shamout, N. based on ESCWA (2013); U.S. Geological Survey; Google Earth Maps and satellite images.

Figure 25: Syrian exploitation of the Euphrates water system. Source: Shamout, p. 17

There is still uncertainty as to just how much irrigated land will be developed adjacent to the Euphrates River. It was estimated that 325,000 ha of land was irrigated in 2000, and a further 325,000 ha of land has been earmarked for future irrigation projects.[218] However, Beaumont (1998) writes that Syrian officials claim that the total irrigated area along the Euphrates might eventually rise to close to one million ha.[219]

Lack of information on the actual amount of land that is irrigated in Syria is a very crucial problem to understanding the current and future state

[218] UN-ESCWA and BGR (United Nations Economic and Social Commission for Western Asia; Bundesanstalt für Geowissenschaften und Rohstoffe). 2013. *Inventory of Shared Water Resources in Western Asia*. Beirut. p. 65
[219] P.Beaumont, *Restructuring of Water Usage in the Tigris-Euphrates Basin: The Impact of Modern Water Management Policies*. Yale School of Forestry & Environmental Studies Bulletin, 1998, 103: p. 175.

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of the water availability in the basin, particularly for Iraq. If irrigated areas in Syrian expand to around 1 million ha, then the volume of water that will be consumed by irrigation activities in Syria will add up to at least 10 BCM. Iraq will consequently only receive about 5,0 BCM of water which is an unacceptable amount to sustain agricultural life in the Iraqi portion of Euphrates.

Water Resources Development in Iraq

Iraq's water utilization practices date back to thousands of years ago, and not surprisingly, she was the first country that sought the ways of developing '*Twin Rivers*' in modern times. Under the British mandate, Department of Irrigation had already been established and first data collection and irrigation projects were initiated. After the British mandate, Iraqi efforts to harness Euphrates-Tigris Rivers continued with organizational restructuring. Several dams and canals were built in addition to existing ones.[220] Until 1970s, Iraq had been exclusive user of both rivers by almost 30 BCM per year consumption to irrigate more than five times as much land as Syria and nearly 10 times as much land as Turkey was irrigating.[221] Compared to Iraq, Syrian water consumption was 2 BCM, while Turkish water consumption was only 820 MCM per year in same time period.

[220] Salih Korkutan, *The Sources Of Conflict In The Euphrates-Tigris Basın And its Strategic Consequences in The Middle East*, p. 15
[221] UN-ESCWA and BGR (United Nations Economic and Social Commission for Western Asia; Bundesanstalt für Geowissenschaften und Rohstoffe). 2013. *Inventory of Shared Water Resources in Western Asia*. Beirut. p. 66.

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Since majority of upstream developments were concentrated on the Euphrates basin, Iraq prioritized its development efforts on the Tigris River. A significant advantage that Tigris offered to Iraqi planners was diversion of additional water to Euphrates for meeting any shortfalls. This idea has been realized by Thartar Canal (Depression) in 1950, which was built between the '*Twin Rivers*' in the northwest of Baghdad. Thartar Canal has played a strategic role in preventing flood from the Tigris and alleviating water shortages in Euphrates basin since then.

Besides Thartar Canal, Iraq built Euphrates Dam and Samara Dam in 1955-1956 period, and increased its flood control capacity. Moreover, Iraq has embarked on extensive irrigation projects such as Kirkuk Irrigation Project that involves irrigation of more than 300,000 ha, and Jezirah Irrigation Project that aimed to irrigate 250,000 ha of land.[222] In 1980s and afterwards, several infrastructure has been constructed on both rivers. Haditha Dam was constructed by Soviet assistance, in order to reduce seasonality in the Euphrates River and increase agricultural production in nearby areas. Iraq began constructing the '*Third River*' between the Euphrates and Tigris Rivers in the 1960s, and the project became operational in 1992. This was a 565 km long canal, which would run from near Baghdad to Basra, and connect the two rivers. Although in the coming decades Iraqi regime used this canal for political purposes, the initial purpose of the canal was to provide irrigation water to the land between the Euphrates and Tigris

[222] *Ibid.*, p.210

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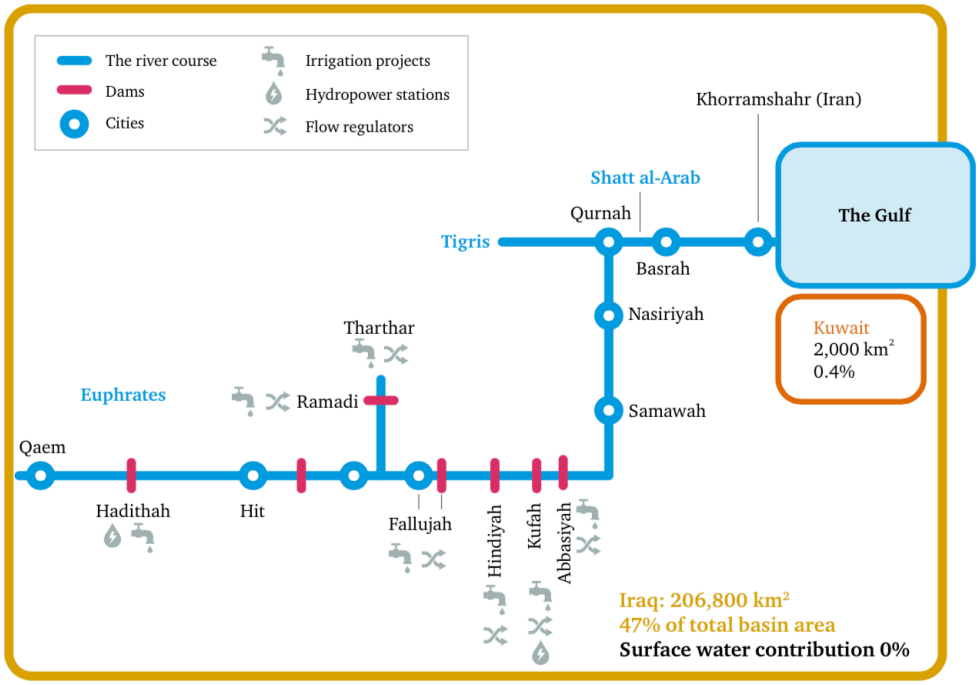
Rivers. Iraq also built Mosul Dam on the Tigris River in 1995 for hydropower generation and irrigation. Although remarkable infrastructural development has been realized in that period, outcome was not promising due to failure in land use policies, chronic soil salinity and waterlogging problems, as well as political instability. More than one million people were working in agriculture during 1950s and Iraq was wheat and rice exporter country.



Note: The figure is not intended to represent the hydrological system of the Euphrates.
Sources: Shamout, N. based on ESCWA (2013); U.S. Geological Survey; Google Earth Maps and satellite images.

Figure 26: Iraqi exploitation of the Euphrates water system. Source: Shamout, p. 18

However, after transforming from mainly an agricultural country to oil-producing semi-industrial nation, Iraq became a food importer country despite all these infrastructure development.

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Available data for water resources and agriculture in Iraq are either incomplete or inaccurate or conflicting. Therefore, it is not an easy task to evaluate past-current-and future agricultural development and irrigation need of that country. Agricultural area of Iraq that has been irrigated by the Euphrates and Tigris Rivers was estimated to be around 6.0 million ha, and in the 1970s this number has raised to 7.6 million ha. At the beginning of the 1980s irrigated area dropped to 5.9 billion ha, and even some estimates claimed 2.5 million ha as an actual irrigated land at the beginning of 1990s.[223] The main reasons of that conflicting and falling data were high salinization, Iran-Iraq and two Gulf wars that destroyed land resources, and economic sanctions afterwards. According to hydrologists, each hectare in Iraq is irrigated with approximately 13,000 m^3 of water annually, and high evaporative climatic conditions promoting water salinity decreases irrigated land and agricultural production. The only solution to deal with salinity is proper drainage and flushing which requires much water.

Water Balance in the Euphrates-Tigris River

Until second half of the 20th century, water usage did not cause much conflict among riparians since amount of water that was being utilized remained small enough. However this situation has changed drastically, when upstream riparians discovered the huge potential of rivers, and embarked on extensive water development schemes to realize this potential.

[223] H. Elver, 2000. Peaceful Uses of International Rivers: The Euphrates and Tigris Rivers Dispute

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Each project has put additional stress over rivers, and it was realized that rivers' capacity was not going to meet respective demands of each riparian, particularly in the Euphrates basin. Claims and counterclaims of riparian countries particularly based on some basin characteristics such as riparian position, flow contribution, and drainage area. However, there is a great discrepancy among riparians about basic characteristics of basin. Lack of reliable data further exaggerated this problem, and each country assigned relative weights to these factors according to their own interest and data set. Therefore, it is very important to reach a common understanding on the physical characteristics of the Euphrates and Tigris Rivers to find a reasonable, equitable, and acceptable solution by all parties.

According to *Table 3*, Turkey possesses almost 21 percent of Euphrates drainage area, 41 percent of its main channel, and contributes 90 percent of its average 32 BCM flow. However, some experts suggests that Turkey's contribution to Euphrates flow is around 98 percent since tributaries that join in Syrian territories take their head waters from Turkey.[224] Turkey's contribution to Euphrates is very significant from relatively small drainage area, which is due to favorable climatic conditions. In Tigris basin, Turkey's share in drainage area and main channel is smaller, but Turkey still contributes significant amount to mean annual flow of 52 BCM, which is proposed to more than 50 percent by some experts. The greatest tributary of

[224] J. Kolars, *Problems of International River Management*, International Waters of the Middle East, 1994, p. 51.

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Tigris, Greater Zab, originates and gets its headwaters from Turkey also. If we consider two rivers, Turkey generates almost 60 percent of mean annual water from 18 percent of total drainage area.

Overvieew of Physical Characteristics of Euphrates-Tigris Basin in Country Level													
		Total area (km2)	Area of country within the basin (km2)	As % of total area of basin	As % of total area of country	Length of River (km)	As % of total length of River	Mean Discharge (BCM)	As % of total discharge of River	Irrigable Area (ha)	Mean Annual Precipitation (mm)	Storage Capacity (BCM)	Evaporation Losses (BCM/year)
TURKEY	Euphrates		121,787	21.1	16	1230	41	28.922	90.00	1,777,000	400-800		
	Tigris	783,562	53,052	14.3	7	400	21.48	20.84	40	650,000	600-1000	90	3-4
	Total		174,839	**18.44**	22.3	1630	**33.53**	49.762	**59.07**	2,457,000			
SYRIA	Euphrates		95,405	19	51.52	710	23.67	3.213	10.00	800,000	200-400		
	Tigris	185,180	948	0.3	0.51	44	2.36	0	0	150,000	200-400	14	1
	Total		96,353	**10.16**	52.03	754	**15.51**	3.213	**3.81**	950,000			
IRAQ	Euphrates		282,532	49	64.46	1060	35.33	0	0	2,500,000	200-400		
	Tigris	438,317	142,175	38.3	32.44	1418	76.15	26.571	51	1,500,000	200-400	100	4-5
	Total		424,707	**44.78**	96.89	2478	**50.97**	26.571	**31.54**	4,000,000			
IRAN	Euphrates		0	0	0								
	Tigris	1,648,195	175,386	47.2	10.64								
	Total		175,386		10.64								
SAUDI ARABIA	Euphrates		77,090	13.4	3.59								
	Tigris	2,149,690	0	0	0								
	Total		77,090		3.59								
TOTAL	Euphrates		576,814	100.00		3000	100.00	32.136	100.00				
	Tigris		371,561	100.00		1862	100.00	52.1	100.00				
	Total		948,375	100.00		4862	100.00	84.236		7,370,000		204	8-10

Table 4: Physical Characteristics of Euphrates – Tigris Basin

Syria is a downstream riparian for Turkey and an upstream riparian with respect to Iraq. This unique position makes Syria the most vulnerable riparian in terms of geographical position and degree of dependence to Euphrates, because unlike Turkey and Iraq, Syria's usage of Tigris waters is limited. Syria shares 19 percent of basin area and 24 percent of main channel of the Euphrates; and contributes varying amounts between 2-10 percent of mean annual flow. Since it is highly dependent on the Euphrates flow from upstream, and also need to look after Iraqi claims over river flow, Syria is bounded to use river flow independently.

Last riparian Iraq is further downstream and forms almost 45 percent

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of total basin area, and 50 percent of main channel of both rivers. Iraq has no contribution to Euphrates River and generates 51 percent of Tigris flow, although headwaters of tributaries originate in Turkey and Iran. Iraq's total contribution to both rivers is around 32 percent of total annual flow.

The claims and counterclaims of the three riparian states are complex and based on these physical parameters. Thus, any conflict over these physical characteristics paves the way for divergent political standing. Each country prioritizes different parts of basin characteristics and tries to legitimize their claims. Hillel (1994) has explained this situation as:

"*The issue in contention is how to weigh historical rights against proportionate contributions to flow; taking into consideration such associated factors as the real needs of each country. Assigning relative weights to those disparate factors in order to establish criteria for the equitable allocation of the river's water among the riparians would be an exceedingly difficult task even if the contenders were willing to submit their claims to impartial adjudication. In the absence of such willingness, the issue remains in contention, and each of the riparian states has been active in developing and utilizing its section of the rivers independently, disregarding the rights, concerns, or works of its neighbors*".[225]

Lack of mutual trust among riparian countries caused extensive unilateral basin development efforts to appropriate as much water as possible, and caused construction of huge storage capacity that increased the amount of evaporation from water surfaces. The total storage of the existing dams on the Euphrates is 148.8 BCM, or 5 times the river's average annual flow. On the Tigris, existing storage totals more than double the average annual flow of the Tigris.

[225] D.Hillel, Rivers of Eden: The Struggle for Water and Quest for Peace in the Middle East (OUP, Oxford, 1995), p. 103

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The management of Euphrates-Tigris basin will be more complex when development plans of all countries are in place and functioning. Even within boundaries of single user, it is not an easy task to manage water between competing sectors, and balancing needs of each one. Thus, measuring supply and demand properly is very crucial to find a common ground for long lasting solution. Divergent claims over supply-demand stand out likewise other basin parameters. Countries come up with different claims based on their own perceptions and data sets. Similar divergence is present in academia also.

Kibaroglu (2002) projected water consumption in the basin, and according to her study, total demand in the Euphrates River exceeds supply by the year 2040 as a targeted year of completion of infrastructure projects in the basin. In her evaluation, although there is huge demand in Tigris portion, supply is sufficient to meet demand. However, if we consider required flow for river ecosystem, surplus in Tigris will be controversial.

The Water Potential of the Euphrates and Tigris Rivers and the Consumption Projections (BCM)					
		Turkey	**Syria**	**Iraq**	**Total**
Euphrates	Supply	28.922	3.213	0	32.135
	Demand	18.50	11.50	23.00	53.00
	Balance	10.422	-8.287	-23	**-20.865**
Tigris	Supply	20.84	0.00	26.571	52.10
	Demand	6.5	3.00	41.800	51.30
	Balance	14.34	-3	-15.229	**0.8**

Table 5: Supply- Demand Balance of Euphrates-Tigris Basin, source: Kibaroglu 2002.

A different study that has been done by Ministry of Foreign Affairs of Turkey projects similar future for the basin. Water demand in the Euphrates

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is estimated to be 168 percent of mean annual flow, which shows the severity of water shortage in near future. On the contrary of Kibaroglu (2002), official evaluation of ministry foresees shortage of 6 BCM in Tigris.

The Water Potential of the Euphrates and Tigris Rivers and the Consumption Projections (BCM)					
		Turkey	**Syria**	**Iraq**	**Total**
Euphrates	Supply	31.58 (88.7%)	4.00 (11.3%)	0	35.58 (100%)
	Demand	18.42 (51.8%)	11.30 (31.80%)	23.0 (64%)	52.92 (168.20%)
	Balance	13.16	-7.3	-23	**-17.34**
Tigris	Supply	25.24 (51.90 %)	0.00	23.43 (48.1%)	48.67 (100%)
	Demand	6.87 (14.1%)	2.60 (5.4%)	45.00 (92.5%)	54.47 (114%)
	Balance	18.37	-2.60	-21.57	**-5.8**

Table 6: Water Potential of Euphrates-Tigris Basin, source: "Water Issues Between Turkey, Syria, and Iraq", Ministry of Foreign Affairs, Department of Regional and Transboundary Waters, June 1996, Ankara, Turkey

As mentioned earlier part of this study, data on the extent of irrigated lands, irrigable lands and water requirements are varied and contradictory. Thus, estimations that based on varying irrigation targets data result in differentiation in demand calculations. Each of the riparian intends to utilize the river for both hydroelectric production and irrigation. Even within boundaries of single user, balancing these needs is not a small task.

Altinbilek (2007) has illustrated the difference in demand projections of various studies; but the basic fact about all these studies is that anticipated and declared demands of the riparian countries are greater than the total volume of the Euphrates and very close to flow of the Tigris River.

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	Altinbilek (1997)	Kolars (1994)	Kliot (1994)	US Army Corps of Engineers (1991)	Belul (1996)
Euphrates					
Natural flow at Turkish–Syrian border	31.43	30.67	28.20	28.20	31.4
Net withdrawal by Turkey	− 14.50	− 21.6	− 21.50	− 21.5	− 12.3
Entering Syria	16.93	9.07	6.7	6.7	19.1
Inflows in Syria	2.05	9.484	10.7	4.5	3.1
Net withdrawals by Syria	− 5.5	− 11.995	− 13.4	− 4.3	− 10.5
Entering Iraq	13.48	6.559	4.0	6.9	11.7
Net withdrawal by Iraq	− 15.5	− 13.0	− 16.0	− 17.6	− 19.0
Flow into Shatt-al-Arab	− 2.02	− 6.441	− 12.0	− 10.7	− 7.3
Tigris					
Runoff in Turkey	18.87	18.5	18.5	18.500	19.3
Net withdrawal in Turkey and Syria	− 8.0	− 6.7	− 7.2	− 6.7	10.2
Entering Iraq	10.87	11.8	11.3	11.8	11.5
Inflows in Iraq by tributaries	30.7	30.7	31.7	30.7	31.0
Net withdrawal in Iraq	− 31.9	− 33.4	− 40.0	− 32.8	− 33.5
Flow into Shatt-al-Arab	9.67	9.1	8.0	9.7	9.0

Figure 27: Summary of water budgets at Euphrates-Tigris Basin; source: D. Altinbilek, 2007.

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CHAPTER 3

Synthesizing Science and Diplomacy: Towards Sustainable Regime Building

Introduction

Turkey, Syria and Iraq have exploited the Euphrates and Tigris Rivers through unilateral, large-scale ambitious projects over the past half-century. Although they initiated their *projects* with *holistic visions*, the reality has been quite different. Social and environmental consequences of projects were not considered carefully, and the pressure on water resources development led to intense political conflict among riparian countries.

Extensive infrastructure developments have already created pressure over the river's capacity. Only in the Euphrates basin, 32 dams and barrages have been built since last 50 years, which enabled a massive storage capacity that 5-times greater than annual average flow of the river.[226] This extensive damming and irrigation activities have caused drastic changes in hydrological characteristics of the rivers. Although some of these alterations have been beneficial such as more regular flow throughout year, flow volume has decreased significantly, particularly in the Euphrates basin. Tense political relations among riparian countries impeded any cooperation to address these adversities with adequate means. As we move into the future, it stands to reason that water conflict in the Euphrates-Tigris basin will become more difficult to manage since inherited problems from the past are

[226] M. Nouar Shamout and Glada Lahn, The Euphrates in Crisis: Channels of is Cooperation for a Threatened River, p.2

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coupling with complex demographic, climatic, and political challenges. Nevertheless, the situation is not completely a hopeless case. If bottlenecks of the system can be diagnosed correctly, and useful measurements can be applied through a collaborative action; water availability in the basin can be improved considerably.

In this chapter, we will try to identify these target areas that can improve the water availability in the basin. Synthesizing first two chapters shows us that one of the most critical problems in the Euphrates-Tigris basin is *lack of reliable data*. Each riparian country based their understanding on different set of data that caused contradicting views over basic characteristics of the basin. Since they framed problem differently, their proposals and standing in negotiation table differed too. Another significant issue has been *lack of innovative technology and agricultural practices*, which could help to save water. Lastly, although riparian countries have applied supplied-led policies up until now, this strategy has caused over-utilization of both rivers, and is not viable option anymore. *Demand management policies* should replace supply-led activities in order to increase water availability in the basin.

However, success of policies abovementioned is really depends on adaptation to challenges that basin has been confronting. Ever-growing population has put utmost pressure upon the availability of water, while climate change phenomena is already beginning to influence basin hydrology. Apart from all these realities, Syrian crisis and *ongoing political*

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instability in the region is the most challenging issue. It has created very complex regional dynamics from mass migration to fundamentalism.

Critical Issues in the Euphrates-Tigris Basin: The Way Forward

The countries bordering the Euphrates and Tigris Rivers have been facing technical, institutional barriers to successful cooperation. Any improvement in these areas can play a significant role in water availability. That's all very well but where to start? A sound diagnosis of the bottlenecks of the system is very crucial to take correct steps further.

Lack of reliable data is an outstanding source of conflict in the Euphrates-Tigris basin. Data regarding stream flow, precipitation, evapotranspiration, water diversions, return flow, salinity, soil type, and other variables in relation to land resources, are very scarce, incomplete, and disputed at many locations.[227] There are various figures concerning availability of water and land resources depending on country or experts. Actual mean annual discharge of both rivers is still controversial. The inconsistency in annual discharge data makes it difficult to determine actual amount of water that would be the basis of water allocation.

There has been great uncertainty relating to impact of ambitious water development projects in each country due to incomplete and conflicting data. How much water will be consumed to irrigate all the projected areas in the GAP is still matter of dispute. There is still uncertainty on actual amount of

[227] Ali Akanda, Sarah Freeman, and Maria Placht, *The Tigris-Euphrates River Basin: Mediating a Path Towards Regional Water Stability*, Al-Nakhlah, 2007, p. 2

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land that is irrigated in Syria. It was estimated that 325,000 ha of land were irrigated in 2000, and further 325,000 ha of land earmarked for future irrigation projects.[228] However, Beaumont (1998) cited from the Syrian officials that the total irrigated area along the Euphrates might eventually rise to close to one million ha.[229] In addition to conflicting irrigated area data, tributary contributions from the Syrian territories also have been obscured by incomplete and conflicting data. Thus, official figures of irrigation projects on tributaries are highly contested by many scholars. Situation is not different in Iraq. Available data for water resources and agriculture in Iraq is either inaccurate or conflicting. While some studies reported 1.8 million ha as potential irrigable area in the Euphrates basin, another study states that amount to be 4 million ha.[230] Since agriculture is the main water consumer in the basin, discrepancy between actual needs of riparians and their claims has been bone of contention.

Joint Technical Committee meetings had been a convenient stage to resolve such data conflicts. Although trilateral meetings enabled exchange of available data on river hydrology and water development projects; the efforts remained inconclusive since riparian countries perceived information as state secrets and used data as a bargaining tool in negotiation table.

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[228] UN-ESCWA and BGR (United Nations Economic and Social Commission for Western Asia; Bundesanstalt für Geowissenschaften und Rohstoffe). 2013. *Inventory of Shared Water Resources in Western Asia*. Beirut. p. 65

[229] P.Beaumont, *Restructuring of Water Usage in the Tigris-Euphrates Basin: The Impact of Modern Water Management Policies*. Yale School of Forestry & Environmental Studies Bulletin, 1998, 103: p. 175

[230] UN-ESCWA and BGR (United Nations Economic and Social Commission for Western Asia; Bundesanstalt für Geowissenschaften und Rohstoffe). 2013. *Inventory of Shared Water Resources in Western Asia*. Beirut. p. 66

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Turkey's Three-Stage Plan was another attempt to resolve data conflict. Plan proposed the establishment of a joint body to do inventory studies of water and land resources in each riparian country via joint data collection and examination. This proposal had a potential to synchronize divergent interpretations stemming from conflicting data; hence, enable same understanding from common data set that would facilitate the solution of conflict. However, political mistrust and short-term national interests impeded acceptance of plan.

In this context reliable data is very essential to achieve a reasonable, equitable, and acceptable solution by all parties. Any improvement in data will not only affect understanding physical characteristics of water availability, but also it will help to establish an effective water governance through better decision making at every scale of water resources planning. On the other hand, collection and sharing of joint data can be a useful confidence-building tool to break political mistrust among riparian countries, and normalize relations. Regional Data Bank Project[231], which was implemented in Jordan River Basin with the involvement of Israeli, Jordanian and Palestinian water authorities, can be a good example of improving water data availability. Project aimed to standardize hydrologic data and enhance exchange of it among participants; thus, create a common practice in water management throughout the basin.[232] Such a joint effort can be very useful in

[231] Annika Kramer, Regional Water Cooperation and Peace-building in the Middle East, Adelphi Research, p. 19

[232] Regional Water Data Banks Project, Multilateral Working Group On Water Resources

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the Euphrates-Tigris Basin. A successful cooperation in data gathering and exchange can pave the way for establishment of a river basin organization that would manage water resources development holistically.

Lack of innovative technology and efficient agricultural practices has been another characteristics of the Euphrates-Tigris basin that further exaggerated the conflict. Agriculture accounts for roughly 80 percent of water use in the basin suchlike global pattern, and this proportion is expected to grow by increasing population, as well as changes in living standards, consumption patterns and life expectancies.

Existing irrigation systems in riparian countries, particularly in Syria and Iraq, are unsatisfactory from the engineering point. Insufficient number of distributing structures on the canals, lack of drainage facilities and improper field irrigation are typical characteristics of the irrigation systems.[233] Both countries had to revise their ambitious irrigation projects several times due to technical incapacity stemmed from poor irrigation system. Moreover, soil salinization has become much worse as a result of inadequate irrigation system, which led to decline in cultivated area and crop production. Both Syria and Iraq consumed higher volume of water to sustain agriculture in those unfavorable lands. Therefore, improvement of the existing irrigation systems in the Euphrates-Tigris basin is very essential for

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(Middle East Peace Process), p. 2

[233] Adai H. Al Hadithi, Optimal Utilization of the Water Resources of the Euphrates River in Iraq, Dissertation, University of Arizona, 1979

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efficient utilization of the water system.[234] Application of modern irrigation techniques can help to conserve considerable amount of water, while increasing crop yields. Technological advancement in 21st century has made more efficient, sustainable solutions possible. Water saving technologies such as drip-irrigation and sprinkler are very suitable for semi arid climate of basin, and can save significant amount of water particularly when they are combined with crop pattern that requires lower water. Moreover, the development in desalination, water reuse and rainwater harvesting technologies with decreasing costs, can be alternative supply-led management options. New technology allows farmers to obtain real-time data on their crops and soil parameters, and enables them to make more informed and efficient decisions. However, these technical solutions alone may not be sufficient to overcome long lasting problems, and should be supported with managerial and institutional policies such as water tariffs and appropriate incentives.

Such a great transformation is beyond only one country's efforts, and requires time and financial resources. Therefore, riparian countries should take immediate steps that would enhance improvement in water utilization and crop yield collaboratively; and should further reinforce these efforts with exchange of technology and expertise, and training farmers.

Demand management is another critical area in the Euphrates-Tigris basin, which is capable of improving water availability in the future.

[234] Adai H. Al Hadithi, Optimal Utilization of the Water Resources of the Euphrates River in Iraq, Dissertation, University of Arizona, 1979

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Although water management activity over the last century had mostly been supply-led that involved large-scale infrastructure projects, this approach is not sustainable anymore, and has to be shifted towards more holistic water demand management policies. A sound water demand management policy can be a useful tool to reduce water needs of riparian countries through controlling determinant factors such as population growth, consumption patterns, demographic shifts, and climate change.[235] Agricultural water demand management is the most challenging issue since it is fraught with huge uncertainties. The determinant factor in this sector will be the future demand for food production, which depends on several complicating issues such as future population and dietary patterns of people. Variations in climatic conditions can complicate matter further. Therefore, a successful water demand management requires an institutional and technological capacity to intervene the system through varying measures such as water tariffs, water metering, recycling, regulation policies, and water-saving irrigation technologies.[236]

However, despite hope-inspiring ideas that would increase water availability and defuse tension in the Euphrates-Tigris basin, there are remarkable challenges that basin countries have been suffering. Success of

[235] The United Nations, Managing water under uncertainty and risk, Water Development Report 4 Volume 1, p. 330
[236] UNDP, Water Governance in the Arab Region Managing Scarcity and Securing the Future, p. 73

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policies abovementioned highly depends on capability of basin countries to adapt these challenges.

One of the key drivers affecting the management of water resources in the Euphrates-Tigris basin is outstanding *population growth.* Region's population growth has been really remarkable over the past half century, and has put utmost pressure upon the availability of water for riparian countries. The total population of the Euphrates-Tigris basin countries is around 131 million, of which 22 million lives in Syria; almost 33 million in Iraq; while more than 74 million lives in Turkey. Total population of the riparian countries is estimated to be more than 200 million by 2050 according to recent World Bank projections.[237] Another striking point is the overall population growth rates of the riparian countries. Iraq and Syria have had some of the highest average population growth rate in the world in this period, respectively 2.9 and 2.3 percent. Turkey's population growth rate is relatively small and has decreased to world average levels, which is 1.3 percent.[238] This significant population impetus has clear implications for the demand placed on food and energy resources in each country.[239]

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[237] http://databank.worldbank.org/data/reports.aspx?source=Health%20Nutrition%20and%20Population%20Statistics:%20Population%20estimates%20and%20projections

[238] http://data.worldbank.org/indicator/SP.POP.GROW

[239] Ali Akanda, Sarah Freeman, and Maria Placht, *The Tigris-Euphrates River Basin: Mediating a Path Towards Regional Water Stability*, 2007, p. 3

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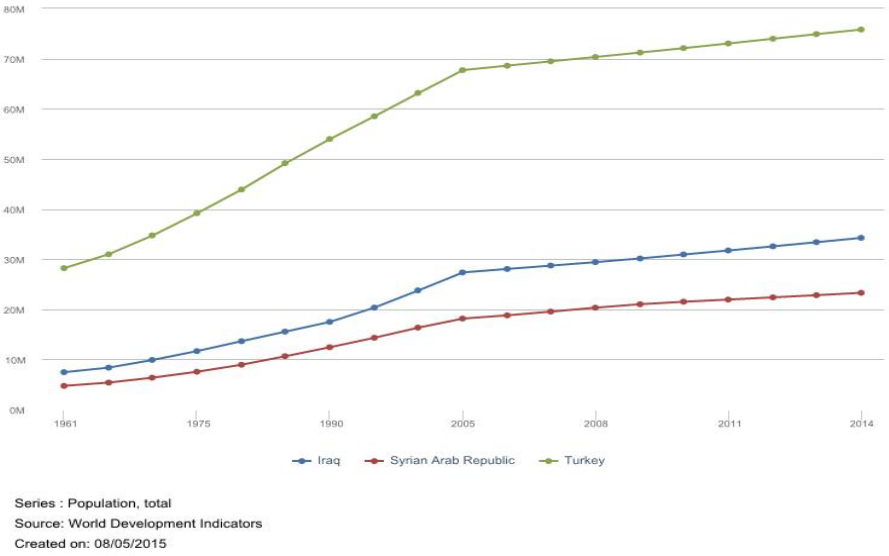

Figure 28: Total of Turkey, Syria and Iraq between the years 1961-2014

Riparian countries likely to expand their agricultural land and irrigated cultivation to meet such a dramatic increase in water requirement, which will multiply the stress on freshwater resources. Population growth not only increases water demand, but also causes decline in per capita water levels. Annual available amount of water per capita in Turkey is expected decrease 1000 m^3 by the year 2030 as a result of estimated population of 100 million.[240] Similar decreasing pattern is expected in Syria, which is forecasted to decline to 770 m^3 per person by the year of 2025.[241] Iraqi per capita water

[240] Mustafa Aydin and Fulya Ereker, *Water Scarcity and Political Wrangling: Security in the Euphrates and Tigris Basin*, p. 606

[241] UN-ESCWA, Regional Cooperation Between Countries In The Management Of Shared Water Resources: Case Studies Of Some Countries In The ESCWA Region, p.7

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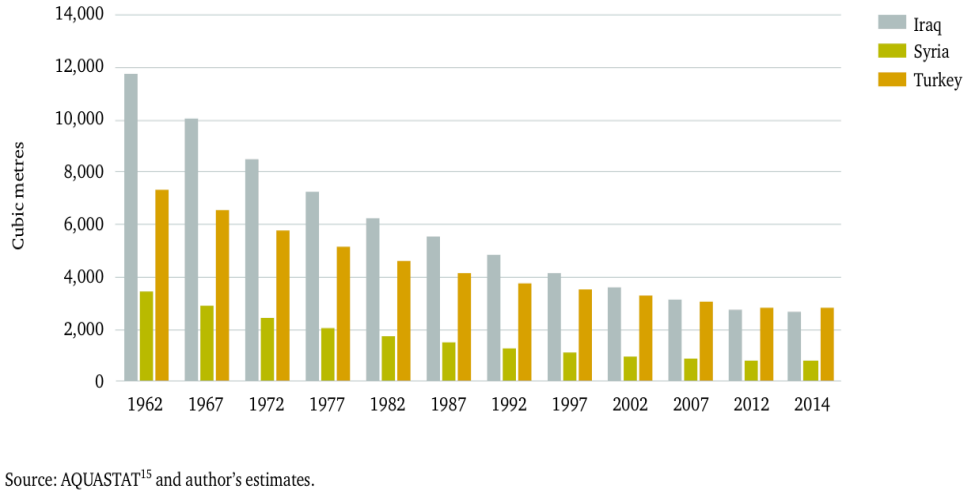
availability is expected to decrease below 1000 m^3 levels that will make this country water-stressed.[242]



Source: AQUASTAT[15] and author's estimates.

Figure 29: Renewable water resources available per capita, 1962–2014, Source: M. Nouar Shamout with Glada Lahn, *The Euphrates in Crisis Channels of Cooperation for a Threatened River*, p. 14

Syrian conflict has further complicated demographic challenges of the basin by creating large numbers of internally displaced people. Water resources infrastructure has been seriously destroyed during the war and millions of inhabitants migrated to neighboring countries, which created further pressure over available freshwater resources in areas receiving the displaced populations. Almost 2 million refugees are living in camps mostly in southeastern part of Turkey.[243]

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[242] Mehmet Ugur, *Strategic Factors In Developing Effective Transboundary Water Resources Regimes The Case of Tigris-Euphrates Basin*, p.50
[243] http://syrianrefugees.eu/?page_id=80

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A climate change phenomenon is another reality that is already beginning to influence water availability in the Euphrates-Tigris basin adversely. According to latest IPCC assessment, the MENA region, which encompasses the Euphrates-Tigris basin also, is expected to experience higher temperatures and reduced precipitations that will result in higher frequency of extreme events.[244] Since water cycle in the basin is dominated by snowmelt-hydrology, it is expected that increasing temperatures will seriously affect runoff and seasonal pattern of both rivers.[245] Substantial amount of research has been done to investigate effects of future climate change in the basin. Bozkurt and Sen (2013) assessed hydrologic impacts of climate change under various emission scenarios using dynamically downscaled outputs of different general circulation models, and they found out statistically significant decrease of 25-55 percent in annual surface runoff, particularly in eastern Anatolian mountains where headwaters of the both rivers located.[246] Moreover, they have made country-based assessments, which indicates that territories of Turkey and Syria are more vulnerable to adverse direct effects of climate change by the end of the present century.[247] Additionally, climate change will likely to cause frequent and intense droughts, which may result in devastating loss as happened in 2007-2008 drought. Particularly in Syria, severe drought conditions have

[244] World Bank, cited 2013:A strategy to address climate change in the MENA region. Available online
at http://go.worldbank.org/ OIZZFRJZZ0
[245] Deniz Bozkurt and Omer Lutfi Sen, Climate change impacts in the Euphrates–Tigris basin based on different model and scenario simulations. J. Hydrol., 480, p. 149
[246] *Ibid*., p. 159
[247] *Ibid*., p. 159

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played a direct role in the deterioration of socio-economic structure of this country.[248] Even some analysts further linked the climate change and Syrian uprising.[249] Although Syrian uprising is such a complex issue that cannot be only attributed to climate change, there are obvious reasons to accept its triggering role. Water shortages and agricultural failure caused significant loss of livelihoods, which led to dislocation of more than 1.5 million people from rural areas to major Syrian cities, and even to camps.[250] If proper measures are not taken immediately, it is likely that this kind of humanitarian crisis will be experienced in the future more severely.

A recent report of U.S. Department of Defense has drawn attention to this critical phenomenon by way of indicating that climate change could have significant geopolitical impacts around the world contributing to poverty, environmental degradation, and the further contribute to food and water scarcity.[251]

Lastly, *political instability* due to ongoing Syrian conflict has been further complicating already complex regional dynamics in the Euphrates-Tigris basin. Since uprising in Syria in 2011, the region has been very unstable and terrorized by religious, ethnic and sectarian violence. More than

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[248] Peter H. Gleick, Water, Drought, Climate Change, and Conflict in Syria, American Meteorological Society, 2014, p. 331
Also look at
C. Breisinger et al., *Economic Impacts of Climate Change in Syria*, Climate Change Economics, Vol. 4, No. 1 (2013), p. 1-30, DOI: 10.1142/S2010007813500024
[249] Francesca De Chatel, The Role of Drought and Climate Change in the Syrian Uprising: Untangling the Triggers of the Revolution, Middle Eastern Studies, 50:4, p. 521
[250] Peter H. Gleick, Water, Drought, Climate Change, and Conflict in Syria, American Meteorological Society, 2014, p. 334
[251] U.S. Department of Defense, *Quadrennial Defense Review Report*, U.S. DOD Rep., p. 85
Available online at
http://www.defense.gov/qdr/qdr%20as%20of%2026jan10%200700.pdf

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200,000 are estimated to have lost their lives in four years of armed conflict, which began with anti-government protests before escalating into a full-scale civil war. Moreover, almost 11 million people have been forced to leave their homes, which of 2 million migrated to Turkey and have been living as a refugee. [252] Bilateral relations between Turkey and Syria, which were in its golden ages just before uprising, deteriorated with the Turkey's support of regime opponents. Two countries have a state of undeclared war, and any cooperation on water challenges seems not possible in near future. Hydraulic infrastructure of the Syria has been badly damaged, and people have been suffering water shortages of drinking water. Water has been the major strategic objective, and fighting groups like ISIS are threatening local population by their control over water supplies.[253] ISIS has control over the upper reaches of the Euphrates and Tigris Rivers, and seized several key water infrastructures in both countries such as Tabqa Dam in Syria and Ramadi, Falluja and Mosul dams in Iraq.[254]

There is great uncertainty over future of the Euphrates and Tigris basin. The chronical water conflict in the basin has been further complicated by the

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[252] http://www.bbc.com/news/world-middle-east-26116868; http://www.reuters.com/article/2015/02/07/us-mideast-crisis-toll-idUSKBN0LB0DY20150207

[253] http://www.theguardian.com/environment/2014/jul/02/water-key-conflict-iraq-syria-isis

[254] http://www.independent.co.uk/news/world/middle-east/isis-use-water-as-a-weapon-in-iraq-by-shutting-dam-on-the-euphrates-river-10295763.html

http://www.businessinsider.com/isis-is-waging-a-water-war-in-southern-iraq-2015-6

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incursion of ISIS and other local and international actors. Problem that could not have been resolved between formal states for during past half-century now has to be dealt with various stakeholders, including terrorist organizations. Therefore, Euphrates-Tigris basin is really prone to any armed-conflict in the future.

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CHAPTER 5

CONCLUSION

The Euphrates and Tigris Rivers are life-bloods of the Middle East, which has been one of the misfortunate regions in the world in terms of water availability. However, human genius has been successful to bring life and prosperity through water utilization since early times, and transformed this arid region into a 'Cradle of Civilizations'. Until modern times, historical location of this development has been lower Mesopotamian plains, and only small proportions of water had been utilized.

That situation has changed drastically by the second half of the 20th century. Riparian countries embarked on large-scale water development projects. This development contestation has had profound effect on various aspects of political and societal life in the basin countries. This study was set to explore the link between hydro-politics and hydro-development in the Euphrates-Tigris basin. Our argument here is that *despite the fact that unilateral and uncoordinated water development projects of riparian countries have been influential in the context of the conflict, the main reason that worsened the dispute have rather been national security perceptions of riparian countries driven by historical mistrust, ideological rivalry and ethno-religious conflicts. Water has been a dynamic catalyst to already complex interstate security relations.*

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Evolution of transboundary water relations were examined in four consecutive periods namely *harmonious*, *contentious*, *conflict-driven*, and *cooperation-oriented*. By doing so, we aimed to understand the basic characteristics of each period, how are these characteristics reflected on legal texts of that period, and how national water policies re-oriented to power dynamics and regional developments.

From the early 1920s until late 1950s, hydropolitical relations among the three riparian countries were harmonious. Water consumptions were not at significant levels, and riparian countries mostly focused on their organizational structuring for later water resources development. Agreements of this period were cooperative in manner, but lacked of executive standards to be realized.

The water question emerged on the regional agenda when upstream countries Turkey and Syria started to challenge the status quo, which had been in favor of Iraq for long time, by initiating ambitious hydropower and irrigation projects during early 1960s. The most remarkable change in that period was the shift in location and type of the development since ancient times, by which emphasis of development has switched from downstream diversion to upstream storage facilities. 1980s and afterwards had been the most conflicting period in the Euphrates-Tigris Basin, since tension stemmed from unilateral utilization efforts coupled with several regional problems that further deteriorated relations. Turkey's ambitious GAP project and its likely hydrologic and political consequences created great anxiety in

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downstream Syria and Iraq. Ataturk Dam crisis seriously challenged riparian relations and suddenly brought *Twin Rivers* on the world agenda through various *water wars* scenarios. Contrarily, the first decade of 21st century can be characterized as the *golden age* of the Euphrates-Tigris Basin, since tension of past 50-years gave way to more cooperative relations. The main distinction of this period was that unlike the earlier periods, water issues were handled in the realm of scientific realities and were de-linked from complex regional conflicts. The political will at the highest level encouraged state bureaucrats to play more constructive role. Rather than focusing solely on water sharing, riparian countries preferred to broaden the agenda and share benefits derived from cooperative initiatives. Cooperative nature of relations has been visible in the legal texts of that period also. Unlike the previous quantity-dominated poor agreements, new cooperation efforts were built on themes such as participatory water management, rural development, climate change, and drought mitigation.

Turkey, Syria and Iraq tried to find a permanent solution to conflict through dialogue also. These efforts were realized by Joint Technical Committee meetings, starting from 1983 to 1993. However, committee could not fulfill its objectives, and talks came to a deadlock due to contention over the subjects that whether the Euphrates and Tigris rivers be considered a single system, or whether discussions could be exclusively limited to the Euphrates. Although JTC was not successful in meeting its goals, it was a

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useful channel for communication, exchanging data, and developing a negotiation practice.

Despite lack of a basin wide agreement, two bilateral agreements signed between Turkey and Syria in 1987, and between Syria and Iraq in 1990. Interestingly, these two separate agreements has created a de facto regime that Turkey is obliged to release an annual average of 500 m^3/s from the Euphrates River to Syria, and Syria is obliged to release 58 percent of that amount to Iraq. Since predominantly concerned with quantity issues, both agreements are far from solving the water conflict.

Narrative of the Euphrates-Tigris basin has been a dramatic example of how water issues can be integrated into a regional security balance. Riparian countries considered water as an important source of power; thus, they initiated large-scale development projects to appropriate this strategic asset as much as possible. This security-oriented perception promoted the concept of self-reliance, which caused prioritization of domestic projects and national interests. Moreover, propelling water issues into realm of national security legitimized exceptional measures that are taken by states in the eyes of public. At this point, *hegemony theory* has come up with a framework to define the role of power in transboundary water relations. Framework is based on three dimensions of power assumption namely structural, bargaining, and ideational power; and claims that asymmetries in these factors determine the outcome of conflict. In the Euphrates-Tigris Basin, Turkey has been identified as a *hegemon* with regards to its superiority in

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terms of geographic position, military might and economic strength. However, we claimed that despite its superiority in structural power sources, Turkey could not create such a *hegemonic order* since Turkish policy making had several limitations. Downstream riparians applied several tactics to close the power gap. *Issue-linkage* has been the most effective and most applied strategy in the basin. Supporting the PKK terrorist organization had been the most dominant strategy that downstream countries effectively applied. By linking water issue to national security, downstream riparians expected to create a water-security dilemma, and get more water from upstream Turkey. Besides Kurdish separatism, blocking international investments in GAP had been another strategy that was resorted by downstream riparians. This financial blockage has put enormous pressure on Turkey's national budget since Turkey had to finance GAP through domestic resources.

However, conflict cannot be well understood independent from hydrology of the basin. Extensive damming and irrigation activities have caused drastic changes in hydrological characteristics of the rivers. Flow volumes have decreased significantly, and it was realized that rivers' capacity was not going to meet respective demands of riparians, particularly in the Euphrates basin. Lack of reliable data and efficient irrigation and agricultural practices further complicated the situation. The inconsistency in annual discharge data and irrigation needs of each country make it extremely difficult to understand actual supply-demand balance of the basin. The conflict in the Euphrates-Tigris basin seems to become more difficult to be

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managed since these inherited problems are coupling with complex demographic, climatic, and political challenges. Riparian countries' population growth has been quite remarkable over the past half-century, and has put utmost pressure upon the availability of water as causing expansion of irrigated agriculture to meet such a dramatic increase in water demand. Climate change is expected to seriously affect water availability in the basin by altering runoff and seasonal pattern of both rivers. One of the greatest challenges that basin is suffering has been ongoing Syrian conflict. Since uprising in 2011, the region has been very unstable, and water supplies has been used as a weapon by the fighting groups to control population and gain strategic superiority. Despite all these challenging factors, water availability in the basin can be improved considerably if bottlenecks of the system can be diagnosed correctly and riparian countries take useful measurements. In this context, reliable data is very essential to achieve a common understanding of water availability in the basin. Improvement in data will help to eliminate uncertainty relating to impact of ambitious development projects and take preventive measures for future challenges such as population growth and climate change. Moreover, existing irrigation systems and agricultural practices in the riparian countries are insufficient, and needs improvement. Applying modern irrigation techniques and switching to a lower-water use crops can save substantial amount of water. However, these technical solutions alone may not be successful to overcome chronical water problem

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of the Euphrates-Tigris basin unless they are supported by sound demand management policies.

Such a great transformation is beyond only one country's efforts, and requires time, financial and institutional capacity. Therefore, riparian countries should take collaborative steps that would enhance improvement in water availability. This study aims to be a small but useful step at that point since it provides a thorough analysis of hydro-politics and hydro-development in the basin, and identifies target areas for improving water availability, as well as challenges that riparian countries are confronting. Although it is not possible to take any cooperative action under the current conditions of political crisis and conflict, still there remains the need for long-term thinking. Riparian countries can only cope with the difficulties of future through collaborative action. Past experience shows that economic interdependencies can play a vital role to integrate riparian countries. Instead of physical distribution of water, they should focus on sharing the benefits derived from the water.

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Appendices

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Appendix A. Water Diplomacy in the Euphrates-Tigris Basin

Date	Parties	Primary issues	Outcome	Significance
1920	France (Syria)-Britain (Iraq)	Joint management	Agreement for establishing a coordination committee for examining the utilization of the Euphrates and Tigris rivers.	This agreement has been first bilateral cooperation just after the collapse of the Ottoman Empire.
1920	France (Syria)-Turkey	Water Quantity	Negotiation regarding the Qweik River, which is small tributary of the Euphrates.	Includes mention of possible use of the Euphrates River.
1921	France (Syria)-Turkey	Water Quantity	**Ankara Treaty**- Reference has been made to obligation of sharing transboundary river, satisfying both parties.	*Article 12* of the treaty states the right of the city of Aleppo in using Euphrates water from Turkey to satisfy water demand in the city.
1923	The Allies - Turkey	Joint Management	**Lausanne Treaty**- *Article 109* of the Lausanne Treaty confirms that issues related to transboundary water should be dealt with separately from any other political issues, and respecting the mutual benefits of the riparian states.	The Lausanne Treaty is a remarkable milestone. It has defined the borders of basin countries, and Euphrates and Tigris rivers have got transboundary nature.
1926	France (Syria)-Turkey	Joint Management	**The Convention of Friendship and Good Neighbourly Relations between France and Turkey-** that aimed to strengthen cooperation and friendship between two countries.	Convention addressed the topic of water supply for the city of Aleppo with emphasis on the commitment by both parties to coordinate their plans for the use of the Euphrates.
1930	France (Syria)-Turkey	Joint Management	**Final Protocol of the Commission on the Delimitation of the Turkish-Syrian Frontier**	Tigris River was mentioned for the first time in that protocol, and several issues of concern such as navigation, fishing, industrial and agricultural uses were stated to be determined on the basis of complete equality.
1936	Turkey	Infrastructure Development	Reconnaissance studies on Euphrates River began, and Keban gauging station was built.	This marked the start of the earliest hydrological observation activities in Turkey.
1946	Turkey-Iraq	Joint Management	**Treaty of Friendship and Good Neighbourly Relations** – that included a protocol relative to the regulation of the waters of the Tigris and Euphrates and of their	This protocol is a remarkable step in basin timeline since it included quite far-reaching rights and obligations in the interests of both parties such as consultation, prior

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			tributaries. *Article 1* of the protocol states the technical cooperation over water utilization. *Article 3* of the protocol allows Turkey to install permanent flow measurement stations. *Article 5* states that Turkey should keep Iraq informed about her development plans.	notification, joint monitoring, data sharing, and technical cooperation. In recognition of upper and lower riparian rights and obligations, protocol was well established and balanced, which has been poorly handled in 1987 and 1990 protocols. What are lacking in the protocol are the standards, which should govern agreements in utilizing water.
1962	Syria-Iraq	Data sharing	Agreement to exchange all available information regarding the Euphrates River. This included: - A call for the establishment of a mutual committee responsible for negotiating on behalf of the two countries. - Joint opposition to any plans for the control of the river's water	This was response to the intention later sent by Turkey in 1957 regarding the plans for building the Keban Dam. Poor political relations prevailed between Iraq and Syria. The committee was never formed.
1965	Turkey-Syria-Iraq	Technical Cooperation Data Sharing	A first round of tripartite negotiations commenced. Issues discussed: -Water sharing - Reservoir and dam filling schedules of Keban and Tabqa dams	The main theme of the tripartite negotiations was the impact of the construction of the Keban Dam in Turkey, and Tabqa Dam in Syria on the river flow. The meeting was unproductive since each riparian brought forward a maximum of demands from the Euphrates with defensive attitudes. Iraq claimed 14 billion cubic meters, Syria 13 billion cubic meters, Turkey 18 billion cubic meters. However, all demands taken together would have by far exceeded the annual yield of the river. Turkey proposed establishment of the Joint Technical Committee in order to frame water allocation.
1966	Turkey	Infrastructure	Turkey started the construction of Keban Dam.	Construction of Keban Dam has been one of the

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				milestones in the basin. By construction of that 30 BCM storage capacity dam, the direction of water development has shifted from downstream to upstream regions. Although it was not constructed as a part of GAP, it has been successfully connected to GAP system. Harmonious hydro-political relations among riparian states until 1960s started to be more problematic. Turkey guaranteed to release 350 m^3/s of flow from the dam to sustain foreign aid.
1967	Iraq-Syria	Water Quantity Data Sharing	Two parties gathered to share data about ongoing development projects. Syria proposed to get 40 % of the Euphrates flow and leave 60 % to Iraq.	Because of the political rivalries and poor relations, two countries could not agreed on allocation. Iraq refused the concept of sharing
1971	Turkey-Iraq	Technical Cooperation	Technical cooperation protocols were signed between two riparians that stated: -Both countries would coordinate during the filling of the Keban Dam. -Direct negotiations would take place about shared waters, starting with Euphrates.	Because of poor coordination and political relations, the filling of Keban dam couldn't be managed properly and caused damage.
1971-1974	Turkey-Syria-Iraq	Data sharing,	Joint Technical Committee meetings were revitalized during that period, and several meetings took place through this period.	Meetings were on ad-hoc basis and main issue was impounding of the two large dams namely Keban (Turkey) and Tabqa (Syria). An agreement over allocation has not been reached, and riparian states couldn't agree on joint management of filling these two dams. Eventually both the Keban and the Tabqa Dams were filled unilaterally within a year between 1974 and 1975.
1975	Iraq-Syria	Water Quantity	**The First Water Crisis occurred**; The almost simultaneous filling of two dams coincided with	Mutual threats brought two parties to the brink of armed hostility. Syria closed its airspace to Iraqi flights and both Syria and Iraq

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			one of the driest years in the basin. Disagreements between Ba'athist parties and tense political situation triggered the crisis. Iraq accused Syria of reducing river's flows to unbearable levels, while Syria blamed Turkey.	reportedly transferred troops to their mutual border. Only mediation on the parts of Saudi Arabia and the Soviet Union was able to avert a violent conflict. Syria consented to slow down the impounding of the *Tabqa* Dam and to provide for additional amounts of Euphrates waters (200 million m^3/year) to be released.
1980	Turkey-Iraq	Water Quantity Joint Management	**Protocol for Technical and Economic Cooperation**- was established between Turkey and Iraq, which stated that: -A joint technical committee should be established to study cooperation over the Euphrates and Tigris rivers. -The committee should review all issues related to transboundary waters between the three countries. -The findings should be reported within two years to a ministerial committee responsible for deciding a fair share for each state.	The Joint Technical Committee was formed again, and Syria began participating in 1983. Issues discussed were centered on upstream development projects, particularly Ataturk Dam which is centerpiece of GAP project. The JTC (Joint Technical Committee) was established to identify a reasonable and appropriate method for water allocation. However, after 16 meetings it concluded its last meeting in 1993 without any agreement. Non-water issues that worsened overall relations among riparians impeded success of committee. The main issues caused the failure were related to both subject and object of the negotiations. Diverging views of riparians states about terminology such as: -Are the Euphrates and Tigris two separate rivers

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				or a single basin? -Are they international or transboundary rivers? caused the deadlock, and riparians could not agree on a regime to determine the equitable utilization of their shared rivers.
1984	Turkey-Syria-Iraq-PKK (Kurdish Separatist Organization)	Security	Kurdish Separatist terrorist organization started its attacks in southern Turkey, where hydro-development projects were being implemented.	PKK has played a significant role in deterioration of relations between riparian countries. Security issues linked to water conflict, and impeded cooperation. The link made between Kurdish issue and water conflict was center of the contention particularly between Turkey and Syria, and triggered the political crisis several times
1987	Turkey-Syria	Water Quantity Security	**Protocol on Economic Cooperation**- has been signed between two countries that included first bilateral agreement reached on Euphrates river flow. -During the filling up period of the Ataturk dam reservoir and until the final allocation of the waters of Euphrates among the riparian countries the Turkish side undertakes to release a yearly average of more than 500 m3/s at the Turkish Syrian border. -In cases where monthly flow falls below the level of 500 m3/s, the Turkish side agrees to make up the difference during the following month. A security agreement has been signed to limit the mobility of PKK on Syrian territory. The Turkish side introduced the details of 'Peace Pipeline' project that was planned to carry a portion of water from Seyhan and Ceyhan rivers in Turkey, through Syria by two pipelines, one going to countries of Gulf, and the other	The agreement came after a tense political period between the two countries. Since the main purpose of the overall agreement was to prevent support of Syria to PKK, water agreement has not been well prepared and detailed. There is no distinction between dry and wet years, no comments about seasonality, and what will happen during extreme climatic conditions such as prolonged droughts. Agreement is also week in terms of identifying upstream and downstream rights and obligations. Although agreement was intended to be temporary measure until filling up period of Ataturk dam, by mutual consent it has been extended and still valid. Although agreement can be

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			to Jordan and Saudi Arabia to supply water for daily household demand.	seen as success, there has been sound criticism since water was used in exchange for security, rather than on the basis of any concept of rights and shared needs. Another shortcoming of this agreement has been that it decided share of Syria, and therefore Iraq's share as well when Iraq was not represented on the table.
1989	Turkey-Syria-Iraq	Water Quantity Data Sharing	Turkish, Syrian, and Iraqi officials met to discuss the waters of the Euphrates River	Measures Turkey was taking to remedy an unexpected reduction of flow to Syria and Iraq next year, when Turkey plans to harness the waters of the Euphrates for the Ataturk Dam was discussed.
1989	Turkey-Syria-Iraq	Water Quantity	Turkey doubled the flow of Euphrates river water ahead of a one-month diversion to fill a major dam to Syria on December 21.	Turkey had released more water in order to minimize the damage to Syria and Iraq. Despite this result for Syria was crop loss and decline in electricity production.
1989	Turkey	Infrastructure Development	Master Plan of GAP has been approved. The Southeastern Anatolia Project, commonly called GAP, is a Turkish multi-dimensional development project involving primarily irrigation and hydropower generation in the Euphrates and Tigris river basin. Although at the beginning it has been formulated to provide power for the western regions of Turkey, GAP has since transformed to include nearly every type of development project to improve the economic situation, increase political stability, and support urban and industrial development within southeastern Turkey.	GAP has been a source of tension between Turkey and the two riparian countries, Syria and Iraq, which are concerned by the modification of the hydrological regime of the Euphrates and Tigris rivers. The project comprises construction of 22 dams, 19 hydroelectric power plants and irrigate 1.8 million ha of land. Project is estimated to consume almost 9-10 BCM of Euphrates water, and 5-6 BCM of Tigris river water.
1990	Arab League-Turkey-Syria-Iraq	Water Quantity	The Arab League asked Turkey to shorten the period during which it cuts the flow of water in the Euphrates and to supply downstream Syria and Iraq	Syria and Iraq started to facilitate a strong campaign against Turkey in international platforms and appealed Arab League to

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			with more water during the cut-off.	increase pressure over Turkey.
1990	Turkey-Syria-Iraq	Water Quantity	Turkey cut off the Euphrates flow (partly) for about 30 days, between 13th January to 12th February.	The filling of the Ataturk Dam led to another tension. Both Iraq and Syria protested against this measure and claimed that they had suffered severe damage. Turkey, again, argued that the filling of the dam was a technical necessity and that it had warned its co-riparians in advance. Also in order to reduce the damage and prove its good intentions, Turkey had increased the quantity of water in the months before the filling of the dam, and released more than the committed 500 m3/sec. Hence, the other riparian states had been given the possibility to store more water.
1990	Turkey-Syria-Iraq	Water Quantity Data Sharing Joint Management	Turkey has proposed a ' *Three Stage Plan*' for the equitable and reasonable utilization of Euphrates and Tigris rivers during the ministerial level Joint Technical Committee meeting. The stages of the plan are as follows: -Inventory studies for water resources -Inventory studies for land resources -Evaluation of land and water resources and reaching an optimum and equitable solution.	Turkish plan has offered needs-based approach throughout joint assessment of land and water resources in each country. Syria and Iraq rejected the plan and insisted on a system under which the supplies would be shared on the basis of each country stating its water needs. But the summed claims of each country exceeded the total potentials of the whole basin, and negotiations ended in deadlock.
1990	Syria-Iraq	Water Quantity	**Syria and Iraq have signed a bilateral agreement on sharing Euphrates waters.** The agreement came several months after they protested to Turkey over cutting the Euphrates flow fill Ataturk dam. According to agreement, Iraq	With this agreement, Euphrates water flow has been allocated by two bilateral agreements. But this agreement did not recognize the 1987 agreement between Turkey and Syria since it was a temporary agreement, but these two bilateral agreements have lasted

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			was to get 58 % and Syria the remainder of 42 % of the Euphrates waters.	until today. The commonality of these two bilateral agreements is predominant concern of quantity issues. More comprehensive form of cooperation including quality, flood protection, preservation of ecosystems issues was paid no attention.
1990	Turkey-Syria-Iraq	Water Quantity	Ministerial level Joint Technical Committee meeting was hold to discuss sharing of Euphrates waters.	After two days of intensive talks, parties could not reach a concrete solution. Iraq pre-requested Turkey to increase river flow from the Syrian border to 700 m^3/s levels, but Turkish side rejected that.
1992	Turkey-Syria	Water Quantity	A joint communiqué issued between Turkey and Syria. The two sides also agreed on resuming meetings of the joint technical committee that was suspended because of political tension.	Two sides reiterated their adherence to joint the economic and technical cooperation protocol signed in Damascus on 8/17/87, particularly regarding water and Turkey's commitment to releasing over 500 m^3/s of Euphrates water to Syria.
1992	Turkey-Syria-Iraq	Water Quantity	Syria, Iraq and Turkey ended talks on sharing the waters of the Euphrates and Tigris rivers without reaching an agreement.	Joint Technical Committee meetings ended after 10 years and 16 meetings without any final agreement. It hasn't been able to solve conflicting claims of riparian countries. The main issues of contention were divergent views of riparians about characteristics of basin such as whether Euphrates and Tigris are separate basins or one single basin; and whether they are international rivers or transboundary watercourses. Although meetings have been fruitful after 10 years of efforts, JTC has been good channel for data sharing and consultation.

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1993	Turkey-Syria	Water Quantity	Finalization of credit agreement for another dam project in Turkey started a new trouble between Turkey and Syria.	Syria started lobbying against Turkey in the Arab League and western countries.
1995	Arab League-Turkey-Syria-Iraq	Water Quantity	Arab League criticized Turkey on monopolizing waters of Euphrates and Tigris.	Syria and Iraq conducted effective campaign against Turkey, and they lobbied to stop further development in upstream.
1997	Turkey-Syria-Iraq	International Agreement	**UN Convention on the Law of the Non-Navigational Uses of International Watercourses.** The UN Watercourses Convention is the only universally applicable Convention that establishes basic principles and rules for interstate cooperation on the management, use, and apportionment as well as for the protection of international watercourses.	Syria was the first country to sign the convention, and Iraq also signed and ratified convention. Turkey voted against the UN convention with China and Burundi. Therefore, the UN Watercourses Convention, which entered into force on 17 August 2014, as well as other regional and sub-regional conventions, is not directly applicable in the Euphrates and the Tigris region, as Turkey does not accept UN convention.
1998	Turkey-Syria	Security	**Adana Accord-** was signed between Turkey and Syria. Turkey accused Syria of supporting the Kurdish rebels, and hosting PKK leader Abdullah Ocalan in Damascus. Two countries were on the brink of war. Syria expelled PKK leader and ended its support to terrorists. In October 1998, Turkey and Syria signed the so-called Adana Accord, in which they pledged not to harbor militant groups targeting the other side.	Although it was security protocol between two riparians and did not have any statement over water issues, it has been beginning of the more cooperative relations that have lasted until uprising in Syria in 2011.
2001	Turkey-Syria	Joint Management Technology/Expert transfer	**Joint Communiqué between Republic of Turkey Prime Ministry Southeastern Anatolia Project Regional Development Administration (GAP-RDA) and Arab republic of Syria Ministry of Irrigation General Organization for Land and**	This Joint Communiqué has been the first cooperative initiative as a result of rapprochement after Adana Accord. Water issue was handled at technical level, and left to intergovernmental

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			Development (GOLD)	networks composed of technocrats. For the first time issues such as urban and rural water quality management, rural development, participatory water management were handled with the broader framework.
2002	Syria-Iraq	Water Quantity Water Quality Dispute Settlement	**Agreement on Setting up a Syrian Pumping Station on the River Tigris between Syria and Iraq**- was signed between Syria and Iraq that governs the establishment of a Syrian pumping station on the Tigris River. It also specified the project area and volume of water extracted on monthly basis.	Since both parties signed the UN convention, the context of the agreement has been shaped by basic principles of convention, which is more cooperative. Quantity of water to be withdrawn has been stated in detail under different conditions. Unlike previous agreements, water quality has been handled in that agreement based on principals of UN convention. For the first time, dispute settlement emphasized separately. Agreement has referred to UN Convention for the issues that have been provided in the agreement.
2003	Turkey-Syria	Joint Management Technology/Expert exchange	**Implementation Protocol between Republic of Turkey Prime Ministry Southeastern Anatolia Project Regional Development Administration (GAP) and Arab Republic of Syria Ministry of Irrigation General Organization for Land Development (GOLD)**	This document is prepared in order to define the principles of implementation of the cooperation envisioned in the Joint Communiqué signed between the GAP-RDA and the GOLD in 2001. The scope of this document includes the projects, training programs and activities which are to be initiated in the year 2003.
2005	Turkey-Syria-Iraq	Academic Cooperation	ETIC (Euphrates-Tigris Initiative for Cooperation) has been established among by a group of scholars and professionals mostly from the riparian countries. The main goal of initiative is to promote basin-wide	ETIC is a kind of 'epistemic community' which has been defined as " network of professionals with recognized expertise and competence in a particular domain and an authoritative claim to policy-relevant knowledge

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			cooperation to achieve social, economic, and technological development.	within that domain or issue-area." It is a non-official, non-governmental, and non-profit organization. It can play a vital role in capacity building efforts in the basin.
2007	Turkey-Syria-Iraq	Water Quantity Technical Cooperation Data Sharing Joint Monitoring	Turkish Minister of Environment and Forestry invited his Iraqi and Syrian counterparts to an international conference in Turkey to further discuss water issues. After the meeting, it has been decided to revive Joint Technical Committee meetings that have been suspended since 1992.	Several trilateral meetings were organized between the years 2007 and 2009. Three riparians considered initiating training programs, expert exchange, and data sharing for effective drought mitigation. Turkey agreed to increase flow of the Euphrates to 550 m^3/s during the dry season of autumn in 2009, after the request of Iraqi delegation. One of the most significant outcome of the meetings was that riparian countries agreed on to establish a joint water institute in Turkey with 15 appointed experts from each country.
2008	Turkey-Iraq	Joint Management Cooperation	**Declaration on the Establishment of the High-Level Strategic Cooperation Council (HSSC)**- which introduced a mechanism for meetings between relevant ministries includes communication over the issue of transboundary waters.	According to strategic partnership agreement; HSSC was to meet at least once a year, with the prime ministers of two countries chairing the meetings, at least three times a year in ministerial level, and four times a year with technical delegations. The political will has been expressed at the highest level and this paved the way for cooperative initiatives on transboundary water issues.
2009	Turkey-Syria	Joint Management Cooperation	**Syrian-Turkish Strategic Cooperation Council Agreement**- was signed between two countries. 50 Protocols were signed, four of which related to regional	This Declaration was another milestone in Turkish Syrian relations. The cooperative initiatives taken at the highest political level, made broader

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			waters, emphasizing; -Cooperation on shared waters -Water quality issues -Cooperation on developing shared water pumping stations and dams -A joint water policy	cooperation possible. Riparians preferred functional cooperation and a benefit sharing approach. This broader cooperation showed that equitable utilization of waters by integrative approach instead of focusing solely on water sharing, might add more development opportunities and enlarge the benefits derived from water, and eventually promote peace in the highly tense region.
2009	Turkey-Syria	Water Quantity Data Sharing	**Memorandum of Understanding between the Government of the Republic of Turkey and the Government of the Syrian Arab Republic on Establishment of a Pumping Station in the Territories of the Syrian Arab Republic for Water Withdrawal from the Tigris River**	Turkey accepted construction of pumping station in Syrian territories at the part of Tigris, forming border. Amount of water to be withdrawn is equal to 1.25 BCM/year which was stated in 2002 agreement between Iraq and Syria.
2009	Turkey-Syria	Water Quality	**Memorandum of Understanding in the Field of Remediation of Water Quality between the Government of the Republic of Turkey and the Government of Syrian Arab Republic**	Both parties accepted importance of sustainable development approach in order to protect water quantity and quality. The aim of memorandum of understanding was to promote scientific, technical, and technological cooperation to promote protection of water quality for the health and welfare of the basin. *Article 2* of the memorandum specifies areas of cooperation, while *Article 3* frames the methodology for the cooperation in specified areas.
2009	Turkey-Syria	Drought Mitigation Joint Monitoring Data Sharing	**Memorandum of Understanding between the Government of the Republic of Turkey and the Government of the Syrian Arab Republic in the Field of Efficient Utilization of Water Resources and Combating**	This MoU was one of the best-designed agreements in the basin history, which includes many modern concepts of cooperation. Drought mitigation measures were at the core

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			Drought	of the agreement. Climate change phenomenon has been stressed for the first time in a legal context. One of the main reasons behind the shift in modalities of cooperation at the recent legal texts is the Turkish experience of European Union Water Framework Directive. In order to harmonize her water policy to EU standards, Turkey tried to implement principals of the Water Framework Directive at the basin level.
2009	Turkey-Iraq	Technical Cooperation Joint Management Data Sharing	**Memorandum of Understanding between the Ministry of Environment and Forestry of the Republic of Turkey and the Ministry of Water Resources of the Republic of Iraq on Water –** has been signed between two countries for; -Strengthening friendly relations and enhancing cooperation on water issues. -Sustainable development approach has been basis of the agreement.	Agreement aimed to sustain transfer of technology and experience for cooperation on water resources management on the basis of equality reciprocity, mutual benefits. Unlike agreements in 1980s-1990s, both countries focused on cooperative water management policies instead of respective water shares. Decrease in water supply has been recognized, and increased water use and climate change have been stressed as reasons behind this situation which has been neglected for a long time. Need of more frequent trilateral Joint Technical Committee meetings was specified. Agreement was more inclusive than past experiences that envisaged the participation of non-governmental institutions, academia and private firms.
2009	Turkey-Syria	Infrastructure/Development Technical Cooperation Joint Management	Turkey and Syria agreed build a joint-dam, named Friendship Dam, on Orontes River in Turkish territories that would produce energy and irrigate	Orontes River has been another dispute between two countries in which Syria has been claiming territorial rights over

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			certain amount of land in both countries, and agreed to share the cost.	Turkish province of Hatay. This dam and signed protocol was remarkable milestone in Turkish-Syrian relations, since the protocol implied the recognition of actual borders of each state.
2011	Syria	Security Political and Armed Conflict	Syrian uprising started in March 2011.	After 10 years of cooperative basin-wide relations, political atmosphere in the region has been very tense again. Particularly Turkish-Syrian relations deteriorated significantly. Some key water infrastructure in Iraq and Syria has been controlled by terrorist organizations, such as ISIS.
2011	Turkey-Iraq	Water Quantity Infrastructure Development	Turkey started the construction of controversial Ilisu Dam, which is 1200 MW and has 10.4 BCM storage volume.	Ilisu Dam has been source of great tension between Turkey and Iraq, and some international organizations because of its impacts on social life, environment, and cultural heritage sites.

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