



STRATEGIC WATER

*Iraq and Security Planning
in the Euphrates-Tigris Basin,
Expanded Edition*

Frederick Lorenz and Edward J. Erickson

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DEDICATION



Dr. Maged Mostafa Hussein
21 September 1965–25 May 2009

The civilian staff of the U.S. Army Corps of Engineers make great contributions to the water sector in Iraq, and they enabled the field work for this book in 2004. One of the authors, Frederick Lorenz, met Dr. Hussein only once in Istanbul in 2009, and was shocked to learn of his death a month later.

Dr. Maged M. Hussein first came to the United States in 1986 as part of an exchange program from Egypt. He later returned to the United States to attend graduate school at Ohio State University, earning master's and doctorate degrees in civil engineering. In December 2003, Dr. Hussein joined the U.S. Army Corps of Engineers, and he worked as a computer modeler on dozens of projects for the Comprehensive Everglades Restoration Plan.

In July 2006, Dr. Hussein, now an American citizen who was fluent in Arabic, volunteered to serve as an advisor to the Iraqi Ministries of Water Resources and Environment. While in Iraq, he worked on the reconstruction of water infrastructure and the construction of water treatment plants, sewer systems, irrigation and drainage systems, and dams, contributing greatly to Coalition efforts to stabilize Iraq.

Dr. Hussein was 43 years old when he was killed in a roadside bomb attack in Fallujah on Memorial Day, 25 May 2009, while visiting construction sites there. He became the first civilian in the U.S. Army Corps of Engineers to die in the Iraq War.

CONTENTS

Dedication	v
Foreword	ix
Preface	xi
Acknowledgments	xiii
Acronyms and Abbreviations	xv
Introduction to the Expanded Edition:	
Iraq and Security Planning in the Euphrates-Tigris Basin	3
Chapter 1.	
The Euphrates-Tigris Basin and Its History	15
Chapter 2.	
Geopolitics in the Euphrates-Tigris Basin	38
Chapter 3.	
External Agency in the Basin	75
Chapter 4.	
Geography, the Kurds, and Water	100
Chapter 5.	
Water Deficit and the Impact of Climate Change	124
Chapter 6.	
Hydropolitics and the Law	161
Chapter 7.	
Data, Science, and Diplomacy: Bridging Technology and Policy	193

Chapter 8.	
Security Planning and the Evolving Crisis	223
Selected Bibliography	247
Index	253
About the Authors	259

FOREWORD

Usually, when one ponders the important security matters of the day, topics such as weapons of mass destruction, hypersonic missiles, or artificial intelligence fill the news headlines. The conversation about the strategic causes of conflict is easy to overlook due to their ubiquitous and unassuming nature. Water scarcity is one of these topics—it can be the root cause of failing economies, food scarcity, migration, and societal displacement, but as the research literature shows, it is difficult to measure and prove. The impact of water scarcity is far-reaching and tends to aggravate the fault lines that erode the underpinnings of a state. Water scarcity is usually not a direct cause of conflict but rather destabilizes a state's economic and social foundations, generating insecurity and goading potential antagonists toward confrontation.

In their volume, Edward Erickson and Frederick Lorenz provide a detailed account of how growing water scarcity related to the Euphrates-Tigris Rivers impacts regional stability. One of the many challenging aspects of researching environmental security is scoping the problem. Dr. Erickson and Colonel Lorenz handled this by focusing on the basin. This allows them to discuss the relationship between water scarcity and interstate security dynamics.

The four states that share this water resource—Iran, Iraq, Syria, and Turkey—are either experiencing some level of freshwater scarcity, though some more severe than others. The authors discuss an all-to-common problem: the upper riparian near the river's source usually dictates how much water the downstream riparian is allotted.

The case of Iran aptly demonstrates the hidden role of water scarcity in state insecurity. Sinkholes have been appearing due to the overuse of aquifers. Agricultural production, employing an estimated one-third of the workforce, is declining and leading to double-digit unemployment. This, in turn, generated demonstrations in the northwest agricultural center, a scarcity of local produce, and food inflation.

This updated study is relevant to more than just the Middle East. Water scarcity is spreading across the globe from places we expect in the Middle East and North Africa to those we did not anticipate, such as Cape Town, Sao Paulo, and Chennai. The more we learn from water conflict and cooperation in the Euphrates-Tigris region, the more likely we will address future crises from an informed perspective.

Dr. Erickson and Colonel Lorenz published the original volume of *Strategic Water* in 2013 to emphasize the importance of water scarcity to military planning in the Middle East. One may argue that, with the U.S. national security pivot to the South Pacific and Europe in the last five years, water scarcity is less of a concern to the Department of Defense. However, this problem is increasing in all geographic combatant commands due to population growth, pollution, and changing regional climate patterns. This book emphasizes the need to consider the impact of dwindling water resources on the planning and the execution of all military operations.

Matthew R. Slater, PhD¹

¹ Matthew Slater has worked in the Department of Defense for more than 20 years as a professor, researcher, editor, and author. He is currently working as an instructional designer for a federal law enforcement program.

PREFACE

As we write this preface in the late winter of 2022, the Euphrates-Tigris basin and its riparian states continue to be shaken by unrest and political instability, with no clear resolution in sight. In two countries critical to our study—Syria and Iraq—the changes come swiftly and present major challenges to U.S. foreign policy. The government of Syria has defied international efforts to help resolve an increasingly deadly civil war that has expanded into a wider conflict involving the great powers. Many predicted the Syrian government would fall long before now, but the Bashar al-Assad regime has shown surprising resiliency. In Iraq, there are signs of economic development, but underlying divisions within the government, sectarian attacks, and corruption remain obstacles to progress. The rise of autonomous and independent Kurdish statelets in the basin further complicates an already dangerously complex geopolitical situation. The United States remains deeply mired in on-the-ground commitments in both Iraq and Syria.

This book is about water security in a broad context and is much more than a simple discussion of access to water. The issue of freshwater scarcity has always been of vital concern to humans, and today it is increasingly characterized as a strategic factor in security planning. In the Euphrates-Tigris basin, water apportionment and management combined with climate change are increasingly emerging as threats to regional stability. The United States has a long-term strategic interest in the stability of the Euphrates-Tigris basin that, in turn, is directly linked to the national interests of the riparian states. The expanded second edition of *Strategic*

Water: Iraq and Security Planning in the Euphrates-Tigris Basin updates the analysis of the geopolitical situation and expands coverage of the aspirations of the basin countries. New chapters include “Geography, the Kurds, and Water,” as well as “Data, Science, and Diplomacy.” The concluding chapter “Security Planning and the Evolving Crisis” presents considerations for security planners and suggests interim and durable approaches to the problem.

ACKNOWLEDGMENTS

This project began in 1997 with funding from the U.S. Air Force's Institute for National Security Studies while the authors were on active duty and Frederick Lorenz was on the faculty of the National Defense University. This initial grant was used for travel to the region and a research project that was published in 1999 by National Defense University Press as *The Euphrates Triangle: Security Implications of the Southeastern Anatolia Project*. In that publication, we benefited from the assistance of Brian R. Shaw, Aaron T. Wolf, and John F. Kolars, and we have tried to build on that foundation as we prepared this book.

In 2004 and 2005, we were again able to travel to the region with funding from the U.S. Department of Defense and the U.S. European Command. We would like to thank the staff of the U.S. embassies in Ankara, Turkey; Damascus, Syria; and Baghdad, Iraq, for their assistance in arranging travel and making contacts in the local area. We are indebted to Dr. J. A. "Tony" Allan, whose groundbreaking research and writing had a major influence on this book. For the revised chapter 7, "Data, Science, and Diplomacy," Lorenz is grateful for the contribution of Dr. Aaron Salzberg, director of the Water Institute in the Department of Environmental Sciences and Engineering at the University of North Carolina at Chapel Hill. Chapter 7 also benefited from input by Matt Zeigler, a PhD student in the Information and Communication Technology for Development (ICTD) Lab at the University of Washington, Seattle.

We are also indebted to our editor, Angela Anderson, for her suggestion that we update the first edition of our book. Angela's superb at-

tention to detail as well as her suggestions on making this a better book were instrumental in seeing it through to publication. We also thank our graphic designer, Robert Kocher, for his creative layout and design suggestions.

ACRONYMS AND ABBREVIATIONS

AANES	Autonomous Administration of North and East Syria
AI	artificial intelligence
AKP	Justice and Development Party (Turkish: <i>Adalet ve Kalkınma Partisi</i>)
AOR	area of responsibility
AQI	al-Qaeda in Iraq
BCM	billion cubic meters
BDA	big data analytics
BSEC	Black Sea Economic Cooperation
CBM	confidence-building measure
CFS	cubic feet per second
CHP	Republican People's Party (Turkish: <i>Cumhuriyet Halk Partisi</i>)
CIA	Central Intelligence Agency
CICA	Conference on Interaction and Confidence Building Measures in Asia
CJTF-OIR	Combined Joint Task Force-Operation Inherent Resolve
CM	cubic meter
CMS	cubic meters per second
COR	Council of Representatives
D-8	the Developing 8, Organization for Economic Cooperation
DAT	Dam Assessment Team
DOD	Department of Defense

DSI	Directorate of State Hydraulic Works (Turkish: <i>Devlet Su İşleri</i>)
ECO	Economic Cooperation Organization
EIU	Economist Intelligence Unit
EO	Earth observation
ETIC	Euphrates Tigris Initiative for Cooperation
EU	European Union
EUAM Iraq	European Union Advisory Mission in Iraq
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	Food and Agriculture Organization of the United Nations Corporate Statistical Database
FCC	functional combatant commands
G20	Group of Twenty
GAP	Southeastern Anatolia Project (Turkish: <i>Güneydoğu Anadolu Projesi</i>)
GCC	geographic combatant command
GDP	gross domestic product
GeoAI	geospatial artificial intelligence
GIS	geographic information system
GRACE	Gravity Recovery and Climate Experiment
GWOT	Global War on Terrorism
HADR	humanitarian assistance and disaster relief
HDP	Peoples' Democratic Party (Turkish: <i>Halkların Demokratik Partisi</i>)
Helsinki Rules	1966 Helsinki Rules on the Uses of the Waters of International Rivers
HPC	high-priority countries
ICIBAD	International Centre for Integrated Basin Development
ICIMOD	International Centre for Integrated Mountain Development
ICJ	International Court of Justice (French: <i>Cour Internationale de Justice</i> , or World Court)
ILC	International Law Commission, United Nations
IMF	International Monetary Fund
ISIS	Islamic State of Iraq and Syria, IS, or Daesh

ISX	Iraq Stock Exchange
IWRM	Integrated Water Resources Management
KDP	Kurdistan Democratic Party
km	kilometer
km ²	square kilometer
KNC	Kurdish National Council
KRG	Kurdistan Regional Government
kWh	kilowatt hour
LOE	line of effort
MAF	million acre-feet
MCPP	Marine Corps Planning Process
MENA	Middle East and North Africa
mg/L	milligrams per liter
MHP	Nationalist Movement Party (Turkish: <i>Milliyetçi Hareket Partisi</i>)
ML	machine learning
MOD	Iraqi Ministry of Defense
MOWR	Iraqi Ministry of Water Resources
MRC	Mekong River Commission
MW	megawatt
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NBI	Nile Basin Initiative
NGO	nongovernmental organization
NMS	<i>National Military Strategy</i>
NSS	<i>Iraqi National Security Strategy</i>
NSSPSC	National Security Strategy Permanent Standing Committee
NWC	U.S. Naval War College
OECD	Organisation for Economic Co-operation and Development
OIC	Organisation of Islamic Cooperation (formerly Organization of the Islamic Conference)
ONSA	Office of the National Security Advisor to Iraq
OPEC	Organization of the Petroleum Exporting Countries

OSCE	Organization for Security and Co-operation in Europe
PKK	Kurdistan Workers Party (Kurdish: <i>Partiya Karkeren Kurdistan</i>)
PMF	Popular Mobilization Forces
PUK	Patriotic Union of Kurdistan
PYD	Democratic Union Party (Kurdish: <i>Partiya Yekîti ya Dêموكرat</i>)
SDF	Syrian Democratic Forces
SDG	UN Sustainable Development Goals
SIIC	Supreme Iraqi Islamic Council (or Sadrist Movement)
SNL	Sandia National Laboratories
SWOT	Surface Water and Ocean Topography
TCP	theater campaign plans
TDS	total dissolved solids
UAV	unmanned aerial vehicle or drone
UN	United Nations
UNAMI	United Nations Assistance Mission for Iraq
UNCT	United Nations Country Team
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNHCR	United Nations High Commissioner for Refugees
UNITAD	United Nations Investigative Team to Promote Accountability for Crimes Committed by Da'esh/ISIL
UNSDCF	United Nations Sustainable Development Cooperation Framework
USAID	U.S. Agency for International Development
USCENTCOM	U.S. Central Command
USEUCOM	U.S. European Command
USGS	U.S. Geological Survey
USIP	U.S. Institute of Peace
USSOCOM	U.S. Special Operations Command
USSR	Union of Soviet Socialist Republics (or Soviet Union)
UTM	Universal Transverse Mercator

Watercourses Convention	1997 Convention on the Law of the Non-navigational Uses of International Watercourses
WTO	World Trade Organization
YPG	People's Protection Units (Kurdish: <i>Yekîneyên Parastina Gel</i>)

STRATEGIC
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INTRODUCTION TO THE EXPANDED EDITION

Strategic Water: Iraq and Security Planning in the Euphrates-Tigris Basin

The authors' first edition was published in 2014 based on the observed situation in the Euphrates-Tigris River Basin in 2012. In the past 10 years, the geopolitical situation has become far more complicated and dangerous. At the beginning of the twenty-first century, Iran excluded, the geopolitical face of the basin riparian states consisted of three politically stable nation-states. The authors' assessments and framework for action were based on that geopolitical situation continuing and improving. Then, unpredictably, Syria fell into a civil war, the Islamic State (ISIS) rose and led to the establishment of American supported rebel groups in Syria, which were necessary to defeat ISIS. In turn, Syrian Kurds established an independent polity along the Turkish border, which has led to an increasingly uncooperative Turkey. Moreover, the current Syrian and Iraqi governments are dangerously unstable and increasingly dysfunctional. The geopolitical face of the basin riparian states, Iran excluded, is now composed of one stable nation-state, two unstable nation-states, one autonomous Iraqi Kurdish federate, and a de facto independent Syrian Kurdish statelet.

The issue of water scarcity has always been of vital concern to humans, and today freshwater availability is entering a new and critical phase. In the Euphrates-Tigris basin, water apportionment and management combined with climate change are increasingly emerging as threats to regional

stability.¹ In terms of security planning, the United States has a long-term strategic interest in the stability of the Euphrates-Tigris basin that, in turn, is strongly linked to the national interests of the riparian states. This expanded second edition of *Strategic Water: Iraq and Security Planning in the Euphrates-Tigris Basin* updates the massive changes in the geopolitical situation of the basin, expands riparian policies and assesses riparian aspirations, adds a section on climate change, and expands the section on data, science, and diplomacy. Finally, the expanded edition will present new assessments and a framework for planning in the next 10–20 years.

Strategic Water

Water is unique and more than a strategic resource such as oil, gas, or mineral wealth; it is inherently unstable in quantity and quality. Throughout this book, the authors use the term *strategic water* to help refine our understanding of water as an unstable and critical element in the strategic context. Strategic water can be on the surface, in the ground, and even in the soil. It is variable from year to year, difficult to quantify, and often unpredictable. It may be measured in a variety of ways, including volume, quality, and accessibility. It is affected by both nature and by human use, and when it flows across national borders, each state will develop its own claims based on concepts of national sovereignty. Strategic water therefore presents major challenges at national and international levels. Thus, we might define strategic water as an unpredictable resource with profound effects on the human condition and now a major concern.

At first glance, Earth seems to have an abundance of water. But of the world's total water supply of about 332.5 million cubic miles of water, more than 96 percent is saline. Only 2.5 percent of Earth's water is fresh water—the amount needed for human survival, and the subject of this book. Of the total fresh water, more than 68 percent is locked in ice and glaciers. Another 30 percent of fresh water is in the ground. Fresh surface-water sources, such as rivers and lakes, account for less than 1 percent of

¹ According to *Strategy*, Joint Doctrine Note 1-18 (Washington, DC: Joint Chiefs of Staff), I-1, "Strategy is about how nations use the power available to them to exercise control over people, places, things, and events to achieve objectives in accordance with their national interests and policies."

total resources, and rivers make up 0.49 percent of surface fresh water.² Although rivers account for only a small amount of fresh water, they support a major part of human needs. In the Euphrates-Tigris basin, the rivers are even more important in the arid and semiarid regional environment. Chapter 1 of this book is devoted to the history of the basin that has been shaped by its unique geography and by its access to water.

This second edition includes eight reorganized chapters; chapter 2 provides a review of the geopolitics of the Euphrates-Tigris river system with a focus on the countries that share its waters—Turkey, Syria, Iran, and Iraq. Much of this book concerns the role of external actors, including the United States in the region, and chapter 3 addresses that issue. Chapter 4 provides expanded coverage of emerging important issues, geography, the Kurds, and water.

As we focus on water, a critical question targets water scarcity: How much is enough? In chapter 5, the authors review the anticipated water deficit in the region based on the current science of water measurement. Will the rivers dry up? If not, will there be enough fresh water to meet human needs? Water is diverted for industrial, agricultural, or domestic needs. Rivers may be so polluted by human activities as to become non-potable or clinically “dead.” Aquifers may become depleted or unusable due to high salt or chemical levels. Excessive damming of rivers may lead to microclimate change, siltation, and habitat disturbances. In fact, it is rare for rivers to dry up, but some once-mighty rivers—such as the Jordan and the Colorado—have no discernible outflow at their terminus today, which are now effectively dry.³

In the first edition, the authors noted that water scarcity is a complex subject, and water quality is often more important than water quantity. Human interventions, usage, and diversions have already altered the flow of the Earth’s waters in significant ways, and the impact is not yet fully understood. We do know for a fact, however, that water scarcity, from whatever the cause, drives poverty, contributes to malnutrition, and lowers

² Water Science School, “Where Is Earth’s Water?,” U.S. Geological Survey, 6 June 2018.

³ Assaf Chen et al., “A Tale of Two Rivers: Pathways for Improving Water Management in the Jordan and Colorado River Basins,” *Journal of Arid Environments*, no. 112 (2015): 1–15, <https://doi.org/10.1016/j.jaridenv.2014.05.017>.

standards of living — all of which serve as sources of instability and insecurity.⁴ During the past 10 years, the impact of climate change has been more thoroughly researched and understood, and the latest projections will be included in chapter 5. Climate change presents one of the greatest threats to civilization and is increasingly viewed as a threat to international security.

Water and the Future of Iraq

This is not a book about predictions but rather an attempt to apply current research and knowledge of how water scarcity might cause instability in a volatile region of the world. The authors hope that the observations and possible courses of action in this second edition will serve as a platform for further work and analysis. Is it likely that the Euphrates-Tigris river system will dry up? Certainly not, but the freshwater usage and demand by the riparian nations of Turkey, Syria, Iran, and Iraq have already exceeded the supply. Increased levels of pollution and salinity have made the management of the limited supply of Euphrates-Tigris water even more difficult for the nations that rely on it.

The riparian nation that will be most affected by the impending crisis is the one farthest downstream — Iraq — and the country most deserving of attention. In the first edition of *Strategic Water*, the authors hoped that increased stability in Iraq would improve the chances for cooperation with Syria and Turkey over water issues, but those conditions have not materialized. Iraq is still fragile and divided along sectarian lines, with corruption rampant and leadership lacking. In Turkey, meanwhile, water diversion projects are moving ahead, with most of the hydropower units completed. But funding shortages and internal conflict have put the irrigation portions of the project years behind schedule. Turkish agriculture has not received the amount of water promised 20 years ago, and while this will delay a major impact in Syria and Iraq, it certainly will not prevent one. Even more important than water quantity is the question of water quality. As more land is brought into production in Turkey, agricultural return flows will surely reduce the quality of water received by the country's neighbors to

⁴ Leah Selim, "4 Things You Need to Know about Water and Famine," UNICEF, 1 September 2022.

the south. Time is on Turkey's side, and it will remain dominant geographically, politically, and militarily for the foreseeable future.

The problems of climate change and decreasing water resources have emerged in the twenty-first century as key issues in the future security environment. In March 2021, a report was produced by the U.S. National Intelligence Council's Strategic Futures Group in consultation with outside experts and Intelligence Community analysts. The report predicted that governments, industry, and civil society will face an increasing risk of water insecurity during the next two decades as demand grows and supply is increasingly strained. Poor governance and resource management, development practices, agriculture, and environmental degradation are also likely to diminish the quantity and quality of water supplies in many parts of the world. Countries that are unable to address water-related challenges will face a confluence of challenges, including greater risk of disease, growing inequality, poor economic growth, and a heightened risk of internal political instability. Shared water resources between states are increasingly likely to become flashpoints as water security diminishes and geopolitical competition grows.⁵

Of particular concern to the United States and the global community is Iraq, which has drawn the attention of the world since the first Gulf War in 1990–91. Since the 2003 invasion, the international community has devoted a tremendous amount of effort and resources to Iraq's reconstruction, with little to show for it.⁶ Today, most analysts consider the 2003 U.S. decision to invade Iraq a strategic mistake.⁷ Saddam Hussein did not possess weapons of mass destruction, nor did he have any serious connection to the Islamic fundamentalists who attacked the American homeland on 11 September 2001. The 2003 invasion had vast regional consequences that are still playing out 20 years later. The United States bears a special

⁵ Strategic Futures Group, *The Future of Water: Water Insecurity Threatening Global Economic Growth, Political Stability* (Washington, DC: National Intelligence Council, 2021).

⁶ "Iraqi Shiite Factions Turn Their Guns on Each Other in a Deadly New Phase," *New York Times*, 30 August 2022.

⁷ See, for example, David C. Gompert, Hans Binnendijk, and Bonny Lin, "The U.S. Invasion of Iraq, 2003," in *Blinders, Blunders, and Wars: What America and China Can Learn* (Santa Monica, CA: Rand, 2014), 161–74; and Raymond Hinnebusch, "The US Invasion of Iraq: Explanations and Implications," *Critique: Critical Middle Eastern Studies* 16, no. 3 (2007): 209–28, <https://doi.org/10.1080/10669920701616443>.

responsibility to Iraq and must not turn away as America shifts focus to its great power rivals.

The water sector in Iraq has been often overlooked by outsiders, but it will become increasingly important in the years ahead. Iraq heavily depends on the waters of the Euphrates and Tigris Rivers, the sources of which come primarily from outside its own borders. Recent assessments provide increasing data and a cause for alarm, which will be covered in chapters 5 and 6. Turkey continues to build a series of dams and agriculture infrastructure that will significantly affect water quantity and quality in both Syria and Iraq. Moreover, the semiautonomous Kurdish governments in Syria and northern Iraq are determined to develop both oil and water resources free from the central government's control.

Without a plan to preserve the long-term strategic water for Iraq, and without decisive action, any gains in the security or economic sphere in Iraq may be lost. Several measures are possible to help avert the worst impact of a crisis, including the formation of a regional initiative for the Euphrates-Tigris basin. The United States and the international community have the capacity to assist Iraq in terms of technology and training to manage its own water resources. A detailed examination of options will be made in the last chapter of this book. To that end, this book seeks to tie an assessment of the current state of hydropolitics in the Euphrates-Tigris basin into a possible framework for action that could reduce the risk of instability in the region.

Water, Security, and Conflict

Water covers nearly three-quarters of the Earth's surface, but less than 1 percent is fresh, and that amount is unevenly distributed.⁸ It is abundant in humid regions, but arid and semiarid regions are afflicted with a chronic shortage. As the world's population rapidly expands, water deficiencies have become particularly noticeable in arid regions such as the Middle East. Dams and river diversions have provided irrigation and hydropower benefits, but at the price of dislocating native peoples and causing significant environmental damage. When rivers cross international boundaries,

⁸ Water Science School, "Where Is Earth's Water?"

the most difficult questions arise: Who is entitled to the water, and how can downstream countries be protected? International law provides little guidance on these questions, for reasons that will be explained in chapter 6.

The available supply of global fresh water is certain to decrease as a growing population and new demands strain hydrologic systems. Concern has also risen as to the declining water quality caused by human impacts. But the question of whether there will be enough clean water to support the world's population in 20 years is controversial.⁹ In terms of U.S. security policy, the question of the potential for conflict over water has become increasingly important. For example, should the United States be prepared to defend its North Atlantic Treaty Organization (NATO) partner Turkey in a conflict over the waters of the Euphrates and Tigris?¹⁰ If there is a potential for conflict, what can be done to reduce the threat?

Water issues can be viewed from several different lenses or perspectives. Food, energy, cultural, historical, and environmental factors are all valuable sources of information. This book uses a security lens for analysis: To what extent will water scarcity cause or contribute to conflict? *Conflict* will be used in a broad sense here to include verbal disagreements to full scale international armed conflict. Both authors have a background in U.S. national security, and they tend to look at issues through the lens of U.S. national interests. But the authors hope that the research and recommendations reach a broader audience, particularly those who are interested in the health and welfare of the people in the region.

Are water wars common? Most analysts agree that the last time two nations went to war *exclusively* over water was about 4,500 years ago, when the Sumerian city-states of Lagash and Umma fought a border dispute. But there is a long and developing recorded history of water playing a role in conflict; the chronology written by Dr. Peter H. Gleick of the Pacific Institute is the most comprehensive listing. The chronology is regularly updated, some events are attributed to terrorism, including the 2003 bombing of a

⁹ For estimates concerning a particular year when the bulk of the planet's inhabitants will not have access to potable water, see the *White House Action Plan on Global Water Security* (Washington, DC: White House, 2022), 2–4; Jeremy M. Sharp, Nicole T. Carter, and Kezee Procita, *Climate and Security in the Middle East and North Africa* (Washington, DC: Congressional Research Service, 2022), 1; and Jay Famiglietti, "A Map of the Future of Water," *Trend Magazine*, Pew Research Center, 3 March 2019.

¹⁰ "Collective Defence and Article 5," North Atlantic Treaty Organization, 20 September 2022.

water supply pipeline in Iraq. The recent chronology includes the bombing of a dam by Russia in the 2022 war in Ukraine. Although water has rarely been the primary factor in war, increasing data indicate that conflict over water will increase in the next 20 years as countries press against the limits of available water. The Pacific Institute uses a three-category format to illustrate how conflict over water impacts history:¹¹

- Water as a trigger of conflict
- Water as a casualty of conflict
- Water as a weapon of conflict

An interactive map provides more detail in each category.¹² The definitions are imprecise, but this is natural as history evolves and new factors become more important. The world's water consumption has quadrupled during the last 50 years, and estimates regarding water availability in the future are uniformly bleak. In the first edition of *Strategic Water*, the authors cited a source predicting that "by the year 2025, thirty-seven countries are likely to be without enough water for household and agricultural needs, let alone water for industries, energy production, navigation, recreation, and other societal needs."¹³ In chapter 5, they note that the prediction has already come true.

Water Scarcity and Water Crisis

Research during the past 10 years provides more clarity on the ongoing crisis. This is a result of not only decreasing water availability and increasing consumption but also of an intersection of water scarcity with an impending energy and food crisis. In truth, most people will likely continue to have enough water to drink; however, food supplies are another matter as much of the world's water used by humans is dedicated to the production of food crops. One way to look at this is through the rough equation that it takes about one liter of water to produce one calorie from food crops. Meat, in turn, takes about 10 times that to produce one calorie

¹¹ "Water Conflict," Pacific Institute, accessed 29 October 2022.

¹² "Water Conflict Chronology: Map," Pacific Institute, accessed 29 October 2022.

¹³ Arun P. Elhance, *Hydropolitics in the Third World: Conflict and Cooperation in International River Basins* (Washington, DC: United States Institute of Peace Press, 1999), 8–9.

of food.¹⁴ Thus, “the average daily diet in California requires some 6,000 liters of water in agriculture, compared with 3,000 liters in countries such as Tunisia and Egypt.”¹⁵ This calculation does not consider the water that is used for hygiene, drinking, and manufacturing.

Adding to this dilemma are subsidies to grow crops to produce bio-fuels (fuels such as ethanol that are produced from renewable biological resources). For example, it takes 9,100 liters of water to grow the soy for 1 liter of biodiesel and 4,000 liters of water to grow the corn needed to produce 1 liter of bioethanol. Because of this, the substitution of biofuels for fossil fuels is a misguided and inefficient trade-off, a fact that is being increasingly recognized by international agencies.¹⁶ All this water scarcity and stress, of course, may be accelerated by global warming trends that are accelerating desertification in many parts of the water-challenged world.

In the Middle East, the water situation is increasingly problematic. A nation that is water deficient can sometimes make up for its shortage by importing food. But this is not an answer for countries that do not have the economic resources; and in matters of food security, a nation will rarely rely on the goodwill of neighboring states to make the food available. Food and water are inextricably linked, another layer of complexity in making any security assessment related to freshwater availability.

In his classic book, Dr. Tony Allan stated that “the Middle East as a region ran out of water in the 1970s.” Allan theorizes that the shortage has been made up by importing food, and the water can be considered “virtual” when contained or embedded in the imported commodities. For example, it takes 1,160 cubic meters of water to produce 1 ton of wheat. Put another way, 40 liters of water are required to produce a slice of bread and 70 liters of water are needed to grow an apple. It can be said that all agricultural and manmade products have a “water footprint.”¹⁷

¹⁴ Peter Brabeck-Letmathe, “A Water Warning,” in *The World in 2009*, special issue, *Economist* (2008): 112.

¹⁵ “Food’s Big Water Footprint,” Water Footprint Calculator, 20 October 2022.

¹⁶ Andrew Steer and Craig Hanson, “Biofuels Are Not a Green Alternative to Fossil Fuels,” *Insights* (blog), World Resources Institute, 29 January 2015.

¹⁷ Tony Allan, *The Middle East Water Question: Hydropolitics and Global Economy* (London: I. B. Tauris, 2002), 3; and World Water Council, ed., *E-Conference Synthesis: Virtual Water Trade—Conscious Choices* (Marseille, France: World Water Council, 2004), 4.

Dr. Allan further explained that water analysts can be divided into “insiders-outsiders” and “optimists-pessimists.” Water outsiders (including the authors) will rarely have credibility when dealing with regional decision makers. And the water pessimists who predicted “water wars” have been consistently proven wrong, but their alarm may not be misplaced. A crisis is imminent, but not in the sense of a classic international shooting war over water. Rather there seems to be new consensus that water has become an increasingly volatile strategic issue because of the secondary impact on regional instability.¹⁸

The Euphrates-Tigris Region

Both Iraq and Syria are heavily dependent on the flow of water from the Euphrates-Tigris and have historic claims to these “Rivers of Eden.” Turkey controls the headwaters of the Euphrates and a major portion of the Tigris, and it intends to fully exploit these resources. The massive Southeastern Anatolia Project (Turkish: *Guneydogu Anadolu Projesi* or GAP) includes 22 dams and 19 hydropower projects that will eventually irrigate and transform an area about the size of the state of Kentucky. The Atatürk Dam alone can hold more than two years of the entire natural flow of the Euphrates River. Both Syria and Iraq have objected to Turkey’s major diversion of water and have demanded increased water allocations.¹⁹ See chapter 6 for more detail on the role of international law in water issues in the basin.

Multiple recent reports from the region have shown significant signs of the water crisis.²⁰ It can now be said that the crisis is no longer “approaching” but now evolving with increasing danger. In May 2021, the flow of the Euphrates River in northeast Syria fell to an all-time low, indicating the worst drought since 1953.²¹ Without increased international

¹⁸ Allan, *The Middle East Water Question*.

¹⁹ “What’s GAP?,” Southeastern Anatolia Project, Regional Development Administration, Ministry of Industry and Technology, accessed 21 December 2022.

²⁰ “Syria Water Crisis: Up to 40% Less Drinking Water after 10 Years of War,” International Committee of the Red Cross, 1 October 2021; and UNICEF, “Running Dry: Water Scarcity Threatens Lives and Development in Iraq,” press release, 29 August 2021. “Nearly 3 out of 5 children in Iraq have no access to safely managed water services and less than half of all schools in the country have access to basic water risking children’s health, nutrition, cognitive development, and future livelihoods.”

²¹ Aurora Sottimano and Nabil Samman, “Syria Has a Water Crisis. And It’s Not Going Away,” *MENA Source* (blog), Atlantic Council, 24 February 2022.

effort, failure to deal with the problem is likely to deteriorate into a situation that will undermine other factors that might otherwise favor regional stability. Even though the political situation in Iraq remains unsettled, the long-term consequences of the water crisis in the next 10–20 years cannot be ignored.

Will there be a water war in the Euphrates-Tigris basin when the major projects in Turkey reach the final stages of development? Will climate change trigger a sudden and major conflict? Rather than a classic shooting war, we are more likely to see increasing tensions, localized violence, a rise in human suffering, and additional conflicting interests. With greater demands being made on the rivers by uncooperative parties, water quantity and quality are likely to be a central cause of regional instability, leading to a decline in economic and public health conditions. This decline will in turn make the region's peoples more susceptible to fundamentalism and extremism, thereby undermining American interests in the region.

What can be done? The final chapter of this book attempts to provide some answers. There may be an opportunity for the creation of an effective transboundary water initiative for Turkey, Syria, and Iraq. There are a number of working models that can provide insight, such as the Mekong River Commission (MRC) coordinating water management efforts in Southeast Asia. These and other models are discussed in more detail in chapter 7. The international community and the World Bank can also provide assistance, making it a truly international endeavor. With the right support, the people of the Euphrates-Tigris basin can move in the direction of cooperation rather than conflict with regard to their water resources.

This second edition of *Strategic Water* has been expanded and reorganized to reflect changing regional conditions and the results of new research and science. In this volume, the authors will attempt to answer the following questions:

- Chapter 1: How does history inform the study of water and security in the Euphrates-Tigris basin?
- Chapter 2: How do political, economic, and military factors interact in the basin, and how is the strategic landscape changing with recent developments in the region?

- Chapter 3: What is the role of the United States in the region, and what are the limitations on U.S. power and influence? Are there strategic opportunities in the next few years to influence peace and stability?
- Chapter 4: How will the autonomy or independence of Kurdish regions in Syria and Iraq affect the regional balance and the availability of fresh water? How will subnational or internal conflict impact the situation.
- Chapter 5: What is the current and projected freshwater deficit in the basin, and how will this impact regional security? In particular, how will this impact Iraq and the well-being of its people? How will climate change impact these calculations?
- Chapter 6: How do the countries of the basin view their own rights to water, and where is the intersection of law, water, and politics in the region?
- Chapter 7: What technological and scientific initiatives might be leveraged to improve the transparency and availability of information related to water? How can these initiatives be linked with diplomacy to improve the level of cooperation and reduce the risk of conflict between the parties?
- Chapter 8: With all the factors mentioned previously, how should planners approach the problem and what dangers and threats might they consider? What are the likely outcomes in terms of conflict and for violence and instability? Using a military planning approach methodology, how might tensions be reduced in the near and long term? For each of the potential outcomes, what is the probability of success?

In the coming century, we know that strategic water will assume a critical role. The demand for fresh water in the Euphrates-Tigris basin has already exceeded the availability of supplies. We also know that the United States and the international community are poorly prepared to deal effectively with a regional crisis caused by water scarcity. These are not predictions but unpleasant facts, and the authors hope that this book can provide a pathway to action to help deal with these issues.

CHAPTER 1

The Euphrates - Tigris Basin and Its History

This chapter outlines the impact of civilization on the Euphrates-Tigris basin and how people affect both the rivers and the surrounding areas.¹ Early empires and later the Arabs and Ottomans built irrigation and water management systems that made the lower basin the breadbasket of the Middle East. It was, however, the collapse of empires after the First World War and the consequent establishment of artificially imposed political boundaries that created the basis for regional instability in the contemporary world.

Geography and Early History

The history of the Euphrates-Tigris basin has been shaped by its unique geography and its access to water. These “Rivers of Eden” find their source in what is today modern Turkey, in the central highlands where rain and snow are plentiful.² Turkey has been fortunate to have an environment that can optimally utilize the waters of these great rivers. Deep valleys, cooler temperatures, and fertile soil provide good conditions for

¹ Portions of this chapter are derived from the authors’ earlier publication, Edward J. Erickson and Frederick M. Lorenz, *The Thread of Life: A Survey of Hydropolitics in the Tigris-Euphrates Basin* (Tacoma, WA: International Research Associates, 2004).

² According to biblical study, four rivers flowed through the Garden of Eden; two of them were thought to be the Euphrates and the Tigris. Genesis 2:10-14 (King James Version).

catchment, diversions, and agriculture. In Syria and Iraq, the rivers flow through mostly flat arid and semiarid land, creating more challenging conditions for utilization and higher rates of evaporation. The Euphrates flows through Syria and Iraq to the head of the Persian Gulf, where it joins the Tigris as the Shatt al-Arab. The Tigris flows directly from Turkey to Iraq, where it obtains additional flows from the Zagros Mountains in Iran.

With a total length of 2,700 kilometers (approximately 1,678 miles), the Euphrates is the longest river in Southwest Asia: it forms a catchment basin of 82,330 square km (km²; approximately 31,788 square miles). Virtually all the water of the Euphrates originates in Turkey, with a minor contribution from Syria and none from Iraq. The Tigris is the second longest river in Southwest Asia, and like the Euphrates it shows great variations in flow from winter to summer. About 45 percent of the Tigris River's water originates in Turkey; the remaining amount is contributed mostly by tributaries in Iraq and Iran.³ Since the Karun River of Iran enters the Shatt al-Arab close to the confluence with the Persian Gulf, Iran is rarely included in flow data for the riparian countries, or those countries that share a transboundary water source. Turkey makes the greatest contribution to the waters of the Euphrates-Tigris basin (map 1.1; more detail on the quantity is provided in chapter 5).

The Tigris and the Euphrates lie in a transition zone between maritime and desert climates. Like the Nile, they are "exotic rivers," deriving their waters from outside the countries through which they flow. Much of the downstream region (modern southeastern Turkey, Syria, and Iraq) receives insufficient precipitation to sustain rain-fed agriculture, but the rivers convey enough surplus water to compensate for the deficit. Farming first developed in the more humid zones but then moved to river valleys in the arid zone where crops could be grown under cultivation with the aid of irrigation. Archeological evidence supports the theory that a small core area within this Fertile Crescent (map 1.2) provided the earliest example of domesticated crops, dating from between 8900 and 8600 BCE.⁴

³ Lloyd M. Gibson, H. F. Seton, and Lewis Owen, "Tigris-Euphrates River System," *Encyclopedia Britannica*, 3 October 2022.

⁴ Simcha Lev-Yadun, Avi Gopher, and Shahal Abbo, "The Cradle of Agriculture," *Science* 288, no. 5471 (2 June 2000): 1602, <https://doi.org/10.1126/science.288.5471.1602>. Previous studies indicated that crops were first domesticated in the Jordan Valley.

Map 1.1. The Euphrates-Tigris River basin and watershed

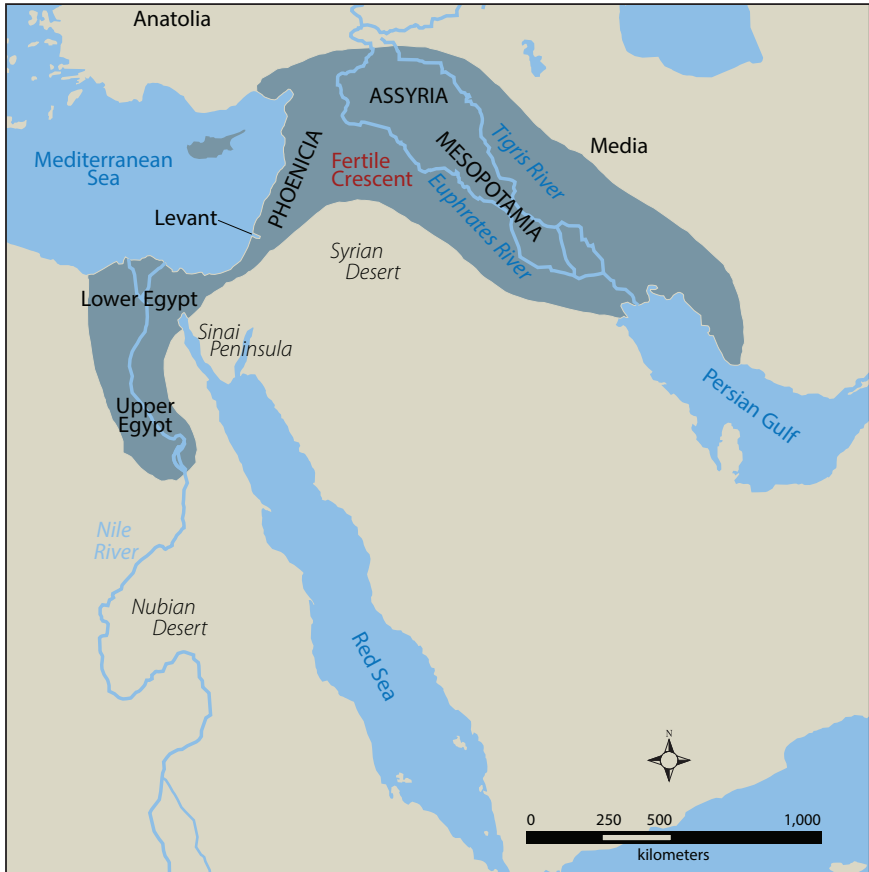


Source: courtesy of Encyclopedia Britannica, adapted by MCUP.

It is said that history began in the Euphrates-Tigris basin. Some believe it to be the location of the biblical Garden of Eden, and this region is often referred to as the “cradle of civilization.” As early as the fourth millennium BCE, agricultural settlements and basic irrigation networks were part of the Mesopotamian landscape.⁵ The Sumerians and Babylonians used the water of the Euphrates, and documents from the time of the Babylonian lawgiver Hammurabi (reigned ca. 1792–1750 BCE) refer to the maintenance of these irrigation systems. The Bible provides early

⁵ Daniel Hillel, *Rivers of Eden: The Struggle of Water and the Quest for Peace in the Middle East* (New York: Oxford University Press, 1994), 41.

Map 1.2. The Fertile Crescent



Source: courtesy of Encyclopedia Britannica, adapted by MCUP.

references to conflicts over water as well. One of the first of these is in Genesis 21, with Abraham reproaching Abimelech for having his servants take over a well used by Abraham's servants. In the same passage, there is a description of the dispute over Isaac's wells, and indeed many of the biblical names of these and other wells in the region have been retained as place names today.⁶

The early inhabitants of the region revered water. The springs of water seemed to be alive, and they inspired divine and animistic associations.

⁶ Genesis 26:21 (Christian Standard Bible).

The Mesopotamians had a creation myth based on a battle of the gods to create a firmament from the sea.⁷ The primacy of water in the region is also reflected in the local languages. Arab culture arose from this life in the desert, where competition over a limited resource was fundamental. Water is often associated with the Arab myth of the amniotic fluid that nurtures life.⁸ Water is also a major theme in the Koran, with numerous references to water, rivers, fountains, springs, and clouds throughout the text. The use of fresh water for ceremonial ablution and purification prior to prayer became essential to Muslim religious practice. Indeed, any visit to a mosque in the region today, even in the driest of areas, is preceded by the cleansing at a fountain containing multiple spigots for the faithful.⁹

Scholars often attribute the decline of early civilizations to political, military, and economic factors, or even to moral decay. Historians today, however, are becoming increasingly aware that environmental degradation often was the key factor in the demise of early societies.¹⁰ In the Euphrates-Tigris region, early exploitation of land and water resulted in the first documented environmental disaster — a consequence of salination (or salinization), siltation, and waterlogging.¹¹ Agricultural success in the basin often created an insidious cycle in which inhabitants took infertile land, irrigated it, and initially produced high crop yields. But the continued irrigation required to maintain production eventually led to soil degradation and ultimately resulted in infertile soils. This soil degradation was caused by the aforementioned salination, silting, and waterlogging, all inevitable byproducts of this seductive cycle. This process was particularly apparent in southern Mesopotamia in the time of the ancient Sumerians and Baby-

⁷ Ira Spar, "Mesopotamian Creation Myths," in *Heilbrunn Timeline of Art History* (New York: Metropolitan Museum of Art, 2009).

⁸ Barbara Watson Andaya, "Rivers, Oceans, and Spirits: Water Cosmologies, Gender, and Religious Change in Southeast Asia," *TRaNS: Trans -Regional and -National Studies of Southeast Asia* 4, no. 2 (2016): 239–63, <https://doi.org/10.1017/trn.2016.2>.

⁹ "Water: Water in the Quran," *Laphams Quarterly* 11, no. 3 (Summer 2018).

¹⁰ Milt Freudenheim, "The Ancients Had Water Politics, Too," *New York Times*, 13 September 1981.

¹¹ *Salination* or *salinization* refers to the process of increasing the salt content of soil, which renders it infertile. *Siltation* is the increased concentration of suspended sediments and the increased accumulation (temporary or permanent) of fine sediments on bottoms where they are undesirable. *Waterlogging* refers to the saturation of the soil by groundwater sufficient to prevent or hinder agriculture.

Ionians, who faced declining amounts of arable land.¹² Soil degradation is still at work today — particularly in modern Syria and Iraq — and today’s challenge is to learn from the past and avoid the mistakes that made life so difficult for the early inhabitants.

According to ancient Mesopotamian beliefs, the buildup of soil salinity (salination) was attributed to mysterious forces or a contest between Apsu, the god of fresh water from above, and Tiamat, the evil goddess of salt water from below.¹³ By keeping the land fallow in alternating years, the ancients found that native plants would send down roots and draw away the saline water. This would delay but not prevent the inevitable consequence of the rising water and increasing salt levels. In modern times, salination can be prevented or remedied by subsoil drainage when there are sufficient resources to build a drainage system. But as later chapters of this book will indicate, salinity is again a significant threat, particularly for Syria and Iraq.

The Sumerians were a great civilization — inventing writing, sailboats, and wheeled vehicles, among many other accomplishments. Despite their achievements, they unwittingly brought about their own decline by causing the degradation of their soil. Deforestation and overgrazing caused increased runoff and soil erosion, resulting in unstable riverbeds and irrigation works clogged by siltation. As detailed above, a greater problem was salination, caused by the increased use of irrigation water and the accompanying return flows to groundwater. The result was an unnatural rising of the salt-laden water table that destroyed crops in poorly drained, waterlogged lands. The loss of agricultural lands ultimately contributed to population movement and a corresponding overall decline in Sumerian civilization. Traveling through the region today, it is difficult to

¹² Hillel, *Rivers of Eden*.

¹³ Hillel, *Rivers of Eden*, 57. The story of the contest between the good god Apsu and the evil goddess Tiamat is related in the *Enuma Elish* (the Seven Tablets of Creation), the Babylonian equivalent of the book of Genesis.

imagine that thriving civilizations existed in places that are now barren, empty deserts.¹⁴

Mesopotamia enjoyed an agricultural revival when the Babylonians built an elaborate canal system in the sixth century BCE, and they built the Nimrod Dam on the Tigris to divert water into the canal system.¹⁵ Their Nahrawān Canal transferred water from the Tigris to the Diyala River plain, which was also dammed. The Babylonians also built a canal that transferred water between the Euphrates and Tigris Rivers; Nebuchadnezzar II (ruled 605–562 BCE) built the famous Hanging Gardens of Babylon using intricate canals and hydrological engineering; and Cyrus the Great (ruled 559–530 BCE) constructed 360 canals during his reign.¹⁶

Subsequent conquerors occupied the region, including Persians, Macedonian Greeks, and Romans. Central to all of these empires were the two rivers and the great cities that grew along their banks. In the mid-seventh century CE, Muslim warriors extended their control over the region and a new civilization emerged under the Umayyad dynasty. Trade and culture flourished under the Umayyads, and Islam entered its first golden age, extending from Spain to the Indus River. The empire encompassed the three early river valley civilization basins: the Nile, the Euphrates-Tigris, and the Indus.¹⁷ But the Umayyads were soon overthrown and replaced by the Abbasids, who continued to preside over a flowering of civilization and culture. Important to this narrative was the establishment of the city of Baghdad by the caliph al-Manṣūr in 765 CE.¹⁸ This was a critical juncture in the history of Islam because the establishment of the Abbasid center of power in the Euphrates-Tigris valley moved

¹⁴ C. Leonard Wooley wrote, “Only to those who have seen the Mesopotamian Desert will the evocation of the ancient world seem well-nigh incredible, so complete is the contrast between past and present. It is yet more difficult to realize, that the blank waste ever blossomed, bore fruit for the sustenance of a busy world. Why, if Ur was an empire’s capital, if Sumer was once a vast granary, has the population dwindled to nothing, the very soil lost its virtue?” Wooley, *Ur of the Chaldees: A Record of Seven Years of Excavation* (Mesopotamia: Ernest Benn, 1929), 70.

¹⁵ Arnon Soffer, *Rivers of Fire: The Conflict over Water in the Middle East*, trans. Murray Rosovesky and Nina Kopaken (Lanham, MD: Rowman and Littlefield, 1999), 83.

¹⁶ Mostafa Dolatyar and Tim S. Gray, *Water Politics in the Middle East: A Context for Conflict or Co-operation?* (London: Palgrave Macmillan, 2000), 129, <https://doi.org/10.1057/9780230599871>.

¹⁷ Tamim Ansaray, *Destiny Disrupted: A History of the World through Islamic Eyes* (New York: PublicAffairs, 2009), 67–78.

¹⁸ Ansaray, *Destiny Disrupted*, 86–87.

the epicenter of Muslim power and wealth eastward from the Nile basin. Baghdad soon became the center of a renewed Islamic golden age that encouraged science, mathematics, architecture, medicine, and trade. To support the increases in population and trade, the caliphs restored many of the ancient irrigation systems. Within several hundred years, however, the empire and dynasty began to decline. A modern scholar has attributed this to the decline of the empire's agricultural base caused by man-made soil erosion and rising soil salinity. This decline, in turn, caused food shortages, leading to the importation of expensive grains and a parallel loss of tax revenue, which was

based on land and agricultural production.¹⁹ The loss of wealth and tax revenue led to loss of political control, which combined with a regionwide cycle of climate change involving substantially drier conditions, caused the Abbasids to grow progressively weaker as they lost their grip on the both the farming and nomadic populations of the region.

Around 1050, the nomadic Seljuk Turks swept out of the Altai Mountains in central Asia through what is now Iran and began to assimilate the moribund Abbasids. The Seljuks established their own empire and restored some of the prosperity and civilization that had been lost. Then catastrophe struck in the form of invasions from the west and the east. European crusaders invaded the Holy Land in 1095 in a continuing series of resource-draining campaigns that lasted for nearly 200 years. However, a much more devastating invasion came from the east in the form of the

Figure 1.1. The Hanging Gardens of Babylon, one of the Seven Wonders of the World



Source: reprinted from J. A. Brendon, *The Ancient World from Early Egypt and Babylonia to the Decline of Rome* (London: Blackie and Son, 1924).

¹⁹ Douglas E. Streusand, *Islamic Gunpowder Empires: Ottomans, Safavids, and Mughals* (Boulder, CO: Westview Press, 2010), 17.

Mongol horde. The final destruction of the Abbasids came in the late 1250s at the hands of the nomadic Mongol leader Hülegü, a grandson of Genghis Khan.²⁰ The fury of the Mongolian conquest was unmatched historically in the Euphrates-Tigris basin, and many cities were burned to the ground and destroyed as the Mongols swept into the area. Baghdad was sacked in 1258 — its world-famous library was destroyed, and perhaps as many as a million inhabitants and refugees were put to the sword. Importantly, the complex system of irrigation canals and waterworks was intentionally destroyed as a military tactic to deny a livelihood to the local population. In the following years, the system was rendered useless by neglect and the breakdown of the central government administration. Large tracts of land that had been productive in antiquity returned to desert, and the land between the two rivers fell into a lethargy from which it did not recover until the twentieth century.²¹

In the late thirteenth century, bands of Turkic warriors from central Asia under chieftains such as Bayezid I and Timur the Lame conquered and replaced the Mongols. Soon to be known as the Ottomans, these Turkic tribes established an empire that would eventually extend from North Africa to the gates of Vienna, forming a dynastic regime that ruled over more than 30 different religious and ethnic groups. During the long rule of the Ottoman Empire (ca. 1300–1922), the Euphrates-Tigris was essentially contained in the boundaries of a single political administration, and some effort was made to restore the irrigation systems. During the ensuing centuries, however, the ever-growing subjects of Ottoman rule became increasingly despondent with the status quo, and by the early nineteenth century the empire began to disintegrate from within. Of note, Midhat Pasha, the famous Ottoman reformer, made strenuous efforts in the 1870s to restore the long-dysfunctional irrigation systems when he served as governor of Baghdad.²² He also constructed dams and cleared sections of the Euphrates-Tigris rivers in order to improve navigation; neverthe-

²⁰ Streusand, *Islamic Gunpowder Empires*, 21–22.

²¹ Rene Grousset, *The Empire of the Steppes: A History of Central Asia* (New Brunswick, NJ: Rutgers University Press, 2002).

²² Stanford J. Shaw and Ezel Kural Shaw, *History of the Ottoman Empire and Modern Turkey*, vol. 2, *Reform, Revolution and Republic: The Rise of Modern Turkey, 1808–1975* (Cambridge, UK: Cambridge University Press, 1977), 67–68.

Figure 1.2. Hindiyah Barrage, the first modern dam on the Tigris River (ca. early twentieth century)



Source: photo by American Colony (Jerusalem), Library of Congress Prints and Photographs Division.

less, these projects were too poorly resourced to restore the lost prosperity of the river basin. The Ottomans renewed their efforts to reenergize the basin based on a report in 1911 from British hydrological engineer William Willcocks, which suggested the construction of Euphrates dams.²³ Willcocks's idea was to control water and provide it to a resurrected irrigation system. Based on this, the Ottoman government began construction of the Hindiyah Barrage (a barrage is an obstruction built to divert or alter the course of water flow), which was completed in 1913.²⁴ The outbreak of the First World War in 1914 ended all further Ottoman projects.

²³ Dolatyar and Gray, *Water Politics in the Middle East*, 132–33.

²⁴ Elhance, *Hydropolitics in the Third World*, 146.

It is clear from the history of the region that the inhabitants of the Euphrates-Tigris basin were both enriched and impoverished by the waters on a periodic basis. Climate and human actions seem to be the main elements in this drama, especially in relation to the existence and operation of extensive irrigation systems. The location lent itself to this simply because Mesopotamia was sometimes a crossroads for invaders and sometimes an objective in and of itself, resulting in man-made destruction on a vast scale. It is fair to say that water scarcity and usage problems are not new issues for the riparian nations of the Euphrates-Tigris river system.

Modern History, Partitions, and Water

This section briefly details the story of how the modern countries of Iraq, Syria, and Turkey came to govern the Euphrates-Tigris basin and outlines current problems whose origins lie at the end of the First World War. In fact, many of the modern Middle East's problems stem directly from European interference in the dismemberment and partitioning of the Ottoman Empire at Versailles in 1919. Aptly called "a peace to end all peace" by historian David Fromkin, the Treaty of Versailles formalized national boundaries and established political relationships that have troubled and are still troubling the entire region.²⁵ While neither the boundaries nor water dominated the talks at Versailles, other regional issues such as oil; European interests; independence for the Arabs and other national minorities, such as the Jews and Kurds; and the creation of a modern Turkish national state plagued the negotiations. The arbitrary division of the region into competing states by the post-World War I powers created new obstacles to the efficient use of the rivers' water. A new regional map was drawn by those who intended to serve their own colonial interests, ignoring the unique histories and cultures of the region. As the Ottoman Empire was systematically dismantled between 1918 and 1923, new states and national lines were formed that would have numerous and profound effects. One of these — a significant one for the purposes of discussion in this book — is

²⁵ David Fromkin, *A Peace to End All Peace: The Fall of the Ottoman Empire and the Creation of the Modern Middle East* (New York: Holt Paperbacks, an imprint of Macmillan, 2009).

that the Euphrates-Tigris basin was divided between three countries (and the Jordan River between four).²⁶

The Ottomans divided the lands of the Euphrates-Tigris basin into vilayets or provinces that were centered on major cities. These provincial divisions tended to be based on geographical and economic considerations rather than political or ethno-religious reasons. The Ottoman vilayets in the lower basin comprised Mosul, Baghdad, and Basra, and those of the upper basin consisted of Aleppo, Van, and Diyarbakir. While much of the area contained ancient and sophisticated civilizations, by 1900 the region had deteriorated into the backwater of the empire. It was not serviced by modern communications or railroads, and the Ottomans experienced continuing difficulties with the tribes that inhabited the Euphrates-Tigris basin. The outbreak of the First World War saw the Ottomans poorly positioned to defend the region, and in November 1914 the British occupied the Shatt al-Arab, or the outlet of the river system into the Persian Gulf.²⁷ British interests concerned maintaining access to the oil reserves of the Anglo-Persian Oil Company, on which the British Royal Navy was increasingly dependent.

In early 1915, the British had already started to actively consider the acquisition of the Euphrates-Tigris River basin, and according to Lord Horatio H. Kitchener, "If the Ottoman Empire is to be wholly or partially broken up, it is imperative that Mesopotamia should become British."²⁸ Kitchener's reasons included not only ensuring continued access to oil and keeping the Russians and French out of the area, but also "incorporating Mesopotamia into the Empire on the grounds of its potential agricultural resources."²⁹ Through fall 1915, the war in Mesopotamia went well for Britain as an expeditionary force reached the gates of Baghdad. However, the tiny army, commanded by Major General Sir Charles V. F. Townshend, was encircled and forced to surrender at Kut al-Amara in April 1916. Subsequently, a greatly reinforced Anglo-Indian army, com-

²⁶ Fromkin, *A Peace to End All Peace*.

²⁷ Edward J. Erickson, *Ordered to Die: A History of the Ottoman Army in the First World War* (Westport, CT: Greenwood Press, 2001), 66–68.

²⁸ Memorandum by Lord Kitchener for the Committee of Imperial Defence, 16 March 1915, Cabinet Records (CAB 24/1/12), National Archives, Kew, United Kingdom, 2, hereafter Kitchener memo.

²⁹ Kitchener memo, 2–4.

manded by Lieutenant General Sir Frederick Stanley Maude, captured Baghdad in 1917. Maude died of cholera and the British offensive ground to a halt; nevertheless, his successor seized the oil-rich city of Mosul in November 1918.³⁰

Kitchener's machinations matured into a full-blown plan by the Allies to divide the Ottoman Empire at the end of the war. By 1918, several overlapping agreements and proclamations destroyed any logical or equitable solution to what was dubbed "the Eastern Question."³¹ Among the most famous were the Hussein-McMahon correspondence (1915–16) that pledged British support for Arab independence and the Balfour Declaration (November 1917) that promised support for the establishment of a Zionist state in Palestine. The Constantinople Agreement (March 1915) with Russia allocated the Turkish straits to the czar, while the Treaty of London (April 1915) gave Italy the Turkish city of Antalya and several islands. However, it was the Sykes-Picot Agreement (May 1916) that had the most direct bearing on the waters of the Euphrates-Tigris. Chief negotiators for the secret plan, British diplomat Sir Mark Sykes and his French counterpart Francois Georges-Picot, famously sketched a hand-drawn map of how the victorious Allies would divide the Middle East.³² According to the agreement, France would receive direct control over Syria and Lebanon, while Britain would control Mesopotamia. An international zone of control was envisioned for Palestine; however, in the wake of General Edmund H. H. Allenby's victories in 1917–18, Britain retained direct control over this area as well. The Armistice of Mudros ended the fighting in the Middle East at the end of October 1918, and the Ottoman Empire lost control of not only Arabia, Lebanon, Mesopotamia, Palestine, and Syria, but also of a large portion of Cilicia (southwest Anatolia), the Cilician Gate, Constantinople, and the Dardanelles in Turkey.³³

³⁰ Erickson, *Ordered to Die*.

³¹ Edward J. Erickson, *Defeat in Detail: The Ottoman Army in the Balkans, 1912–1913* (Westport, CT: Praeger, 2003), 37–38.

³² Roger Ford, *Eden to Armageddon: World War I in the Middle East* (New York: Pegasus Books, 2010), 388, 397–400. The Hussein-McMahon correspondence refers to letters between Hussein ibn Ali, emir of Mecca, and Sir Henry McMahon, the British high commissioner in Egypt. The Balfour Declaration refers to a letter from Arthur James Balfour, the British foreign secretary, to Lionel Walter Rothschild, 2d Baron Rothschild, a leader in the Anglo-Jewish community.

³³ James L. Gelvin, *The Modern Middle East: A History*, 5th ed. (Oxford, UK: Oxford University Press, 2020), 178–85.

The various peace treaties ending World War I then produced a profound effect on the region. The Treaty of Versailles in 1919 resulted in a new League of Nations, the covenant that established the mandate system to oversee the former territories and colonies of the defeated Central Powers. In the Middle East, the mandate system formalized the Sykes-Picot Agreement (map 1.3). Versailles, however, did not close the book on the Allied war against the Ottoman Empire, and it was not until the Treaty of Sèvres in 1920 that hostilities formally ended.³⁴ Unfortunately, the Sèvres treaty was badly skewed in favor of the Allies, and it split major portions of the Turkish Anatolian heartland between Greece, which received western Anatolia; Italy, which received southern Anatolia; and France, which received most of southeast Anatolia. Sèvres also pledged the establishment of an independent Armenian state that would have included most of the headwaters of the Euphrates-Tigris rivers. Competing for much of the same areas claimed by the Armenians were the Kurds, but the treaty merely promised them autonomy.³⁵

Reaction to the harsh terms of the Sèvres treaty was immediate and in large measure served as the catalyst that created the Turkish nationalist movement led by Kemal Atatürk (formerly Mustafa Kemal). The Greeks, in particular, were eager to claim their share and launched an invasion from Smyrna (modern İzmir) into the Anatolian hinterlands that had almost reached Ankara by 1921. The Italians and French also sent troops into their areas, of which the French-constructed Armenian Legion wrought considerable havoc. Concurrently with these incursions, the British continued their occupation of Constantinople and the Bosphorus and Dardanelles straits, while Armenians and Kurds in the Caucasus bitterly contested the controls of an evolving Turkish state. In a remarkable turn of events, the Turks defeated the Greeks and forced the remaining Allies out of Anatolia. The destruction of the Anatolian population, economy, and infrastructure caused by nearly continuous wars between 1914 and

³⁴ Michael G. Roskin and James J. Coyle, *Politics of the Middle East: Cultures and Conflicts*, 2d ed. (Upper Saddle River, NJ: Pearson/Prentice Hall, 2008), 151.

³⁵ For a comprehensive treatment of these events, see Briton C. Busch, *Mudros to Lausanne: Britain's Frontier in West Asia, 1918–1923* (Albany: State University of New York Press, 1976) remains the definitive work.

Map 1.3. The casually drawn map of the Sykes-Picot Agreement, in which Britain secured Iraq (in red) and Zone B while France secured Lebanon/Syria (in blue) and Zone A



Source: adapted by MCUP

1922 was monumental. In the end, the war-weary Allies finally agreed to return to the conference table to revise the Sèvres treaty.³⁶

The Treaty of Lausanne in 1923 constructed the modern political boundaries that define the riparian states using the Euphrates-Tigris waters to this day. The Lausanne Conference was unique because it was the only meeting where a defeated Central Power was treated on anything remotely resembling equal terms. Opening on 20 May, the Turkish delega-

³⁶ Margaret MacMillan, *Paris 1919: Six Months that Changed the World* (New York: Random House, 2003), 427–55.

tion, led by Ismet Inonu, advanced positions favorable to the new Turkish nation. There was a great deal of bargaining as the Turks agreed to demilitarize the Bosphorus and Dardanelles in return for control of Thrace. The boundaries of the modern Turkish republic were finalized, with the exception of the provinces of Hatay and Mosul, which remained under French and British occupation, respectively.³⁷ Moreover, the Allies agreed to withdraw all of their forces from the parts of Turkey they still occupied, notably Constantinople and the straits. If Turkey emerged the victor from Lausanne, it was surely the Kurds who emerged as the loser.

The Armenians, led by Boghos Nubar, were well organized and represented themselves successfully at Versailles and Sèvres. This was in large part due to their rebellion and status as active opponents of the Turks. Unfortunately for the Armenians, by 1923 no Allied state, including America, was willing to support their aspirations of statehood beyond the tiny and isolated rump state high in the Caucasus.³⁸ The Kurds, on the other hand, were Islamic and, as subjects of the Ottoman sultan, were classified with the Turks as an enemy. Consequently, the Kurds were the subject of much debate, not as an independent people in search of self-determination, but rather as a bartering chip or deal breaker. Indeed, the Kurdish puzzle seemed to defy a reasonable solution, and Lausanne ended badly for the Kurds.

Figure 1.3. Kemal Atatürk, the father of modern Turkey, in 1918



Source: courtesy of the presidency of the Republic of Turkey.

³⁷ Andrew Mango, *Atatürk: The Biography of the Founder of Modern Turkey* (New York: Overlook Press, 1991), 373–87.

³⁸ The term *rump state* refers to the remnant of a once-larger government that is left with limited powers or authority.

The Kurdish problems began in March 1921 at the Cairo Conference brokered by the British, who were trying to sort out their obligations and the promises they made to the Arabs during the First World War in return for support against the Turks. There were two main Arab tribal groups the British tried to placate by dividing up former Ottoman lands. The British gave the house of Ibn Saud control over the Hejaz (western portion of modern day Saudi Arabia), including the holy cities of Mecca and Medina, while the Hashemite house of Hāshim received the lands in between Arabia and the French mandate of Syria.³⁹ There were two Hashemite princes who had participated in the Arab Revolt (1916–18) and to whom the British owed favors. Abdullah was offered the throne of Transjordan, and Faisal was offered the throne of Iraq. Thus, the British seemed to have solved their problem, but this solution led to other, more difficult questions. The newly crowned King Faisal I of Iraq took up residence in his new capital of Baghdad. He soon inquired as to the status of the former Ottoman province of Mosul, which contained the predominantly Kurdish cities of Mosul, Erbil, Sulaymaniyah, and Kirkuk. As these areas were known to hold vast deposits of oil, the British were understandably reluctant to cede control to Faisal, who was left with the area between Baghdad and Basra. The issue surfaced at Lausanne and the British attempted to work a deal with the Turks, who claimed the former Ottoman vilayet for themselves.⁴⁰

In the end, the issue of Mosul and the Kurds was put on hold so as not to obstruct the final resolution of the Treaty of Lausanne, which was signed on 24 July 1923. The status of the province as well as the final definition of the international boundary between Turkey and Iraq was turned over to the League of Nations for arbitration and future resolution. In 1925, the league ruled in favor of Britain and awarded Mosul and its hinterlands to Iraq, then still a British mandate. This was a critical decision because it automatically created a restive Kurdish minority within the predominately Arab Iraq. Alternatively, its acquisition by Turkey would have created an even larger Kurdish minority within Turkey, as well as

³⁹ King Abdul Aziz (1880–1953), the first monarch of Saudi Arabia who was commonly referred to as Ibn Saud, meaning “son of Saud.”

⁴⁰ Gelvin, *Modern Middle East*, 180–85.

endowing the Turks with substantial oil reserves. In either case, the Kurds were destined to lose.⁴¹

In the following decades, Mustafa Kemal assumed the surname of Atatürk (father of the Turks) and became the first president of the infant Turkish republic. Continuing the domestic policies of the defunct Committee of Union and Progress, he embarked on a vigorous program of modernization and Westernization that moved Turkey closer to Europe. Importantly, Atatürk defined a new Turkish identity built on nationalism and secularism (or Kemalism), which served to build a cohesive society but at the same time culturally excluded the Kurds.⁴² Turkey maintained a carefully guarded neutrality during the Second World War, and in the 1950s it joined the new North Atlantic Treaty Organization (NATO) and participated in the Korean War. Although Atatürk was more or less a dictator, he successfully established a constitutional democracy that is his true legacy. Unfortunately, the Turkish experiment with democracy has been marred by a number of military coups, which in turn saw control returned to civilians. Throughout these periods of domestic turmoil, Turkey remained a staunch NATO partner and a strategically important component of the alliance.⁴³ A particularly strong partnership developed between the United States and Turkey, which had been one of the first nations to receive military aid under the Truman Doctrine in the late 1940s.⁴⁴ This strong relationship was thrown off track in the mid-1970s by America's arms embargo as a result of the Turkish invasion of Cyprus, a condition that lasted about 10 years.⁴⁵ The 1991 Gulf War hurt Turkey economically

⁴¹ Arbella Bet-Shlimon, "The British Mandate," in *City of Black Gold: Oil, Ethnicity, and the Making of Modern Kirkuk* (Redwood City, CA: Stanford University Press, 2019), 51–78, <https://doi.org/10.1515/9781503609143-006>.

⁴² Mango, *Atatürk*, 500, 537. Atatürk's Kemalist principles (or Six Arrows) focused on: republicanism, populism, secularism, reformism, nationalism, and statism.

⁴³ James Zanotti and Clayton Thomas, *Turkey (Türkiye)-U.S. Relations: Timeline and Brief Historical Context* (Washington, DC: Congressional Research Service, 2023), 1–2.

⁴⁴ On 12 March 1947, President Harry S. Truman gave a speech to Congress in which he recommended a policy of U.S. support for Turkey and Greece to prevent their falling under Soviet influence. This policy became known as the Truman Doctrine, and it is regarded by many historians as the beginning of the Cold War. President Truman's Message to Congress, 12 March 1947, Document 171; 80th Cong., 1st Sess., Records of the United States House of Representatives, Record Group 233, National Archives, Washington, DC.

⁴⁵ Edward C. Keefer, ed., *Foreign Relations of the United States, 1969–1976*, vol. 30, *Greece; Cyprus; Turkey, 1973–1976* (Washington, DC: Department of State, 2007), 224–34.

by cutting off trade with Iraq, but increasingly robust trade with Europe more than compensated for this.

Syria and Iraq continued in their status as mandates of France and Britain, respectively, through the end of World War II. But while French-dominated Syria was relatively stable, British-dominated Iraq was a seething cauldron of bloody revolts and internecine massacres. Famously, the British Royal Air Force played a key role in the 1920s by maintaining a highly visible aerial presence over previously violent parts of Iraq. However, postwar decolonization saw the collapse of the rule of law in both countries and the rise of military dictatorships. In 1949, Syrian Army chief of staff colonel Husni al-Zaim seized control of Syria, and in 1958 Iraqi military known as the Free Officers assassinated the king (Abdullah, heir of the Hashemite king Faisal I). By the mid-1960s, coups led by ex-military officers had installed the Ba'ath (Resurrection) Party, which was ideologically socialist and nationalist, in both Syria and Iraq. In the following years, both nations would drift away from the West, mainly over the issue of Israel and the Palestinians. Syria briefly experimented with a political union with Egypt beginning in February 1958 called the United Arab Republic, but this fell apart quickly, ending by September 1961. Confronted by a heavily armed Israel, Syria turned to the Union of Soviet Socialist Republics (USSR) for military assistance and by the 1970s had become something of a Soviet client state. Iraq fell into the hands of Saddam Hussein, who by 1980 had declared war on Iran and actively suppressed the Kurdish minority inside Iraq. In both cases, he used weapons of mass destruction, including chemical and biological munitions. His war against the Islamic Republic of Iran drew him into a de facto alliance with the West, particularly with the United States, where President Ronald W. Reagan considered him the lesser of two evils and a valuable bulwark against the Iranian ayatollahs.⁴⁶

The end of the Cold War in 1991 brought an end to Soviet involvement in the Middle East and began a corresponding American willingness to involve itself militarily in the region. The events of the 1991 Gulf War are well known and resulted in a significant degradation of Hussein's power,

⁴⁶ Jeremy Salt, *The Unmaking of the Middle East: A History of Western Disorder in Arab Lands* (Berkeley: University of California Press, 2009), 91 – 120.

as well as international embargoes and sanctions designed to weaken his regime. At the same time Syria—oddly an active partner of the United States in the Gulf War—became progressively weaker as Soviet aid dried up. The American invasion of Iraq in 2003 ended Saddam Hussein and the Ba'ath Party's rule but certainly led to a higher degree of regional instability caused by the U.S. failure to install or allow an effective Iraqi follow-on government to evolve.⁴⁷ This subject will be examined in depth in the next chapter.

There are few real territorial issues today between the governments of Turkey, Iraq, and Syria. The issues of Hatay and Mosul have long been put to rest, and all three nations are satisfied with the current boundaries. Although there is a Turkmen minority in Iraq and an Arab minority in Turkey, there are few irredentist problems with these populations. However, one of the great tragedies of the mandate period was the betrayal of the Kurdish people who lived in the region of modern western Iran, northern Iraq, eastern Syria, and southeastern Turkey. Though they were promised their own political sovereignty, the Kurds were never given the possibility to form their own state; indeed, they became aware too late of the terms of the Sykes-Picot Agreement in which the postwar powers secretly divided the area among several powerful nation-states. The failure by the Kurds to produce credible leadership compounded the problem, and hopes for independence or some degree of political autonomy were dashed when the League of Nations agreed on the region's final political boundaries in 1926, dividing it between five countries.⁴⁸ This issue continues to affect regional stability and will be addressed in detail later in this book.

Use of the waters of the Euphrates-Tigris rivers was not a controversial issue during the Ottoman period, but immediately after the First World War, issues dealing with water rights began to emerge. During the mandate period, the Allies were concerned about water use but not enough to raise the potential for conflict. In 1920, the French and British signed the Treaty of Sèvres, establishing consultative committees to manage the use

⁴⁷ Norman Lowe, *Mastering Modern World History*, 5th ed. (New York: Palgrave Macmillan, 2013), 273–77.

⁴⁸ David McDowall, *A Modern History of the Kurds* (London: I. B. Tauris, 1997), 146.

of the two rivers.⁴⁹ This was at the request of the French, who envisioned diverting the Tigris to irrigate vast areas of Syria. France remained concerned about this as the Nationalist Turks fought for independence, so the French negotiated a bilateral Treaty of Ankara with the Turks on 20 October 1921, which concerned downstream riparian rights and tapping the Euphrates for use by the city of Aleppo.⁵⁰ The Treaty of Lausanne signed between the Allies and the new nation of Turkey on 24 July 1923 included the following provisions in Article 109 regarding the uses of international water.

In default of any provisions to the contrary, when as the result of the fixing of a new frontier the hydraulic system (canalisation, inundation, irrigation, drainage or similar matters) in a State is dependent on works executed within the territory of another State, or when use is made on the territory of a State, in virtue of pre-war usage, of water or hydraulic power, the source of which is on the territory of another State, an agreement shall be made between the States concerned to safeguard the interests and rights acquired by each of them. Failing an agreement, the matter shall be regulated by arbitration.⁵¹

This article has been interpreted by some authors as “an explicit appreciation of the rights of the downstream parties.”⁵² Other specialists have construed it to mean that “Turkey should confer with Iraq before beginning any activities that may alter the flow of the Euphrates.”⁵³ In any event, the French renegotiated a second treaty — titled the Convention of Friendship and Good Neighbourly Relations — on 30 May 1926, ratifying the previous agreement. A third Franco-Turkish protocol was signed on 3 May 1930 that committed the two nations to coordinating any plans to use

⁴⁹ Dolatyar and Gray, *Water Politics in the Middle East*, 133.

⁵⁰ Dolatyar and Gray, *Water Politics in the Middle East*.

⁵¹ *The Treaties of Peace, 1919–1923*, vol. 2 (New York: Carnegie Endowment for International Peace, 1924), article 109.

⁵² Dolatyar and Gray, *Water Politics in the Middle East*, 133.

⁵³ Yahia Bakour and John Kolars, “The Arab Mashrek: Hydrologic History, Problems, and Perspectives,” in *Water in the Arab World: Perspectives and Progress*, ed. Peter Rogers and Peter Lydon (Cambridge, MA: Harvard University Press, 1995), 139.

the waters of the Euphrates.⁵⁴ The outbreak of World War II temporarily ended further conversations about water in the Euphrates-Tigris basin.

Two treaties were signed between Iraq and Turkey: one in 1930, when Iraq was still under the British mandate, and another in March 1946, after Iraqi independence, that was titled the Treaty of Friendship and Good Neighbourly Relations.⁵⁵ In these treaties, Turkey consented to Iraq's construction of dams in Turkey to regulate the flow of the rivers into Iraq. Though the dams were never built, Iraq might argue today that the effect of these treaties was Turkish acceptance of Iraq's vested right to receive the amount of water established in the 1930 treaty. Moreover, Turkey obligated itself to begin monitoring data for the rivers and sharing it with Iraq. Iraq then became the first of the three riparian countries to seek full development of the potential of the rivers' waters. Although a number of barrages were constructed to divert waters for irrigation—on the Diyala in 1927–28 and at Kut in 1934–43 (as well as for the construction of the Habbaniyah and Abu Dibis lakes, which were created by filling depressions with water)—the Iraqis built no actual dams. More barrages were built on the Euphrates at ar-Ramadi in 1954 and on the Tigris at Samarra in 1957, and dams were constructed on the Little Zab and Diyala rivers in 1959 and 1961. The first Syrian effort began in 1965 and was finished in 1973 as the Tabaqah Dam.⁵⁶

Turkey initiated investigations of water resources in southeastern Turkey following the establishment of hydrometric stations on the Euphrates River in 1936 and the Tigris in 1947. In subsequent years, topographical and hydrologic surveys were conducted. Reconnaissance studies were completed in 1958, and initial plans were developed for three dams on the lower Euphrates and five dams on the Tigris, producing a total irrigation area of 20,000 hectares. The Directorate of State Hydraulic Works (Turkish: *Devlet Su İşleri* or DSI) prepared studies to assess the energy potential in 1963, and the first major dam at Keban entered into operation in

⁵⁴ Mango, *Atatürk*, 442; and Ayla Göl, "A Short Summary of Turkish Foreign Policy: 1923–1939," *Ankara University Journal* 48, no. 1 (January 1993): 57–71.

⁵⁵ United Nations, Treaty of Friendship and Neighborly Relations between Iraq and Turkey, Collection of Treaties, No. 580 (1946), 281–331; and Dolatyar and Gray, *Water Politics in the Middle East*, 134.

⁵⁶ Soffer, *Rivers of Fire*, 85–87.

1974. This was the beginning of a program that would come to be called the Southeastern Anatolia Project (Turkish: *Güneydoğu Anadolu Projesi* or GAP). The Turks completed their second Euphrates dam, the Karakaya, in 1988 and finished their iconic signature of the GAP, the Atatürk Dam, in 1990. The subsequent filling of the mammoth Atatürk Dam caused such disruption in the flow of the Euphrates River that Turkey and Iraq had previously negotiated a boundary water agreement on 26 December 1975 to formally allocate water to the downstream nation.⁵⁷ Even so, the Turks unilaterally released large amounts of additional water to make up the shortfall. These treaties have little relevance today, and the current state of international law in the region is covered in chapter 6.

In recent years, conflict surrounding access to oil in the Middle East has largely obscured a much older and more acute problem of resource scarcity, of which the rise of the Iraqi, Syrian, and Turkish dams are only one example. Although some countries in the Middle East are oil-rich, all are water poor — and getting poorer. Water scarcity is compounded by serious environmental problems that have grown out of the ancient cycle of deforestation, desertification, soil erosion, salination, and the contamination of water supplies. Increased water demands for hydropower and irrigation in the years ahead may reach crisis proportions without an allocation agreement between riparian nations. This is particularly true in the Euphrates-Tigris basin, where population growth and projected demands on the rivers will eventually exceed the dwindling supply of water. Future solutions will depend on the cooperation of riparian nations and, potentially, a fourth riparian actor in the form of an autonomous or independent Kurdistan.

⁵⁷ Jerome Delli Priscoli and Aaron T. Wolf, “Appendix G: Treaties that Delineate Water Allocations,” in *Managing and Transforming Water Conflicts*, International Hydrology Series (Cambridge, UK: Cambridge University Press, 2009), 308–18, <https://doi.org/10.1017/CBO9780511551536.017>.

CHAPTER 2

Geopolitics in the Euphrates-Tigris Basin

Geopolitics is defined as a study of the influence of such factors as geography, economics, and demography on the politics and especially the foreign policy of a state.¹ Since the first edition of this book was published in 2014, there have been seismic shifts in the geopolitics of the riparian states of the Euphrates-Tigris basin. The basin today, excluding Iran, includes one stable nation-state, two unstable nation-states, one autonomous Kurdish federate, and an independent Kurdish statelet. This chapter examines the changing geopolitical situation and outlines the domestic, foreign, and national security (military) policies of Iraq, Turkey, Syria, and Iran with particular attention on how these policies create a framework that impacts the overall stability of the region. Chapter 4 describes the policies of the Kurdistan Regional Government (KRG) as well as the those of the Syrian Kurds. American agency intersects with the policies of the riparian nations and is described more completely in chapter 3. This chapter ends with an appreciation of how geography, water, and policy create a confusing and dangerous geopolitical situation in the Euphrates-Tigris basin.

¹ Merriam-Webster Dictionary, s.v. "geopolitics," accessed 22 December 2022.

Riparian Politics and Policies

This section outlines the political processes that stand behind the governments of Iraq, Turkey, Syria, and Iran, and the associated domestic policies, primarily economic, that affect the management and usage of the Euphrates-Tigris waters. Iran is a riparian nation of the Tigris River; its water consumption is an increasing factor in the basin. A series of proposed new dams in Iran built mostly with Chinese financing will be discussed in chapters 3 and 5. This, combined with Iran's increasing political influence in Iraq, will be a matter of concern. This section also outlines the foreign policies of the riparian states that might affect their ability to negotiate and work together as cooperative riparian partners in the Euphrates-Tigris basin. Of note, three countries have secular governments that formerly appeared committed to Westernization and integration into the world economic community. Events since that time have resulted in a far less promising future. Finally, this section outlines the national security policies and strategies of the riparians that affect the outlook and behavior as nation-states. Of note is Turkey's increasingly independent position as a military power, which may lead to it becoming a regionally hegemonic nation. Moreover, the Iraqi national security strategy explicitly identified the upstream riparians as threats to Iraqi national security.

Iraq: Government and Domestic Policy

Elections in 2005 produced a permanent constitution in Iraq and Shia-dominated coalitions have dominated the government since. The government remains a fragile body embedded in a fragile federal state because Iraq is saddled with a compromised constitution that guarantees minority representation in both the Council of Representatives (the Iraqi parliament) and within the executive branch itself. For example, the major sects of Iraq must be represented in the presidency council, the cabinet, and the major branches of government. This has led to incessant political maneuvering by the major political parties, which tend to represent religious and ethnic constituencies. However, no single party has won a majority sufficient to form an effective or durable government. Prime ministers have included Nuri al-Maliki, Ayad Allawi, Haider al Abadi, and Mustafa al-Kadhimi. For significant periods caretakers remained in power while a

Map 2.1. Relief map of Iraq



Source: Central Intelligence Agency map, adapted by MCUP.

political impasse developed when the parliament was suspended. At various times, Allawi, the Sunnis, and the Kurds walked out of parliament. The sectarian and religious divides in a population of approximately 26

million continue to plague the political process and cause major fractures in Iraqi politics.²

President Barack H. Obama ended the American combat forces' mission in Iraq in 2011, but a small training mission remained behind. Security conditions deteriorated from 2012 through 2014, as the insurgent terrorists Islamic State of Iraq and Syria (ISIS) swept out of Syria to conquer large portions of northern Iraq, including Mosul and Tikrit. This led to the reintroduction of American combat forces but, more importantly, led to a revival of Iraqi militias as Popular Mobilization Forces (PMF), which took over the fight against the invaders in the absence of the Iraqi Army. The PMF and the Kurds waged a hard campaign to liberate Iraq from ISIS, but in the end were successful by 2017. In turn, the return of powerful militias led to empowered political groups, particularly those of Shia cleric Muqtada al-Sadr and Nouri al-Maliki. Rather than unify the country, it may be argued that the war against ISIS led to even more political division, and al-Sadr and al-Maliki remain bitter political rivals.³

Iraq held national elections in October 2021 for the 329 members of the Council of Representatives (COR, Iraq's unicameral legislature), the "largest bloc" of whom the constitution tasks with nominating a president and designating a new prime minister. Negotiations among Iraqi political groups since the election to identify the new COR's largest bloc became deadlocked. In June 2022, Shia cleric Muqtada al-Sadr directed his supporters to withdraw from the COR, recasting the political dynamics of the country's long delayed government formation process.⁴ This enabled a Shia-dominated parliament in Iraq to approve Mohammed Shia al-Sudani's cabinet, which draws its strength from Iranian-backed militias and the political marginalization of Muqtada al-Sadr, Barham Salih, and Mustafa al-Kadhimi.⁵

² Jonathan Morrow, *Iraq's Constitutional Process II: An Opportunity Lost* (Washington, DC: U.S. Institute of Peace, 2005); and Marina Ottaway and Danial Kaysi, "Iraq: Movement Without Progress," Carnegie Endowment for International Peace, 18 October 2010.

³ Christopher M. Blanchard, *Iraq and U.S. Policy*, IF 10404 (Washington, DC: Congressional Research Service, 2022).

⁴ Blanchard, *Iraq and U.S. Policy*, 1.

⁵ Bilal Wahab, *Buying Time in Baghdad?: What to Expect from Sudani's Government*, Policy Watch 3666 (Washington, DC: Washington Institute for Near East Policy, 2022).

According to the Congressional Research Service, “Sadr and his supporters had won the most seats (73) in the October 2021 election and had proposed forming a ‘national majority’ government in cooperation [with] the Taqaddum (Progress) movement of Speaker Mohammed al Halbousi (37 seats), the Kurdistan Democratic Party (KDP) (31 seats), and others. Sadr’s Shia Arab rivals in the Coordination Framework (CF) bloc, including former prime minister Nouri al Maliki and Hadi al Ameri of the pro-Iran Fatah (Conquest) coalition.”⁶ Al-Sadr had sought to exclude al-Maliki from the new government and has portrayed his supporters’ withdrawal as a refusal to participate in government with unspecified “corrupt” parties. The well-respected the Economist Intelligence Unit (EIU) asserted that “Iraq is heading toward a period of high political turbulence and policy unpredictability.”⁷ The EIU further maintained that, in the end, a Shia-dominated coalition will form a new government.

Other political Iraqi blocs include the Kurds, Sunnis, and secularist groups. Of these, the Kurdish Alliance is the largest and most significant. It is composed of the Kurdistan Democratic Party (KDP) led by Masoud Barzani, who currently serves as the president of the Kurdistan Regional Government (KRG), and the Patriotic Union of Kurdistan (PUK) led by the late Iraqi national president Jalal Talabani’s oldest son, Bafel. Although the KDP and PUK jointly administer the KRG, Barzani’s party advocates independence and actively promotes autonomy (chapter 4 addresses the KRG and Kurdish politics). For the purposes of this study, the reality of the KRG as a semiautonomous “state within a state” demands that the KRG be treated as a riparian state.⁸

While fragmented, the Iraqi government has proven itself surprisingly resilient and agile in balancing the competing demands of the power blocs in Iraq. But the government is crippled by its inability to pass critical legislation and controversial amendments to an admittedly flawed constitution. These issues include partial rescission of the de-Ba’athification laws (a key demand of the Sunni community); a national hydrocarbons

⁶ Blanchard, *Iraq and U.S. Policy*, 1.

⁷ Economist Intelligence Unit, *One-Click Report: Iraq*, 1 July 2022, 3.

⁸ Hamdi Malik, “Nujaba’s Regime Change Threat to the Kurdistan Democratic Party,” Washington Institute for Near East Policy, 21 March 2022.

law that equitably shares energy and oil revenues; right of return laws to rectify the demographic engineering of the former regime; reconciliation structures to retard sectarian partitioning and violence; anticorruption laws; and very importantly, security protocols with the United States regarding the status of American forces.⁹ The most stable region of Iraq is the KRG, which declared itself a federated region (allowed under the 2005 Iraqi constitution) and which remains largely autonomous.¹⁰ It has remained almost entirely free of the violence that afflicted Iraq in the twenty-first century and is sometimes seen as a model for the remainder of the country.

The Iraqi Economy

Iraq has an “undiversified economy” that is almost entirely based on oil revenues.¹¹ Its gross domestic product (GDP) growth in 2021 was estimated at 7.8 percent. As oil production increases, GDP growth is expected to rise by several percentage points. Government and coalition efforts aimed at introducing a capitalist consumer-based market economy have been only marginally successful, although there is a small Iraq Stock Exchange (ISX, formerly Baghdad Stock Exchange). Most employed people in Iraq work directly or indirectly for the government, and beyond the shopkeeper level, capitalism as practiced in the West is almost nonexistent. Banking, investment, and finance remain undeveloped as the country struggles to find both capable people and viable enterprises. A recent EIU report showed that

Policy in the near-term hinges on alleviating food and energy supply issues, facilitated through the Emergency Law for Food Security and Development that was passed in June. . . . If a viable government is formed . . . policy will also center on the allocation of windfall energy revenue to alleviate the country’s severe infrastructure inadequacies, including the problem of chronic water shortages. Improvements to domestic power capacity, including

⁹ Safwan Al-Amin and Bilal Wahab, *Iraq’s Constitutional Moment?*, Policy Watch 3651 (Washington, DC: Washington Institute for Near East Policy, 2022).

¹⁰ Mehmet Uyanik, “Turkey and the KRG After the Referendum: Blocking the Path to Independence,” Center for Strategic and International Studies, 22 November 2017.

¹¹ Economist Intelligence Unit, *One-Click Report: Iraq*, 5.

diversifying away from reliance on Iranian gas, will be another priority.¹²

Iraq: Foreign Policy

The following information comes directly from the webpage of the Iraqi embassy in Washington, DC, and the data are current as of September 2022:

In the last 10 years, Iraq has undergone a dramatic, rapid, and positive transformation and is making progress after decades of war and instability inflicted by Saddam Hussein. Today, the Republic of Iraq is restoring its natural role as a critical global partner and a stabilizing force in the Middle East. Iraq can be a positive factor for regional stability and a friendly, peaceful country that respects national interests and understands the security concerns of our neighbors.¹³

It may be argued that Iraq's foreign policy is conditional on the views of the coalition or party currently in power. It remains focused on the restoration of Iraq as a functioning nation-state integrated into the regional and global economy and institutions. According to the Economist Intelligence Unit, Iraq will seek to maintain a neutral stance in regional politics.¹⁴

Iraq: National Security Strategy

The most recent Iraqi *National Security Strategy* (NSS) was approved by the Iraqi government in 2015, but it is unavailable to the authors. It was developed by the Office of the National Security Advisor (ONSA) with international advice and assistance provided through the United Nations Development Programme (UNDP). According to an analyst, the Iraqi NSS identifies the principal challenge is with protecting the people from terrorism, not protecting the nation-state from foreign invasion.¹⁵ The NSS also breaks the problem set down into four risks that must be countered:

¹² Economist Intelligence Unit, *One-Click Report: Iraq*, 15.

¹³ "Foreign Policy," Embassy of the Republic of Iraq, accessed 31 August 2022.

¹⁴ Economist Intelligence Unit, *One-Click Report: Iraq*.

¹⁵ William Dechow, "Thoughts on the Practicalities of Implementing the Iraqi National Security Strategy," *Strategy Bridge*, 1 June 2017.

political, diplomatic, economic, and security risks. In this regard, the 2015 NSS appears broadly to conform to the format and intent of the 2007 NSS, which was titled *Iraq First*. Parts of *Iraq First* were relevant to water and security because they reflected Iraqi thinking about the issues.¹⁶ One aspect of *Iraq First* that is significant is the explicit identification of upstream riparians Turkey and Syria as threats to national security.

Ecological Interdependence

The problem of decreasing water levels in the Tigris and Euphrates Rivers is a dangerous phenomenon that directly threatens environmental and nutritional security. It affects the climate and wetlands, increases desertification, and even decreases the availability of potable water in the middle and southern regions. This problem stems essentially from the fact that there are large dams in Turkey and Syria for storing the water of the two rivers that do not take into consideration the rights of Iraq to water resources and the longer stretch of these rivers on its territory. Therefore, leaving this problem as it is due to the failure of joint committees formed to resolve it leaves Iraq subject to a catastrophe that threatens its current and future national security.¹⁷

The Iraqi national defense policy and military strategy complemented the new national security strategy and ran concurrently from 2008 to 2011. Through 2012, the Ministry of Defense (MOD) and joint staff were focused on force generation within a democratic context while maintaining and improving internal security. After that point, the Iraqis planned to create a modern army of about 18 NATO-style divisions supported by tanks, artillery, and jets. This plan catastrophically failed during the onslaught of the quasiconventional ISIS offensive into northern Iraq in 2014, leading to the reintroduction of American and NATO forces into the country. In 2022, it remains difficult to assess the capability and capacity of the Iraqi armed forces. According to the Congressional Research Service,

¹⁶ *Iraq First: Iraqi National Security Strategy, 2007–2010* (Baghdad: Cabinet and National Security Council, Republic of Iraq, 2007). This document has not been superseded, and it is likely that the subsequent document will bear a close resemblance to this one. *Iraq First*, 9–49.

¹⁷ *Iraq First*, 16.

U.S. assessments note that Iraq's security forces depend on coalition support for some operations. Congress has authorized counter-IS train and equip programs for Iraq through 2022, and has appropriated related funds available through September 2023, including aid to KRG forces subject to the Iraqi government's approval. Since 2014, Congress has appropriated more than \$7.4 billion for counter-IS train and equip programs for Iraqis. Iraq also began receiving Department of Defense Global Train and Equip (10 U.S.C. §333) program aid in 2021.¹⁸

The European Union Advisory Mission in Iraq (EUAM Iraq) convened a Strategic Dialogue Workshop in Erbil during 13–18 February 2022 with the National Security Strategy Permanent Standing Committee (NSSPSC), responsible for creating a *National Security Strategy* for Iraq: "The overriding objective of the event was to support the evolution of the new National Security Strategy and use the platform to build on the Mission's engagement in enabling and advancing the development and of a credible, effective, and ultimately sustainable Iraqi-owned and delivered NSS. This Strategy will provide the policy framework for setting Iraq's strategic orientation both in the security context as well as in other policy fields."¹⁹ It would seem reasonable that given this verbiage, and given increasingly severe water stress on Iraq, it would drive the continued identification of upstream riparians as threats to Iraqi national security.

Turkey: Government and Domestic Policy

The Justice and Development Party (AKP, or *Adalet ve Kalkınma Partisi*) achieved a dominant position in Turkish politics in the July 2007 general election when it increased its share of the national vote to 47 percent from 34 percent in the 2002 election. This enabled the AKP, led by Prime Minister Recep Tayyip Erdoğan, to obtain an absolute majority in parliament (340 out of 550 seats). The AKP was further strengthened when Abdullah

¹⁸ Blanchard, *Iraq: Background and U.S. Policy*, 2; and 10 U.S. Code § 333–Foreign Security Forces: Authority to Build Capacity (2016).

¹⁹ "Iraqi National Security Strategy 2022–2027 — Workshop Held in Support of the Process," European Advisory Mission in Iraq, 21 February 2022.

Map 2.2. Relief map of Turkey



Source: Central Intelligence Agency map, adapted by MCUP.

Gül, the former foreign minister, was elected to the presidency in August 2007. The AKP has its roots in the now -banned Islamist Welfare Party, but it continues to enjoy broad support from a wide spectrum of Turkish constituencies, including Islamic religious orders and conservatives, as well as the impoverished classes of Turkish society and ultranationalists. The AKP's victories were, in many ways, a reaction on the poor performance and corrupt practices of the previous administration than a reflection of an emerging Islamist movement in Turkey.

Prime Minister Erdoğan formerly presented himself as a moderate determined to maintain the secular Atatürkism of the modern Turkish state. However, his assurances that he would defend the secular principles of the Turkish constitution are clouded by his successful efforts to rewrite the 1982 constitution and move Turkey toward a centralized American-style presidential system with a powerful executive branch. Moreover, Erdoğan and his wife became ardent and public crusaders for lifting the ban on

women wearing headscarves in public spaces.²⁰ Most visibly, Erdoğan's AKP government has packed many government agencies (notably the judiciary and the security apparatus) with AKP loyalists, who advocate a return to traditional Turkish ways of life. There is deep-rooted suspicion on the part of the hardline secularist elite toward Erdoğan that is the source of much tension in both the Turkish government and Turkish society today.²¹ The AKP narrowly avoided being banned by the constitutional court in 2008 (over its supposed deviation from the secular tenants of the republic), which served as a sort of wake-up call, causing Erdoğan to pull back from some of his proposed reforms. However, his constitutional reform package, designed to increase civilian oversight over the military and the judiciary, passed overwhelmingly in a national referendum on 12 September 2010.

Erdoğan and the AKP enjoyed the support of the Islamic religious leader Fethullah Gülen and his Gülenist movement. However, this relationship began to sour when Gülenists were implicated in orchestrating the Balyoz and Ergenekon show trials, in which a number of senior military and naval flag officers were falsely accused and sent to prison.²² Although the trials weakened the hold that the Turkish military had exercised over the government since Atatürk's time, they also showcased the risks that the Gülenists were willing to take. During this time Erdoğan also began to clamp down on freedom of expression by imposing censorship on the press and the media. The Gezi Park protests of May 2013 led to nationwide protests involving millions of Turks. The government brutally suppressed the protestors (22 were killed and thousands injured) and many were put on trial and imprisoned. Erdoğan used the protests to further restrict freedom of expression.²³ About the same time, he began negotiations with the banned insurgent Kurdistan Worker's Party (PKK, or *Partiya Karkeren Kurdistan*) and lifted many of the restrictions imposed on Turkey's minority Kurdish populations, including the right to teach and speak the

²⁰ Humeyra Pamuk, "Turkey Lifts Generations-old Ban on Islamic Head Scarf," Reuters, 8 October 2013.

²¹ James Zanotti and Clayton Thomas, *Turkey: Background and U.S. Relations* (Washington, DC: Congressional Research Service, 2022), 1, 4–5.

²² "Turkish Court Acquits 235 Suspects in Notorious Ergenekon Trial," *Daily Sabah*, 1 July 2019.

²³ Zanotti and Thomas, *Turkey: Background and U.S. Relations*, 3–4.

previously banned Kurdish language.²⁴ Thus, Erdoğan maintained some semblance of advocating liberal reforms. After 11 years as prime minister, Erdoğan decided to run for president, winning the office and becoming Turkey's first popularly elected president on 28 August 2014. This set the stage for Erdoğan to begin the process of concentrating political power in the executive branch and upending Turkish politics.²⁵ Erdoğan did not appear threatening to Turkish democracy at this point, but as his heavy-handed negotiations with the PKK collapsed and the peace process totally broke down in August 2015, when the PKK resumed terrorist attacks in Turkey. Alerted to the growing influence of the Gülenists, Erdoğan became concerned with the movement's increasing power and he began to cut his ties with the movement by forcing some of its members out of the government. The loss of influence and prestige of the Gülenists led to the most important event in Turkish history in the twenty-first century.

On 15 July 2016, a Gülenist faction within the Turkish military attempted a violent coup d'état by simultaneously attacking government institutions; key infrastructure in Ankara, Istanbul; and key military bases. General Dynamics F-16 Fighting Falcons bombed the parliament in Ankara and coup-led army units seized a Bosphorus bridge. There is no question that the conspirators planned to kill Erdoğan and install a new government. However, the coup was poorly planned and incompletely launched, leading directly to its rapid failure. The anticoup reaction of the Turkish public played a large role in its collapse. Erdoğan blamed Fethullah Gülen, who was living in exile in the United States, and his organization as the principal force behind the coup. More than 300 Turks lost their lives and more than 2,100 were injured. The immediate effect of the failed coup enabled Erdoğan to declare a state of emergency and impose martial law. Erdoğan's security services began an immediate purge of individuals in the government and society, who were Gülenists or associated with the movement in any fashion. The sackings took place en masse through 2018 and continue individually today: "Some 292,000

²⁴ Zanotti and Thomas, *Turkey: Background and U.S. Relations*, 13; and Ragan Updegraff, "Turkey Under the AKP: The Kurdish Question," *Journal of Democracy* 23, no. 1 (January 2012): 119–28.

²⁵ Zanotti and Thomas, *Turkey: Background and U.S. Relations*, 3–4.

people have been detained over alleged links to Gulen, nearly 100,000 of them jailed pending trial. Some 150,000 civil servants were sacked or suspended after the coup, with some 20,000 expelled from the military. Courts have handed down more than 2,500 life sentences.”²⁶ In effect, the failed coup became political gold and an unexpected opportunity for Erdoğan to removed opponents, critics, and secularists from every position of authority and influence in Turkey, including members of the armed forces and judiciary, civil servants, academics, teachers, provincial officials, business leaders, and members of opposition parties. It was a massively successively internal purge that solidified Erdoğan’s grip on the government and the nation, though many of the purged were not involved in the coup or Gülenists but were simply opponents of Erdoğan and the AKP.

In the years that followed, the lack of opposition created by the purge enabled Erdoğan to further cement his personal power in government. The security services accused the moderate pro-Kurdish Peoples’ Democratic Party (Turkish: *Halkların Demokratik Partisi* or HDP) of links with the outlawed PKK terrorist organization, enabling Erdoğan to arrest its leaders and marginalize it as a political entity.²⁷ Moreover, the two major opposition parties—Republican People’s Party (Turkish: *Cumhuriyet Halk Partisi* or CHP) and the Nationalist Action party (Turkish: *Milliyetçi Hareket Partisi* or MHP)—remain divided and poll 30 percent and 7 percent, respectively. In April 2017, Erdoğan successfully pushed through a public referendum of amendments the Turkish Constitution, changing the governmental system from a parliamentary system to an American-style presidential system. This abolished the prime minister’s position and enabled President Erdoğan to assume larger and more far-reaching authorities as the executive leader of the government.²⁸ Erdoğan cracked down harder on dissent and enacted new censorship laws. He took over the direction of the Turkish government’s fiscal and economic policies and put family members and cronies in the ministries concerned with the economy. To placate growing public criticism and unease with his draco-

²⁶ “Turkey Jails Hundreds for Life Over 2016 Failed Coup Attempt,” *Al Jazeera*, 26 November 2020.

²⁷ Zanotti and Thomas, *Turkey: Background and U.S. Relations*, 13–17.

²⁸ Zanotti and Thomas, *Turkey: Background and U.S. Relations*, 3–4.

nian approach to government, Erdoğan launched massive public works projects, including such construction projects as a tunnel under the Bosphorus, a presidential palace, new Bosphorus bridges, a bridge over the Dardanelles and, most visibly, hundreds of mosques nationwide. Erdoğan's populist approach did not satisfy thousands of secular, educated, and Western-minded Turks, and the AKP lost political control of a number of large cities in 2019, including Istanbul, Izmir, and Ankara. Erdoğan has continued to crack down on dissent and criticism. New censorship laws now restrict access to the internet and many Western websites are banned in Turkey. It was recently reported that the Turkish government collects the internet and website information for every internet user, more than 80 million, in Turkey.²⁹

Turkish Economy and Agriculture

The Turkish economy is a robust, world-class economy, especially in comparison to its Caucasian, Iranian, and Arab neighbors. A 2022 report showed that "Turkey is an emerging, largely free-market economy and a leading producer of agricultural goods, textiles, vehicles and construction materials."³⁰ With 85 million people and a young and well-educated workforce, Turkey has the world's 17th largest economy. The economy is well balanced between agricultural commodities and industrial production, recently becoming a major producer of armed drones and military equipment. The Turkish government's economic policies aspire to maintain macroeconomic stability, enhance competitiveness, and further attract direct foreign investment. Since 2019, Turkish GDP growth generally outperformed all other G20 economies and remained strong during the coup and the COVID-19 pandemic.³¹ Remarkably, Turkish GDP growth in 2021 was 11 percent.³² Turkish fiscal and monetary policies are directly controlled by President Erdoğan and are focused on maintaining the Turkish lira as a viable world currency. Unfortunately, Erdoğan's insistence on keeping interest rates at an absurdly low level have led to the col-

²⁹ Zanotti and Thomas, *Turkey: Background and U.S. Relations*, 6–8.

³⁰ Economist Intelligence Unit, *One-Click Report: Turkey*, 22 July 2022, 19.

³¹ Economist Intelligence Unit, *One-Click Report: Turkey*, 19.

³² Economist Intelligence Unit, *One-Click Report: Turkey*.

lapse of the Turkish lira and rampant inflation.³³ As a matter of policy, the AKP government remains committed to European Union (EU) accession and to maintaining a healthy economy marked by controllable inflation and lower levels of unemployment to please its domestic constituencies. However, these aspirations have all come to naught as currency collapse and inflation have destroyed both foreign currency reserves and personal savings.

Of importance to this study is a review of the Turkish agricultural industry, which accounts for 25 percent of its economy, or 10.2 percent of all exports and 7.5 percent of all imports (according to 2009 data).³⁴ Turkey is a net exporter of food and aims to increase this in the future. In 2009, 62 percent of Turkey's total irrigable land was under cultivation, and completion of the Southeastern Anatolia Project (Turkish: *Güneydoğu Anadolu Projesi* or GAP) will raise that figure to an astonishing 91 percent. Commodities data from 2022 show that many of Turkey's products — cow's milk, wheat, tomatoes, watermelons, and potatoes, for example — require water-intensive agricultural methods.³⁵ In addition to raising production, current Turkish agricultural policy is intended to bring Turkey in line with the EU. General government support to the agricultural sector steadily dropped from 15.4 percent in 2000–2 to 2.3 percent in 2019–21.³⁶ The importance of agriculture to the Turkish economy cannot be understated. When agriculture is considered in relation to energy policy, a geopolitical dynamic emerges. Turkey is a net importer of energy, particularly oil and natural gas. Moreover, electricity consumption has surged in the past decade: "Renewables, including hydro and non-hydro sources, will reach 60% of Turkey's electricity capacity by 2031, from a combined 52% in 2021."³⁷ It becomes obvious that reliable and large quantities of water for agriculture and water for hydropower will continue to play a significant role in Turkish politics as well as in Turkey's domestic and foreign policies.

³³ Zanotti and Thomas, *Turkey: Background and U.S. Relations*, 8–10.

³⁴ "The World Factbook—Turkey," CIA, accessed 9 August 2022.

³⁵ "The World Factbook—Turkey."

³⁶ "Support to Agriculture," in *Agricultural Policy Monitoring and Evaluation 2022: Reforming Agricultural Policies for Climate Change Mitigation* (Paris: OECD Publishing, 2022), <https://doi.org/10.1787/7f4542bf-en>.

³⁷ Economist Intelligence Unit, *One-Click Report: Turkey*, 41.

Turkey: Foreign Policy

The Republic of Turkey is a modern secular democracy that is fully integrated into international, European, and regional security and cooperation institutions. It is a member of the United Nations (UN), the Council of Europe, the North Atlantic Treaty Organization (NATO), the Organization for Security and Co-operation in Europe (OSCE), the Organisation for Economic Co-operation and Development (OECD), the World Trade Organization (WTO), the Organisation of Islamic Cooperation (OIC, formerly Organization of the Islamic Conference), the Black Sea Economic Cooperation (BSEC), the Economic Cooperation Organization (ECO), the Group of Twenty (G20), and the Conference on Interaction and Confidence Building Measures in Asia. Turkey was offered a path to accession in the EU in 2005 but this has not been achieved.³⁸ Perhaps signaling an informal abandonment of its EU aspirations, Turkey joined the Belt and Road Initiative in 2015, giving it access to non-Western financing for infrastructure projects, including nuclear-powered energy plants.³⁹

Turkish foreign policy is a pragmatic approach to the problems of living in a region saddled with instability and conflict. A resurgent Russia lies across the Black Sea; to the northeast, the Caucasus region presents ethnic tensions and civil wars; to the east lies a rapidly nuclearizing Iran; in the south, Iraq struggles with the establishment of government and the rule of law while Syria struggles to end its civil war; and in the west, Greece and Cyprus also pose significant challenges. Turkey lies both at a crossroads of cultures and also at the epicenter of a ring of violence and strife. As a consequence of their geography and history, the Turks view themselves as honest brokers and their country as a multidimensional bridge for interaction and dialogue between East and West, Christianity and Islam, modernity and tradition, and democracy and totalitarianism. The huge scale of Turkey's involvement in international and regional structures showcases this view.

³⁸ Ioannis N. Grigoriadis, "Turkey's Accession to the European Union: Debating the Most Difficult Enlargement Ever," *SAIS Review of International Affairs* 26, no. 1 (2006): 147–60.

³⁹ Burak Gürel and Mina Kozluca, "Chinese Investment in Turkey: The Belt and Road Initiative, Rising Expectations and Ground Realities," *European Review* 30, no. 6 (2022): 806–34, <https://doi.org/10.1017/S1062798721000296>.

In 2013, there were two major foreign policy objectives that defined the Turkish vision for the future. Both sprang from the ruling AKP and presented Turkey as a much more assertive actor in regional affairs. The first objective was to achieve accession and become an integral part of the EU. Accession negotiations began on 3 October 2005 and hinged on the successful completion of the Copenhagen criteria (the rules that determine a country's eligibility to join the EU).⁴⁰ Some felt that this goal meant stumbling in the face of Islamophobic European opposition; yet, the Turkish government remained publicly committed to its success as a matter of policy. The second objective was to help create an environment of security, stability, prosperity, friendship, and cooperation "at the natural convergence point of Europe, the Balkans, the Caucasus, the Black Sea, the Middle East, the Mediterranean and Central Asia."⁴¹ The key to success in the first case, however, revolved mostly around changes to such domestic issues as civilian control of the military, minority rights, and freedom of expression (i.e., wearing headscarves in government buildings). The second case was much more newsworthy in the West and has brought Turkey to the center of the world stage. This was the work of the AKP's charismatic, inventive, and aggressive foreign minister, Ahmet Davutoğlu, whose stance termed "zero problems with neighbors" came to personify Turkish foreign policy.⁴²

Under Prime Minister Erdoğan, Turkey became a very active player in regional affairs. Of note were the efforts to help broker an Israeli-Palestinian settlement; resolve the Cyprus and Armenian normalization issues; and, along with the Brazilians, negotiate a solution to Iran's enrichment of nuclear materials.⁴³ Unfortunately, none of these initiatives was successful. Moreover, the zero-problems foreign policy soon broke down

⁴⁰ The Treaty on European Union sets out the conditions (Article 49) and principles (Article 6[1]) for countries wishing to become a member of the EU. These accession criteria (a.k.a. Copenhagen criteria) were established by the Copenhagen European Council in 1993 and strengthened by the Madrid European Council in 1995.

⁴¹ *Foreign Policy—Synopsis* (Washington, DC: Turkish Embassy, 2011), 2.

⁴² "The Davutoglu Effect," in *Anchors Aweigh: A Special Report on Turkey* (London: Economist, 2010), 6–8.

⁴³ Adam Philipp, "Turkey: A Viable Peace Broker in the Israeli-Palestinian Conflict?," *Willamette Journal of International Law and Dispute Resolution* 23, no. 1 (2015): 115–40; Sergey Minasyan, "Prospects for Normalization between Armenia and Turkey: A View from Yerevan," *Insight Turkey* 12, no. 2 (2010): 21–30; and Gönül Tol, "The Turkey-Brazil-Iran Nuclear Deal: Another Missed Opportunity?," Middle East Institute, 24 May 2010.

under the stress of international events as well as from political pressure, primarily from the United States and its powerful Israeli/Jewish, Armenian, and Greek political lobbies. Some observers saw a resurrected neo-Ottomanism in contemporary Turkish foreign policy — an idea based on the concept that the areas of concern to Turkey today geographically seem to overlap the former Ottoman Empire’s farthest boundaries.⁴⁴ This is a seductive idea, but it disguises the fact that Turkey is simply dealing with neighboring states and ignores the fact that Ottoman foreign policy was basically reactive and defensive for the last 300 years of its history. Although the Turks regarded their current foreign policy as coherent and complementary to a strategic partnership with the United States, it is becoming increasingly clear that there were cracks in the relationship because the zero-problems policy seemingly offered blind support for its Islamic neighbors. In turn, it drove a wedge between Turkey and its formerly close partners — the United States and Israel.

Turkey: Current Challenges

Turkey’s zero-problems policy collapsed entirely in 2015 because of the Syrian Civil War. The civil war in Syria pushed thousands of refugees into southern Turkey and caused resulting international pressure on Turkey to somehow intervene in Syria. This period also saw a resurgence of terrorism and insurgency from the Kurdistan Workers Party (Kurdish: *Partiya Karkeren Kurdistan* or PKK) in the southeast and the continuing cross-border Turkish bombing of northern Iraq.⁴⁵ Territorial and continental shelf issues regarding seabed minerals, including important natural gas deposits, off the coast of divided Cyprus continued to impede the dialogue over that island.⁴⁶ These were not simple problems that can be wished away with diplomatic rhetoric and catchy phrases.

However, what is called the “Arab Spring” can be seen as the proximate cause of an emergent and aggressive foreign policy that effectively

⁴⁴ See, for example, George Friedman, “Geopolitical Journey, Part 5: Turkey,” *Stratfor*, 23 November 2010; and James Traub, “Turkey’s Rules,” *New York Times Magazine*, 23 January 2011, 35–36.

⁴⁵ Jim Zanotti and Clayton Thomas, *Turkey-U.S. Relations: Timeline and Brief Historical Context* (Washington, DC: Congressional Research Service, 2021), 2.

⁴⁶ See “Summary,” in Zanotti and Thomas, *Turkey: Background and U.S. Relations*.

isolated Turkey from its neighbors. The post-Muammar al-Qaddafi civil war in Libya further isolated Turkey when Erdoğan supported the legitimate government in Tripoli against the rebel government in Benghazi, which was supported by most of the neighboring Arab countries. Relations with Saudi Arabia reached a low point after Saudi agents assassinated journalist Jamal Khashoggi in Istanbul in 2018, and Ankara deepened trade and energy ties with Iran, Saudi Arabia's bitter rival.⁴⁷ At the same time, Turkish relations with the United States deteriorated badly as a result of American support for anti-Bashar al-Assad rebel groups in Syria, which were mainly composed of Syrian Kurds (this subject will be comprehensively cover in chapters 3 and 4).⁴⁸ American military intervention in Syria continues in 2022 and further impedes American-Turkish relations. The heavily politicized issue of the alleged 1915 Armenian genocide also interfered with Turkey's relations with the West as an increasing number of governments have officially acknowledged these events as a state-sponsored genocide (France in 2015 and the United States in 2021 being the most notable). Ongoing Turkish support for Azerbaijan, which successfully conquered Nagorno-Karabakh in the fall of 2020, has further inflamed the West in support of the country of Armenia.

Taken together, President Erdoğan's foreign policies increasingly isolated Turkey. However, recent changes in regional geopolitics appear to be alleviating Turkey's isolation.⁴⁹ Qatar reached an agreement with its adversary Arab neighbors, ending the economic blockade of that country, enabling Turkey to reengage Egypt. Combined with decreasing international interest in the Khashoggi case, Turkey also appears ready to repair its relationship with Saudi Arabia. President Donald J. Trump's Abraham Accords in 2020 opened a new door for Israel and four Arab states to establish diplomatic and economic relations, and it appears that the Turks might begin to reestablish their relationship with Israel.⁵⁰ In 2022, the Turkish Ministry of Foreign Affairs characterized its current foreign policy

⁴⁷ Kali Robinson, "Backgrounder: Turkey's Growing Foreign Policy Ambitions," Council on Foreign Relations, 24 August 2022.

⁴⁸ Zanotti and Thomas, *Turkey-U.S. Relations*, 2.

⁴⁹ Rich Outzen, *Deals, Drones, and National Will, The New Era in Turkish Power Projection* (Washington, DC: Washington Institute for Near East Policy, Policy, 2021), 1–25.

⁵⁰ Rich Outzen and Soner Cagaptay, "The Third Age of Erdogan's Foreign Policy," *Observatoire de la Turquie Contemporaine*, 10 February 2022.

by the Turks as an “Enterprising and Humanitarian” policy that “aims to protect Türkiye’s interests in a volatile regional and global environment, while also shaping conditions for sustainable peace and development in our neighborhood and beyond. In the pursuit of this primary goal, Türkiye contributes to peace, prosperity, and stability around the world.”⁵¹ This goal originated in the early republican era and is somewhat of a legacy of Kemal Atatürk’s famous dictum, “Peace at home, peace abroad.”⁵² This position should not be seen as conflicting with Turkey’s policies regarding neighboring Iraq and Syria, which today contain quasi-independent Kurdish polities (the KRG and Rojava). All legal Turkish political parties stand behind Erdoğan’s position that protecting the Turkish homeland against the PKK and YPG does not end at the Turkish border and that cross-border military intervention is necessary to prevent Kurdish terrorism.⁵³ Whether the current foreign policy reflects geopolitics, what might be termed *econopolitics*, or simply the desires of President Erdoğan remain to be seen.

It must be noted that the Turks have a tradition of being very tough negotiators who do not give up anything without concessions in return. Historically, Turkey has a record of refusing to negotiate in any way regarding issues of national sovereignty. Examples of this are numerous and include both bilateral partners as well as international partners. The Cyprus intervention in 1974 and Turkey’s refusal to withdraw from the island resulted in a three-year U.S. arms embargo. Likewise, Turkey refuses to come to any agreement with Greece over long-standing issues regarding the status of the island of Lemnos, Aegean air traffic control, territorial waters, and the ownership of Aegean islets. Since the mid-1990s, there have been serious disagreements between Turkey and neighboring Armenia about the status of Azerbaijan, which resulted in Turkey’s re-

⁵¹ According to the United Nations, the Republic of Türkiye changed its official name from the Republic of Turkey on 26 May 2022 in a request submitted to the secretary general by the country’s minister of foreign affairs. “Türkiye’s Enterprising and Humanitarian Foreign Policy,” Turkish Ministry of Foreign Affairs, accessed 20 August 2022.

⁵² In Turkish, the slogan “*Yurtta sulh, cihanda sulh*” or “Peace at home, peace in the world” was first pronounced by Mustafa Kemal Atatürk on 20 April 1931 to the public during his tours of Anatolia.

⁵³ Alper Coşkun and Sinan Ülgen, *Political Change and Turkey’s Foreign Policy* (Washington, DC: Carnegie Endowment for International Peace, 2022), 20–25.

fusal to establish a normal diplomatic and economic relationship with Armenia. In 1991 and 2003, Turkey refused to intervene with UN- and American-sponsored coalitions in Iraq. In 2022, Turkey blocked Swedish and Finnish requests to join NATO due to their alleged noninterference of PKK members residing in those nations. In the Ukrainian-Russian war of 2022, Turkey provided a neutral location for diplomacy between the warring parties. While Turkey refused to sanction Russian businesses and individual citizens, it was instrumental in brokering an agreement to ship grain from blockaded Ukrainian ports. There is nothing to suggest that this pattern of extremely tough and nonnegotiable positions regarding issues of Turkish national sovereignty will not continue in the future.

Turkey: National Security Strategy

As the end of the Cold War decisively altered both NATO and American security policies, so too did the collapse of the USSR alter Turkish national security policy. Until the mid-1990s, Turkish national security policy focused on the land defense of the Turkish straits and Caucasia. This was partly a function of NATO's intent to deny the Soviets the use of the Bosphorus and Dardanelles and partly a function of the state of the Turkish Army, which was armed with older, second-rate American weapons. In the late 1990s, a growing Turkish economy and a revised vision of the security challenges facing the country enabled the Turkish general staff to undertake a massive recasting of Turkey's national security policy.⁵⁴

In 1998, the Turks released their *White Paper—Defence 1998*, which represented a major shift in how the Turks thought about their military role in a dangerous region as the world moved into the twenty-first century. The new policy was, in many ways, an extension of the changing NATO strategy and new vocabulary and articulated a policy of “forward engagement” and “crisis management.”⁵⁵ These policies moved Turkey away from defensively oriented postures toward the idea of power projec-

⁵⁴ For a summary of evolving Turkish defense policies, see Edward J. Erickson, “Turkey as Regional Hegemon—2014: Strategic Implications for the United States,” *Turkish Studies* 5, no. 3 (Autumn 2004): 25–45, <https://doi.org/10.1080/1468384042000270317>.

⁵⁵ *White Paper—Defence 1998* (Ankara: Ministry of National Defence, Republic of Turkey, 1998); and *Turkey's National Defense Policy*, pt. 4, white paper (Ankara: Ministry of National Defence, Republic of Turkey 1998).

tion and cross-border operations. The paper also outlined the hardware acquisition packages that Turkey would need to execute such a strategy. Two years later, the Turks published a second white paper on defense that added definition to the previous work and outlined Turkey's national security goals as deterrence, military contributions to crisis management and intervention, forward defense, and collective security. This paper went on to outline how Turkey would restructure its military and acquisition programs in order to develop deterrent military forces; to enhance command and control systems; to advance technology weapons and systems; to create superior operational capability; to improve antimissile and nuclear, chemical, and biological defense capabilities against weapons of mass destruction; to enhance the capability to mobilize rapidly to conduct operations other than war; and to improve the capability to conduct joint and combined warfare. Importantly, the land forces were tasked with the mission to "transfer operations across borders when necessary."⁵⁶ This white paper set the course for the execution of Turkish national security policy for the next two decades.

The Turks have not published subsequent defense white papers, and in general terms, the 1998 paper still serves as the way ahead. Operationally, Turkish interventions against the PKK in northern Iraq continued episodically after 2003. The most recent articulations of Turkey's policy of cross-border interventions result from the Syrian Civil War, which gave rise to a new Kurdish threat to its southern border. Turkey conducted new cross-border operations against the YPG/PYD in northern Syria: Operation Euphrates Shield in 2016–17, Operation Olive Branch in 2018, Operation Peace Spring in 2019, and Operation Spring Shield in 2020.⁵⁷ Continuing operations in northern Syria appear likely. Moreover, the Turks renewed complementary anti-PKK Operations Claw and Eagle Claw in northern Iraq in 2021 and 2022, respectively.

According to retired U.S. Army colonel Richard Outzen, the operative term for understanding Turkish military policy is *power projection*.⁵⁸

⁵⁶ *Turkey's National Defense Policy*, pt. 4, sect. 1, white paper (Ankara: Ministry of National Defence, Republic of Turkey, 2000).

⁵⁷ "Türkiye to Establish a Security Belt in N Syria: Erdoğan," *Hurriyet Daily News*, 23 November 2022.

⁵⁸ Outzen, *Deals, Drones, and National Will*, 1.

Under the AKP, the Turkish defense industry made remarkable progress in the production of state-of-the-art military equipment and related technologies, especially in unmanned aerial vehicles (UAVs or drones). While Turkish Bayraktar TB2 medium-altitude long-endurance unmanned combat aerial vehicles are heavily covered by the media and, according to Outzen,

Yet the Turkish drone program is just part of a revamped national approach to power projection in neighboring regions—an approach with economic, diplomatic, strategic, and reputational effects, as well as implications on the battlefield. An expanded network of Turkish military agreements and overseas basing, the maturation of partner and proxy relationships, the expansion of the defense industry beyond UAVs, military doctrine to integrate new sensors and weapons, and—perhaps most critically—the development of risk-tolerant political will in foreign affairs have enabled Turkey to become a formidable hard-power player in the Middle East, North Africa, the Caucasus, and the Black and Mediterranean Seas.⁵⁹

Syria: Government and Domestic Policy

Backed by a brutally effective system of security services and the ruling Ba'ath Party, President Bashar al-Assad continues to maintain an unbreakable grip on Syria. Al-Assad is a member of the minority 'Alawī Shī'ite sect as are a number of his core elite, many of whom he has appointed to key posts. This has given him increased control over state institutions but has narrowed his power base. He has proven to be repressive and slow to take steps that would diminish the power of his party. The Economist Intelligence Unit assesses that al-Assad will remain in power through 2026 and possibly much longer.⁶⁰

Syria remains a country that represses dissent and discourages efforts aimed at furthering democratization. Activists such as those associated with the Damascus Declaration—a secular coalition that offered a proclamation advocating democratic reform—have been rapidly rounded up

⁵⁹ Outzen, *Deals, Drones, and National Will*.

⁶⁰ Economist Intelligence Unit, *One-Click Report: Syria*, 22 July 2022, 4.

Map 2.3. Relief map of Syria



Source: Central Intelligence Agency map, adapted by MCUP.

and arrested.⁶¹ Likewise, demonstrations in the spring of 2011 were suppressed. Al-Assad's intelligence services and security forces are highly effective and deeply embedded in every sphere of Syrian society. Consequently, opposition to the regime in all forms remains dangerous and problematic. In April 2011, the regime was facing its greatest challenges in 30 years in the form of street demonstrations and local riots. By the spring of 2012, these demonstrations had turned into a full-blown civil war in which thousands of Syrians have been killed and thousands of refugees

⁶¹ Malcom H. Kerr, "The Damascus Declaration," Carnegie Middle East Center, 2012.

have fled into neighboring Turkey. This internal struggle led directly to the most destabilizing event in the Middle East since the American invasion of Iraq in 2003 — the rise of the Islamic State of Iraq and Syria (ISIS).⁶² ISIS is a transnational Sunni Islamist insurgent and terrorist group.⁶³

ISIS seemed to come out of nowhere, but it grew out of al-Qaeda in Iraq (AQI). The Congressional Research Service reported that “in 2011, some ISI members traveled to Syria to establish a new Al Qaeda affiliate there, known as the Nusra Front. In 2013, then-ISI leader Abu Bakr al Baghdadi announced that ISI and the Nusra Front had merged into the Islamic State of Iraq and Al Sham (ISIS/ISIL). Al Qaeda rejected Baghdadi’s move to subsume the Nusra Front under his leadership, and severed ties with the group in 2014.”⁶⁴ It is critical to understand that, in the absence of the centralized authority of al-Assad’s government, a window of opportunity opened for insurgent groups to take physical control of land and hold it. Unlike al-Qaeda, ISIS surged in 2013 to take over and hold large portions of land in northern and eastern Iraq. Encouraged by its success, al-Baghdadi declared the establishment of a “caliphate” and renamed the group as the Islamic State. ISIS began to operate as a quasigovernment by providing services to the residents of its occupied territories. Formerly an insurgent group, ISIS’s military wing formed conventional units that successfully contested territory from al-Assad’s seriously weakened Syrian Army. In June 2014, ISIS invaded northern Iraq, seizing Mosul on 10 June and Tikrit the following day. The American trained and equipped Iraqi Army collapsed and, for a time, it appeared that ISIS would take Baghdad.⁶⁵

Like a train of falling dominos, the rise of ISIS led to several significant events that changed the geopolitical landscape of the Euphrates-Tigris basin. Now facing not only insurgents in a civil war but the conventional forces of ISIS and desperate for succor, President al-Assad asked Russian

⁶² There are several terms in use to describe this organization, including ISIS, ISIL (Islamic State of the Levant and Syria), and *Daesh* (the Islamic State of Iraq and the Levant). Because many Americans are more familiar with ISIS, the editors have standardized usage throughout to ISIS for simplicity.

⁶³ Carla E. Humud, *The Islamic State* (Washington, DC: Congressional Research Service, 2022), 1.

⁶⁴ Humud, *The Islamic State*.

⁶⁵ Humud, *The Islamic State*, 2.

president Vladimir Putin for direct military assistance. Russia (and before it the Soviet Union) was a strategic partner and longtime provider of arms and equipment to the Syrians. In September 2015, Putin deployed an air-ground expeditionary force to Syria. According to a recent Rand study, Putin not only wanted to save his proxy, Syria's al-Assad regime, but Putin recognized the immense danger to regional stability that the establishment of an Islamic State represented in the Middle East. Russian intervention, particularly air support and the mercenaries of the Russian Wagner Group, enabled the Syrian Army to retake Aleppo and halt the westward expansion of ISIS. In 2022, strong Russian air forces and a Russian advisory group remain in Syria.⁶⁶

An associated change in the geopolitical landscape occurred when Syrian Kurds, living mostly in three noncontiguous areas of Afrin, Kobane, and Jazirah, along the Turkish border, rebelled and declared the independent state of what is now called the Autonomous Administration of North and East Syria (AANES) or Rojava. Rojava is dominated politically by the Democratic Union Party (Kurdish: *Partiya Yekîti ya Dêmkokrat* or PYD). The military arm of the PYD is the People's Protection Units (Kurdish: *Yekîneyên Parastina Gel* or YPG) militia, which is also the most well-known of the coalition of militias known as the Syrian Democratic Forces (SDF) that have partnered with the American-led Coalition against the Islamic State.⁶⁷ As a corollary to defeating ISIS in Iraq, the United States intervened directly in Syria in 2015 in support of the SDF and the PYD by sending American military forces into northern and eastern Syria.⁶⁸ With the support of American and NATO special forces advisors, the American trained and equipped YPD fought a bitter campaign against ISIS and eventually defeated it. The PYD absorbed the territory taken from ISIS, and American advisors remain in eastern Syria today.

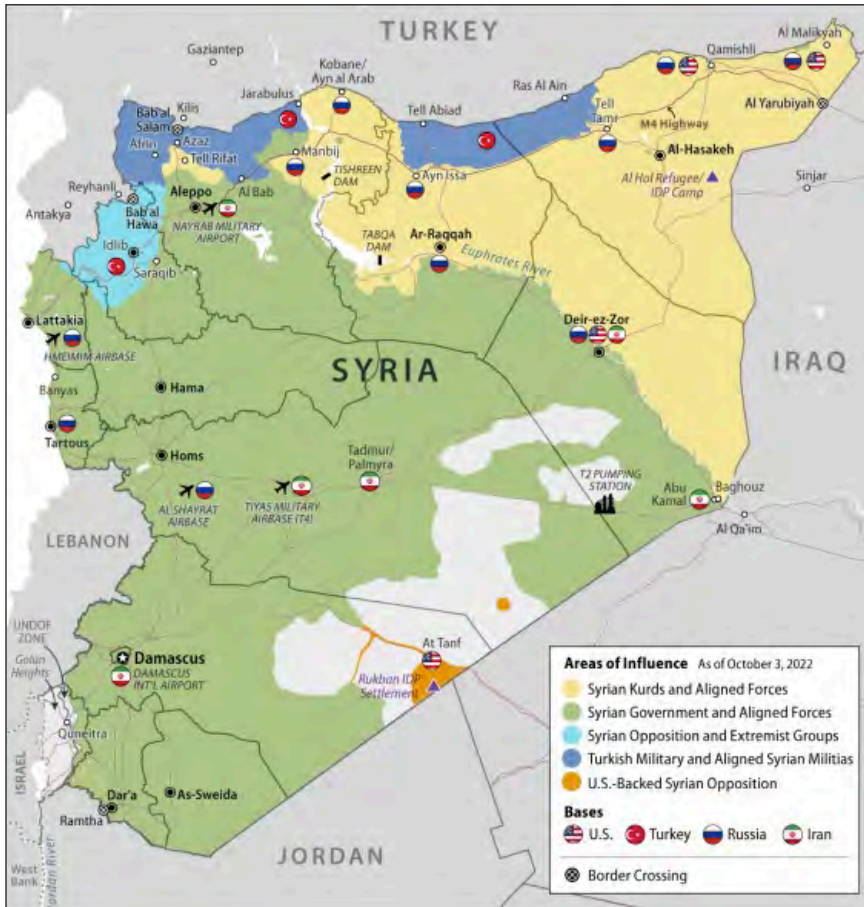
The Syrian civil war and the rise of ISIS also led to the establishment of Turkish-aligned militias composed mostly of Turkmen Syrians in en-

⁶⁶ Samuel Charap, Elina Treyger, and Edward Geist, *Understanding Russia's Intervention in Syria* (Santa Monica, CA: Rand, 2019), 3, <https://doi.org/10.7249/RR3180>.

⁶⁷ James Zanotti and Clayton Thomas, *The Kurds in Iraq, Turkey, Syria, and Iran* (Washington, DC: Congressional Research Service, 2019), 1.

⁶⁸ Carla E. Humud, *Syria and U.S. Policy* (Washington, DC: Congressional Research Service, 2022), 1.

Map 2.4. Syrian areas of influence



Source: Janes Conflict Monitor, adapted by MCUP.

claves along the Turkish border, which are supported by the Turkish government.⁶⁹ Terrorism continues to be a dormant threat in Syria today.⁷⁰

The population of Syria is difficult to quantify because of the massive displacements caused by the civil war. The Central Intelligence Agency (CIA) estimates that around 21.6 million people live in Syria.⁷¹ However,

⁶⁹ Humud, *Syria and U.S. Policy*.

⁷⁰ Carla E. Humud, *Syria Conflict Overview: 2011–2021* (Washington, DC: Congressional Research Service, 2021), 1–2.

⁷¹ “Syria—Country Summary,” CIA World Factbook, accessed 19 August 2022.

the actual number of Syrians in the country is largely meaningless because millions of Syrians do not live where they used to live. Many of the cities, for example, like Aleppo and Damascus, have undergone severe population loss on the order of 30–50 percent. According to the United Nations High Commissioner for Refugees (UNHCR), the number of externally displaced refugees in surrounding states numbers more than 5.2 million Syrians, while the number of internally displaced Syrians numbers 6.8 million.⁷²

The Syrian economy is largely based on agriculture today, but it does export oil in small amounts. The past 40 years saw substantial investment in irrigation and agriculture, but the clumsy and inefficient planning produced poor results. Although the Damascus Securities Exchange opened in 2009, Syria has an old-style centrally planned economy, which has been entirely thrown off course by the civil war. The economy is currently characterized by government subsidies, wage and price controls, government purchase of crops, and restrictions on foreign currency transactions. Syria was receiving grants from the Persian Gulf states as a reward for its support of the 2020 Joint Declaration between the Islamic Republic of Afghanistan and the United States of America for Bringing Peace to Afghanistan (a.k.a. Doha Agreement). Fiscal policy was moving toward measures designed to facilitate foreign investments and modernize the banking sector. However, because of the civil war, the economic challenges that Syria faces are considerable and include low growth, rampant inflation, declining oil production, and decreasing agricultural production.

Syria: Foreign Policy

The Syrian Arab Republic is officially a parliamentary republic, but in truth it remains a secular Ba'athist dictatorship ruled by Bashar al-Assad. Al-Assad is the son of Hafez al-Assad and is supported by key elements in the security services and the Ba'ath Party leadership. Although Syria remains isolated, it maintains membership in the UN, International Monetary Fund (IMF), OIC, Arab League, and several Arab economic and de-

⁷² "Syria Refugee Crisis Explained," UNHRC, 8 July 2022.

velopment councils. In the midst of a terrible civil war, which has fractured the country, it is fair to ask: “Does Syria today even have a foreign policy?”

Newly installed Syrian president Bashar al-Assad appeared to lean toward the West in the early years of his regime.⁷³ He withdrew Syrian military forces from Lebanon and demonstrated a willingness to engage in diplomatic discussions aimed at normalizing its relations with Syria’s neighbors, particularly Lebanon and Israel. Syrian foreign policy appeared oriented toward emerging from international isolation caused by its occupation of Lebanon, supporting terrorist organizations aimed at Israel, fostering a friendship with Iran, and developing suspected weapons of mass destruction projects.⁷⁴ However, as the demonstrations of 2011 metastasized into a civil war, President al-Assad’s government became increasingly drawn into the turmoil of domestic problems. Rebel groups seized control of major cities, Aleppo and Palmyra in particular. His regime endangered, al-Assad turned to Russian president Vladimir Putin for help. Facing the loss of its only permanent aero-naval base in the Mediterranean, as well as that of a client state, long-time ally Russia became the only country willing to extend military and financial support to Syria. Al-Assad’s foreign policy came apart and was replaced by a Russia-centric foreign policy aimed at regime survival.⁷⁵

ISIS seized the city of Palmyra and rapidly expanded its control of territory. While the Syrians and Russians seemed able to retain western Syria and Damascus, the regime rapidly lost control of the Euphrates-Tigris valley and the entire eastern part of the country.⁷⁶ By the end of the year, ISIS controlled large areas of Syria and was expanding into northern Iraq, thus changing not only the conduct of the war but regional geopolitics as well. The rise of ISIS as a polity controlling territory in an area of strategic interest to the United States forced President Barack H. Obama to authorize airstrikes in Syria.⁷⁷ This matured into Operation Inherent Resolve in 2014, which included a train-and-equip mission to field proxy

⁷³ Raymond Hinnebusch, “Syrian Foreign Policy under Bashar al-Asad,” *Ortadoğu Etütleri* 1, no. 1 (July 2009): 7–26.

⁷⁴ Hinnebusch, “Syrian Foreign Policy under Bashar al-Asad,” 15–16.

⁷⁵ Charles Lister, “Putin’s War Killed Syria Diplomacy: It’s Time for a New Way Forward,” *Foreign Policy*, 15 March 2022.

⁷⁶ Charap, Treyger, and Geist, *Understanding Russia’s Intervention in Syria*, 4.

⁷⁷ Humud, *Syria Conflict Overview: 2011–2021*, 1–2.

militias called the Syrian Democratic Forces (SDF), which would fight to defeat ISIS (rather than commit U.S. ground forces to a war in Syria). Apart from the YPG, this effort spectacularly failed, and these failures led President Obama to deploy American soldiers and Marines directly into Syria in October 2014. The Department of Defense (DOD) established Combined Joint Task Force-Operation Inherent Resolve (CJTF-OIR) to support the SDF and conduct operations against ISIS in Iraq and Syria. While the world press covered the horrific battle between rebels and Syrian and Russian forces fighting for control of Aleppo, the YPG, now armed with American weapons and well supported by American airpower and artillery, expelled ISIS from the Euphrates-Tigris valley and western Syria. The YPG's success led to the PYD establishing the AANES in 2016. The existence of a heavily armed, independent Kurdish polity on its southern border drove President Erdoğan to launch Operation Euphrates Shield in which Turkey occupied long stretches of Syrian territory along the Turkish-Syrian border. By 2017, Syria had Russians, Americans, Turks, rebel Kurds, and assorted other rebel Kurds occupying more than one-half of the country.⁷⁸ It is fair to say that Syria in 2022 probably has no functional foreign policy other than to cling to regime survival and whatever aid Russia and Iran care to send.

Syria: National Security Policy

During the past 10 years, the Syrian military forces have been unable to conduct offensive operations without the support of Russian airpower, Russian advisors and mercenaries, and Iranian fighters. In December 2016, the Syrians and their allies recovered the city of Aleppo and the U.S. intelligence community assessed that the Syria conflict had “decisively shifted in the Syrian regime’s favor.”⁷⁹ In the spring of 2018, chlorine gas attacks by Syrian military forces in Douma prompted British, French, and U.S. missile strikes on three chemical weapon storage and research sites. By late 2018, the Syrian government had recaptured most areas formerly held by opposition forces. Since 2019, the Syrians and their allies have made little progress in recovering territory lost to rebel groups and the

⁷⁸ Humud, *Syria Conflict Overview: 2011–2021*, 1–2.

⁷⁹ Humud, *Syria Conflict Overview: 2011–2021*, 2.

civil war appears stalemated. Beyond regime survival, Syria today does not appear to have a coherent national security policy.⁸⁰

Iran: Domestic Policies and Agendas

According to the World Bank,

Iran's economy is characterized by its hydrocarbon, agricultural, and service sectors, as well as a noticeable state presence in the manufacturing and financial services. Iran ranks second in the world for natural gas reserves and fourth for proven crude oil reserves. While relatively diversified for an oil exporting country, economic activity and government revenues still rely on oil revenues and have, therefore, been volatile. The Iranian authorities have adopted a comprehensive strategy of market-based reforms for their 20-year economic vision and five-year development plan for 2016/17 to 2021/22. The plan comprises three pillars: the development of a resilient economy, progress in science and technology, and the promotion of cultural excellence. Among its priorities are the reform of state-owned enterprises and the financial and banking sectors, and the allocation and management of oil revenues. The plan envisions annual economic growth of 8%.⁸¹

Further projections are problematic because of global sanctions and the uncertainty of a renewal of the *Joint Comprehensive Plan of Action (JCPOA)*.⁸²

Water management is coordinated primarily through the Ministry of Energy (hydropower and dams) and the Ministry of Agriculture (irrigation, farming, and crops). The Ministry of the Environment is tasked to oversee the environmental impact of policies and projects of the above ministries. The last 80.5 kilometers of the Euphrates-Tigris River is called the Shatt al-Arab river, known as the western boundary rivers by Iran, and governed by a 1975 treaty (a.k.a. the Algiers Agreement) between Iraq

⁸⁰ Humud, *Syria Conflict Overview: 2011–2021*.

⁸¹ "Islamic Republic of Iran," World Bank, 27 April 2022.

⁸² *Joint Comprehensive Plan of Action (JCPOA)* (Washington, DC: State Department, 2015).

and Iran.⁸³ The Shatt al-Arab is a navigable and, consequently, has strategic importance to the import and export economies of both countries.

Iran: Foreign and Military Policies

The foreign and defense policies of the Islamic Republic of Iran are well known to most Americans and the world, and we do not offer a comprehensive treatment of this subject here. Iran's foreign and defense policies are inextricably intertwined with Islamic ideology so we present them together in this section. Iran remains isolated from the global economy because it is a supporter of terrorism in the Middle East and Africa, an active adversary of Israel and the United States, active in promoting regional instability, and interested in developing nuclear weapons capabilities. The Islamic Republic is actively working to increase its influence and presence in Iraq and Syria. Although Iran is the terminal downstream riparian, policies related to upstream riparian nations appear to take a back seat to Iran's regional priorities. According to the Congressional Research Service, "Iran's national security policy is arguably the product of overlapping and sometimes competing priorities such as the ideology of Iran's Islamic revolution, perception of threats to the regime and to the country, and long-standing national interests."⁸⁴ Iran continues to back anti-Western terrorist and revolutionary groups throughout the Middle East.

In terms of water and riparian rights, the Algiers Agreement of 1975 between Iran and Iraq served only to delimit and mark the channel and banks as the border between the two riparians rather than to adjudicate or resolve any water rights.⁸⁵ Neither party was satisfied with the treaty and the border dispute as well as Iran's diversion of the Shatt al-Arab's tributaries upstream contributed to increase tensions became the causes of the Iran-Iraq War of 1980–88. Operation Desert Storm (1991) and the invasion of Iraq in 2003 halted cooperation, but today Iran and Iraq are "jointly working towards the protection of the river."⁸⁶ Iran's Kārūn River

⁸³ *Treaty Concerning the State Frontier and Neighbourly Relations between Iran and Iraq*, no. 14903 (New York: United Nations, 1976), 135–213, hereafter Algiers Agreement.

⁸⁴ Kenneth Katzman, *Iran's Foreign and Defense Policies* (Washington, DC: Congressional Research Service, 2021), 2.

⁸⁵ Algiers Agreement.

⁸⁶ "Iraq-Iran: from Water Dispute to War," *Climate Diplomacy*, accessed 8 September 2022.

is a principal contributor to the Shatt al-Arab, but the existence of seven upstream Iranian dams has created difficulties between the two riparians regarding water quality and quantity.⁸⁷

The Kurds in Syria⁸⁸

When the Syria conflict began in 2011, Syrian Kurds were largely concentrated in three noncontiguous areas (Afrin, Kobane, and Jazirah) along the Turkish border. Having endured repression under the rule of the al-Assad family and Syria's earlier leaders, Kurds gained greater autonomy in 2011–12 as the Syrian government redeployed military forces to other areas of the country. The PYD (see above and chapter 4), which was established in 2003 in affiliation with the PKK, emerged as the dominant Syrian Kurdish group, though a number of smaller political factions still exist. Non-Kurdish groups in PYD-controlled areas include Arabs, Turkmen, Assyrians, and Armenians.

Following a failed effort to administer Syrian Kurdish areas with the Kurdish National Council (KNC), a group aligned with Iraq's KDP, the PYD established a governing confederation for the three Syrian Kurdish areas (now dubbed "cantons") in early 2014 (AANES) or Rojava. The PYD-controlled YPG militia is the leading force in the coalition of militias known as the SDF that have partnered with the U.S.-led coalition against the Islamic State. U.S. officials do not consider the PYD or the YPG to be a terrorist group, but have acknowledged that ties exist between them and the PKK. The PYD claims that the territories it administers, including in predominantly Arab-populated areas, remain subject to Syrian sovereignty but are models for a future decentralized system. Turkey strongly objects to the U.S. approach to the PYD/YPG. YPG territorial gains have contributed to increased Turkey-PKK tensions and direct Turkish military operations in Syria since August 2016. Turkish forces, along with their Syrian rebel allies, occupied Afrin in early 2018 and Turkey has threatened further operations to "cleanse" its border of YPG fighters. The YPG

⁸⁷ See "Chapter 5: Shatt al Arab, Karkheh and Karun Rivers," in *The Inventory of Shared Water Resources in Western Asia* (New York: United Nations Economic and Social Commission for Western Asia and the German Federal Institute for Geosciences and Natural Resources, 2013).

⁸⁸ Zanotti and Thomas, *The Kurds in Iraq, Turkey, Syria, and Iran*, 2. The text of this section is based on this source.

also has clashed at times with Syrian government forces. For the purposes of this study, the geopolitical reality of a Kurdish quasi-state or statelet named Rojava, which sits astride the Euphrates River as it enters Syria and as a left bank riparian for the entire duration of the river's flow to the Iraqi border, demands that it be considered as a fifth riparian state.

Geography, Water, and Policy

Turkey

Turkish domestic, foreign, and national security policies converge on preserving the territorial integrity of Southeast Anatolia and control of the headwaters of the Euphrates and Tigris Rivers as an absolute strategic imperative. The heavy transgenerational and continuing investments made in the Southeastern Anatolia Project (GAP) are designed to create industrial and agricultural growth that is considered vital to Turkey's future. Hydroelectric power and irrigation are integral and essential to this vision. Moreover, the Turkish people are united behind the government in supporting the retention of Southeast Anatolia at any cost. The Turkish president and the AKP have, likewise, staked their political future on sustained economic growth without which the development of the Turkey's southeast is impossible. Therefore, Turkey will do whatever is necessary to guarantee the retention and development of the Euphrates and Tigris headwaters.

The hydroelectric power and irrigation provided by the GAP are a causal factor in Turkish understandings of national security policies necessary to secure country's economic future as well as the ways with which to secure that in a changing world. This will be explored further in chapter 5. What supports this national security imperative? The key to understanding Turkish policy and thinking in this regard, is to understand Turkey's need for a stable and secure border, and its refusal to allow insurgent Kurdish military threats in Iraq and Syria. To accomplish this, Turkey has defined its national security interests as the elimination of the PKK in Iraq and elimination of the PYD/YPG in Syria. Turkish interventions in Iraq and Syria indicate its willingness to conduct cross-border operations on a long-term basis in pursuit of these goals. To achieve this, Turkey needs the permission and cooperation of the KRG to eliminate PKK sanctuaries, capability, and capacity in northern Iraq.

In Syria, Turkey needs the Syrian government to recover and reassert control of northeast Syria to end permanently the PYD/YPG as a perceived military threat to its southern border. To achieve this, Turkey needs a working relationship with the al-Assad regime and its Russian backers that can be managed to restore Syrian sovereignty over its rebel-held territory without the media stigma of being seen as supporting al-Assad. The alternative is to confront the U.S.-backed Syrian Kurds by itself, attacking and occupying northeast Syria until such time as the Syrian government reclaims its territory. In Iraq, Turkey needs stability and the rule of law assured by a functional central government. An Iraqi government in which the northern Kurds partner with the Sunni center to balance the Shia majority in the south is probably the best Turkey can hope for.

The KRG

A long-held question for Middle East analysts is whether the Iraqi Kurds will declare independence or remain as a federate of the Republic of Iraq. The KRG is well positioned to do either, and weighing the benefits of either case represents the hardest choice for Kurdish decision makers. Year by year, the KRG has distanced itself politically, economically, and socially from the Baghdad government (e.g., Arabic is no longer the primary language of two entire generations of Kurds in the KRG). Likewise, year by year, the KRG has exerted absolute control over its natural resources, first oil and gas, and then agricultural products. Water is surely to follow.

Iraq

The turmoil in Iraqi domestic politics does not appear to be ending or become solvable now, and its continuance as a given seems probable. The inability to form functional governments as well as the inability to reduce or control private militias is an intractable problem in governing Iraq. Inevitably, this weakens Iraq as a reliable partner in solving regional challenges. For some years, the Kurds acted as “the kingmakers” in Iraqi politics but this dynamic is decaying by the day. The hard choices for Iraq involve how to overcome this situation without restarting foreign interventions by the United States and Iran in the political and social affairs of the country. The rapidly diminishing water resources of the Euphrates-

Tigris system are a key part of Iraq's agricultural and human resources vision of its future. At the present time, all of Iraq's policies are aspirational, underfunded, and poorly coordinated rather than functional in changing conditions in Iraq. As narrated above, this is a recipe for increased instability.

Syria

President al-Assad's overriding objective is regime survival followed by restoring his authority over the large areas of his country now controlled by Syrians Kurds and rebels. Syrian policy of any sort today is irrelevant simply because its oil, natural gas, and most of its hydroelectric capacity and water for irrigation are not under government control. This forces Syria to partner with the Russians on whose continued military assistance and goodwill it depends. If President al-Assad has any choices, they involve the degree of autonomy that he will concede to Russia. While the 2022 war in Ukraine certainly limits some components of Russian support, which the Syrians remain dependent on.

Other Riparian States

In 2022, Iranian attention is far from the matter of water resources and associated policies. Consequently, Iran has little interest in water usage and management issues in the Euphrates-Tigris basin. This could change if the lower Euphrates valley experienced increased hot weather and decreased availability of water. Syrian Kurds have a loosely organized confederation with no policies and no fiscal resources (chapter 4 covers this in more detail). Their use of the Euphrates River is localized, uncontrolled, and probably counterproductive to the best practices of water usage and management.

Conclusion

The geopolitics of the Euphrates-Tigris basin are far more complicated in 2022 than they were in 2014. Iran excluded, at the beginning of the twenty-first century, the geopolitical face of the basin riparian states consisted of three politically stable nation-states. Iraq and then Syria fell into civil wars, which crippled their central governments and led to Kurdish

polities along the Turkish border. The geopolitical face of the basin riparian states in 2022, Iran excluded, includes one stable nation-state, two unstable nation-states, one autonomous Kurdish federate, and an independent Kurdish statelet.

CHAPTER 3

External Agency in the Basin

External Agency

In addition to the riparian states, there are external actors and agencies that operate to a varying extent in the Euphrates-Tigris basin. This chapter focuses on the external actors operating in Iraq, the principal downstream riparian, which may have the capability and capacity to affect water-related problems. These actors include the United States, the United Nations (UN), the European Union (EU), the North Atlantic Treaty Organization (NATO), and a deep bench of international nongovernmental organizations (NGOs). Of these, the United States is the largest contributor in funding and resources dedicated to the stabilization of Iraq and its integration into the global economy. The effect of American agency on the basin is slow and targets the northern Kurdish regions of Iraq, while the impact of the remaining agencies is more widely distributed in the country. However, the effect of global warming and the negative consequences of climate change on the Euphrates-Tigris River system as a risk needing immediate attention is embedded in the analysis and policies of nearly all the external agencies operating in the basin. Whether any of the external agencies have the will or the resources to contribute to timely solutions to improving Iraq's water deficits remain to be seen.

Map 3.1. The Euphrates-Tigris River basin



Source: Philippe Rekacewicz, UNEP/GRID-Arendal, adapted by MCUP.

U.S. Foreign and National Security Policy¹

American agency in Iraq began under American president George H. W. Bush and the enduring effect of his decisions in the geopolitical affairs of the Euphrates-Tigris River basin cannot be overstated. The 1991 Persian Gulf War injected American ground and air forces into the Euphrates-Tigris basin with the brief occupation of the right (western)

¹ This section is based on the analysis found in Edward J. Erickson, "Climate Change and the Department of Defense: An Introduction," *Marine Corps University Journal*, Special Issue (2016): 7–24, <https://doi.org/10.21140/mcu.2016si01>.

bank of the river around Safwan, Iraq. By June 1991, the U.S. Army had withdrawn to Kuwait as well as evacuated some 40,000 Shia rebels to Saudi Arabia. However, America remained deeply engaged in the affairs of the basin riparian states through Operations Provide Comfort I and II and Operations Northern and Southern Watch. America imposed Operation Southern Watch, a no-fly zone designed to protect Shia rebels remaining in the lower basin from 26 August 1992 through 17 March 2003. More importantly to this narrative, President Bush's administration conducted Operations Provide Comfort I and II providing a safe haven in Turkey for northern Iraq's rebellious Kurds, which served American strategic interests by maintaining an America-friendly opposition group in Iraq. The back-to-back humanitarian operations ended on 31 December 1996, at the request of the Turkish government. President William J. "Bill" Clinton subsequently began Operation Northern Watch on 1 January 1997, which operated through 17 March 2003, providing a no-fly zone to protect the returning northern Iraqi Kurds. These commitments by Presidents Bush and Clinton have embroiled their successors in the geopolitical affairs of the Euphrates-Tigris River basin.²

Outside of the basin, circumstances forced Clinton's presidency to redefine American foreign and national security policy in a world that was no longer bipolar. The America of the late 1990s was often described as a "hyperpower" with immense resources and seemingly positioned to change the world for the better.³ Clinton's foreign policy focused on opportunity rather than a defined long-term policy or end state, unlike the "containment" that it replaced. American national security policy shifted toward a new reliance on alliance partners and active cooperation with the UN. Much of what Clinton achieved reflected his beliefs in globalization and multilateralism. His successor, George W. Bush, campaigned on unilateralism and moving America away from nation building. The 11 September 2001 (9/11) attacks clarified and strengthened Bush's determination to set America on a new foreign policy pathway. The Global War

² Michael Knights and Wladimir van Wilgenburg, *Accidental Allies, The U.S.–Syrian Democratic Forces Partnership Against the Islamic State* (London: I. B. Tauris, 2021).

³ Edward J. Erickson, "What Do We Mean by Great Power or Superpower?: An Introduction to Terms and Concepts," *Marine Corps University Journal* 9, no. 2 (Fall 2018): 17–18.

on Terrorism (GWOT) became the vehicle by which the Bush administration implemented its agenda in American foreign policy. In brief, the new American foreign policy under President Bush rested on three principles: a right to take unilateral and preemptive action (including military strikes), when necessary; American dominance in international affairs and forums; and the aggressive promotion of American-style democracy around the world.⁴ The events that followed in Afghanistan and Iraq are well known and need not be repeated here.

Under President Barack H. Obama, U.S. foreign policy returned to Clinton-style realism, which was based on humanitarian and social justice concerns, within a framework of multilateralism that attempted to engage the world as an equal partner. The Obama administration re-committed the United States to working through and with international organizations, particularly the UN. In 2011, American combat forces departed Iraq, leaving a small training mission behind with a counterpart surge in combat operations in Afghanistan. Famously, Hillary R. Clinton attempted a “reset” with Russia as early as 2009.⁵ Unfortunately for the administration, what became known as the Arab Spring or Arab Awakening in 2011 had all the appearances of a positive moment for the region. Nothing could have been further from the truth. The Obama administration proceeded to encourage popular movements in Tunisia, Libya, Egypt, Syria, the Gulf states, and Saudi Arabia in the name of human rights and freedom of expression.⁶ The nobility of the American effort was unquestioned but the practical effect on regional stability was disastrous.

Libyan dictator Muammar al-Qaddafi was overthrown in 2011 but, in 2022, Libya remains divided between a legitimate government and rebel elements. Egypt underwent a similar, although less violent, experience that simply resulted in another ex-military president for life in Abdel Fattah al-Sisi. The Persian Gulf states divided into a bitter economic blockade, which pitted Qatar against the Saudis, Bahrain, and the United

⁴ “The Global War on Terrorism: The First 100 Days,” State Department, accessed 30 December 2022.

⁵ Warren Strobel and Matt Spetalnick, “Skeptical of Russia, Clinton Seen Going Toe-to-Toe with Putin,” Reuters, 20 September 2016.

⁶ Daniel S. Morey et al., “Leader, Follower, or Spectator?: The Role of President Obama in the Arab Spring Uprisings,” *Social Science Quarterly* 93, no. 5 (2012): 1185–201.

Arab Emirates (UAE)—all which were informal American allies. As previously described, the success of the Islamic State of Iraq and Syria (ISIS) led to the United States reintroducing combat troops not only to Iraq but also into Syria. By 2015, the realities of geopolitics turned the Obama administration away from a formal Wilsonian foreign policy based on humanitarian concerns to an ad hoc foreign policy based on response and intervention.⁷

While not articulated America's *National Security Strategy* (NSS), the administration of Donald J. Trump in 2017 reversed the formal policies of the Obama administration by embracing unilateralism and isolationism and by disregarding American participation and leadership in traditional alliances and international institutions.⁸ America quickly withdrew from the proposed transpacific trade partnership, from the *Joint Comprehensive Plan of Action* (JCPOA) to denuclearize Iran, and from the Paris Climate Accord.⁹ President Trump publicly threatened to withdraw the United States from the NATO alliance and tried to pull most American forces out of Europe, while at the same time increasing economic pressure on China by imposing sanctions on steel, aluminum, and consumer goods.¹⁰ In the Middle East, the administration's support for Israel increased in March 2019, when President Trump recognized Israeli annexation of the Golan Heights and parts of East Jerusalem, most notably moving the American embassy from Tel Aviv to Jerusalem.¹¹ In February 2020, the Trump administration concluded an agreement with the Taliban to withdraw from

⁷ David Unger, "The Foreign Policy Legacy of Barack Obama," *International Spectator* 51, no. 4 (2016): 1–16, <http://dx.doi.org/10.1080/03932729.2016.1227914>.

⁸ See *National Security Strategy of the United States, December 2017* (Washington, DC: White House, 2017).

⁹ James McBride, Andrew Chatzky, and Anshu Siripurapu, "What's Next for the Trans-Pacific Partnership (TPP)?" Council on Foreign Relations, 20 September 2021; White House, "President Donald J. Trump Is Ending United States Participation in an Unacceptable Iran Deal," fact sheet, 8 May 2018; and Donald J. Trump, "Statement by President Trump on the Paris Climate Accord" (statement, Rose Garden, White House, 1 June 2017).

¹⁰ See Donald J. Trump, "Trump Confirms He Threatened to Withdraw from NATO" (statement, Charleston, WV, 21 August 2018); Philip H. Gordon, "Trump's Sudden and Dangerous Troop Withdrawal from Germany," Council on Foreign Relations, 8 June 2020; and Benjamin Haas, Ben Jacobs, and Edward Helmore, "US Imposes Sanctions on China, Stoking Fears of Trade War," *Guardian*, 22 March 2018.

¹¹ Amnon Cavari, "Trump and Israel: Exploiting a Partisan Divide for Political Gains," *Israel Studies* 27, no. 1 (2022): 156–81.

Afghanistan at the end of May 2021.¹² President Trump concluded his administration's diplomatic legacy in August 2020 with the signing of the Abraham Accords, which traded normalization of relations with Israel by some Arab states (Sudan, Morocco, the UAE, Bahrain, Oman, and Jordan) in return for American economic assistance, trade deals, and military aid.¹³

The election of President Joseph R. "Joe" Biden upended the policies of Donald Trump by returning American foreign policy to a more traditional post-Second World War position of embracing multilateralism and the responsibility of leading alliances and international institutions.¹⁴ Saddled with the prior obligations with the Taliban, the Biden administration initiated the American military withdrawal from Afghanistan in August 2021. Although heavily criticized in its execution, the administration conducted the withdrawal with small loss of American lives as well as successfully evacuating thousands of Afghans and Westerners.¹⁵ In 2022, the Biden administration is trying to restore the JCPOA with Iran as well as contain China with increased forward deployments and stronger military assistance programs.¹⁶

Despite Obama, Trump, and Biden's emphasis on China as the principal threat to American national security, the United States continues to play a key role in the geopolitics of the Euphrates-Tigris River basin. While American strategic interests in the region since 1991 have remained remarkably constant, there have been dramatic turnabouts in American foreign and military policy that have made it difficult for the United States to influence the governments and the people of the Middle East. In particular, the pendulum-like changes in American national security strategy have created an atmosphere of mistrust that the Biden administration is working hard to dismantle. Likewise, the legacies of changing and con-

¹² *Joint Declaration between the Islamic Republic of Afghanistan and the United States of America for Bringing Peace to Afghanistan* (2 February 2020).

¹³ "The Abraham Accords," Bureau of Near Eastern Affairs, Department of State, accessed 30 December 2022.

¹⁴ See *Interim National Security Strategy Interim Guidance, March 2021* (Washington, DC: White House, 2021).

¹⁵ Joseph R. Biden, "Remarks by President Biden on the Drawdown of U.S. Forces in Afghanistan" (speech, East Room, White House, 8 July 2021).

¹⁶ Robert Einhorn, *Revisiting the JCPOA Is the Better Alternative—But Can It Be Made Sustainable?* (Washington, DC: Brookings, 2022); and *National Security Strategy, October 2022* (Washington, DC: White House, 2022).

flicted American actions in the region have created few new friends while at the same time led to an increasing number of disenchanted old friends. Important to this narrative, bipartisan American support for the Iraqi Kurds remains strong and constant.

Climate Change and Water in American National Security Policy

American awareness of water as a significant challenge affecting regional stability appears to be increasing. Despite this, opinion in the U.S. government regarding where and under what circumstances water issues might cause instability is mixed. For example, the U.S. Marine Corps Center for Emerging Threats and Opportunities' (CETO) *2011 Edition of Flashpoints* posited water as 1 of 10 factors used to predict instability and catalysts for conflict. According to the CETO report, Afghanistan was the country most at risk for conflict based on water issues, while Iraq appeared far down on the list of potential water-related flashpoints.¹⁷ This interpretation competed with a recent assessment from the Office of the Director of National Intelligence that listed the Euphrates-Tigris system as a potential region of concern (during the next 30 years) but does not mention the issue of Afghanistan-Iran hydrogeopolitics.¹⁸ Between 2017 and 2020, institutions such as the National Defense University, the Army War College, and the Naval War College published very little regarding climate change or water scarcity. However, recent publications in 2022 from the Army War College and the U.S. Army Combined Arms Center signal renewed interest with such titles as "Water Wars of the Future: Myth or Reality?" and *Climate Change & National Security: Implications for the Military*.¹⁹

Other than a nod to the energy industry about zero-emissions clean coal and ethanol technologies, the idea of climate change was absent in Republican president George W. Bush's March 2006 NSS, and it is fair to say that the United States government had no policy regarding climate change

¹⁷ *2011 Edition of Flashpoints* (Quantico, VA: Center for Emerging Threats and Opportunities, 2011), 1.

¹⁸ Office of the Director of National Intelligence, "ODNI Releases Assessment on Global Water Security," news release, 22 March 2012.

¹⁹ Gerald J. Krieger, "Water Wars of the Future: Myth or Reality?," *Parameters* 52, no. 1 (2022): 89–104, <https://doi.org/10.55540/0031-1723.3131>; and Albert Palazzo, *Climate Change & National Security: Implications for the Military* (Fort Leavenworth, KS: U.S. Combined Arms Center and Army University Press, 2022).

under his administration.²⁰ Several senators working together across the aisle in 2007 called for a study on the topic, especially an examination of potential national security impacts, but little came of it in terms of national policy without the support of the commander in chief.²¹ The election of Barack H. Obama in 2008 introduced seismic shifts in American foreign and domestic policies, which included a 180-degree reversal of foreign and domestic policy regarding climate change and global warming. The Obama administration's first NSS appeared in May 2010, more than a year after the president's inauguration, and it directly addressed climate change.²² Climate change was explicitly noted as part of the strategic environment affecting American interests as was the need to engage global partners on the issue. Obama's strategy document noted that the "danger from climate change is real, urgent, and severe" and went on to state that global warming would lead to natural disasters, land degradation, and refugee crises. The strategy outlined domestic and foreign policy goals. As a matter of foreign policy, the administration sought to implement the Copenhagen Agreement and to work toward global cooperation in reducing emissions.²³

Water scarcity appeared as a national security concern in the Department of Defense's 2010 *Quadrennial Defense Review* (QDR), which placed climate change in the realm of reforming how DOD did business, and its authors included the section "Crafting a Strategic Approach to Climate Change and Energy."²⁴ In these pages, DOD officials presented climate change as a problem to be dealt with rather than a problem to be solved.

²⁰ George W. Bush, *National Security Strategy of the United States of America* (Washington, DC: White House, 2006), 29.

²¹ Amanda Little, "Bipartisan Bill Calls for Intelligence Assessment of Climate Impacts," *Grist*, 6 April 2007; and U.S. Senate, White House, "FY'08 Intelligence Authorization Bill Approved by Senate Panel Includes Provision to Require National Intelligence Estimate (NIE) on Potential National Security Impacts of Climate Change," press release, 1 June 2007.

²² Barack H. Obama, *National Security Strategy, May 2010* (Washington, DC: White House, 2010).

²³ In 2009, at the 15th global climate change meeting (COP15), the attendees acknowledged the Copenhagen Agreement's recommendations to extend the Kyoto Protocol, committing signed parties to reduce greenhouse gases. The agreement is also referred to as the Copenhagen Accord as it is not legally binding. See *Report of the Conference of the Parties on Its Fifteenth Session, Held in Copenhagen from 7 to 19 December 2009* (Copenhagen: United Nations Framework Convention on Climate Change, 2010); and *Copenhagen Accord: Draft Decision-/CP.15* (Copenhagen: United Nations Framework Convention on Climate Change, 2009).

²⁴ *Quadrennial Defense Review, February 2010* (Washington, DC: Department of Defense, 2010), 84–88.

It was an issue that, in effect, shaped the operating environment and affected the roles and missions of the American military. They noted that “climate change could have significant geopolitical impacts around the world, contributing to poverty, environmental degradation, and the further weakening of fragile governments. Climate change will not only contribute to food and water scarcity and increase the spread of disease, but may also spur or exacerbate mass migration,” all of which might act as accelerants of instability and conflict.²⁵ To deal with these threats, the DOD saw the way forward as developing effective assessment tools and building environmental security cooperation. As a second nod to the administration, the DOD report recognized the need to reduce the impact of its own energy outputs and move toward more effective energy stewardship, collaboratively working toward making more environmentally friendly facilities and organizations.

Further strategic guidance from the Obama administration appeared in January 2012, conspicuously announcing a shift in focus to the Pacific. This document established priorities for American force structure and the missions that the military would then undertake. While climate change was not specifically mentioned, the guidance noted that humanitarian and disaster relief operations were likely. This operational guidance, however, was circumscribed by noting that increasing or maintaining capacity to conduct such missions was not a priority requirement in building the future Joint force.²⁶ In analyzing the DOD’s approach to climate change from 2006 to 2012, it is clear that the subject was introduced into American strategic policy as the administration shifted politically from the right to the left in 2009. Thereafter, as a matter of strategic concern, the DOD shifted its approach to climate change from a position of no action to one that accepted the reality of global warming and climate change, as these affected the strategic environment. Importantly, the DOD steered well clear of the issue of causation linked to human activity, preferring instead to address the agency’s need for energy efficiency and economy. During the first four years of the Obama administration, the DOD concluded that climate

²⁵ *Quadrennial Defense Review*, 84–88.

²⁶ Barack H. Obama, *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense* (Washington, DC: White House, 2012).

change was most strategically relevant in the context of demographics; in this particular instance, how the impact of climate change might affect the approximately 1 billion people who live in coastal or littoral areas of underdeveloped countries, which in turn creates risk and an obligation for humanitarian and disaster relief operations. Strategic guidance noted, however, that the Joint force might not have the capacity to fully conduct such missions.²⁷

The reelection of President Obama ensured that the issue of climate change remained embedded in DOD policy. The administration reengaged the topic in the 2014 QDR and continued the trend toward making policy statements that acknowledged climate change and presented it as a significant challenge to DOD operations. Importantly, the 2014 QDR noted that “as greenhouse gas emissions increase, sea levels are rising, average global temperatures are increasing, and severe weather patterns are accelerating.” In turn, these phenomena, coupled with global dynamics such as population changes, “will devastate home, land, and infrastructure.” According to the QDR, the DOD needed to be aware of such issues as water scarcity, food shortages, and resource competition because they are “threat multipliers that will aggravate abroad such as poverty, environmental degradation, political instability, and social tensions — conditions that enable terrorist activity and other forms of violence.”²⁸

The DOD then published its *2014 Climate Change Adaptation Roadmap*. In his foreword to the roadmap, Secretary of Defense Chuck T. Hagel referred to the defense strategy noting once again that the DOD accepted climate change as a “threat multiplier” and also acknowledged that, although the science was converging on a consensus, DOD leaders remained uncertain. The roadmap noted that climate change posed an *immediate risk* to U.S. national security and presented two DOD responses — adaptation and mitigation — as recommended by the administration.²⁹

²⁷ See, for example, *Department of Defense Climate Risk Analysis* (Washington, DC: Department of Defense, 2021).

²⁸ *Quadrennial Defense Review, 2014* (Washington, DC: Department of Defense, 2014), 8.

²⁹ *2014 Climate Change Adaptation Roadmap* (Washington, DC: Department of Defense, 2014), “foreword,” 1. Emphasis added.

Overall, the 2014 *Climate Change Adaptation Roadmap* may be characterized as a forcing document designed to generate self-assessment by the DOD to consider current and future capabilities and capacities.

To summarize the administration's position and findings, the White House released *The National Security Implications of a Changing Climate* in May 2015. Much of the substance for this document originated in the *Third National Climate Assessment* published by the U.S. Global Change Research Program in 2014, but the authors also drew from the 2014 QDR, the 2015 NSS, and the 2014 *Quadrennial Homeland Security Review*.³⁰ The release of *The National Security Implications of a Changing Climate* created a flurry of interest in the Republican-controlled House and the U.S. Senate. Consequently, members of Congress submitted a request with the DOD 2015 appropriations bill asking the DOD to identify the most serious and likely climate-related security risk of each geographic combatant command (GCC); the ways in which the GCCs integrated mitigation of these risks into their planning processes (including providing humanitarian assistance and disaster relief [HADR], engaging security cooperation, building partner capacity, and sharing best practices in mitigation), and a description of the resources required for an effective response.³¹ Responding quickly to the request, DOD officials released a *Response to Congressional Inquiry on National Security Implications of Climate-Related Risks and a Changing Climate* on 23 July 2015. The report began by clearly restating both the security-related risks posed by climate change as well as the DOD's possible responses in terms of military missions. In part I, the DOD noted that it "recognizes the reality of climate change and the significant risk it poses to U.S. interests globally." Further, "climate change is an urgent and growing threat to our national security." The response also affirmed that the DOD *Climate Change Adaptation Roadmap* represented a serious recognition and attempt to deal with the threats. In addition to the

³⁰ *Findings from Select Federal Reports: The National Security Implications of a Changing Climate* (Washington, DC: White House, 2015). See also Jerry M. Melillo, Terese (T. C.) Richmond, and Gary W. Yohe, eds., *Climate Change Impacts in the United States: The Third National Climate Assessment* (Washington, DC: U.S. Global Change Research Program, 2014), <https://doi.org/10.7930/J0Z31WJ2>; and *The 2014 Quadrennial Homeland Security Review* (Washington, DC: U.S. Department of Homeland Security, 2014).

³¹ *Department of Defense Appropriations Act, 2015*, 113th Cong. (16 November 2015).

general thrust of the DOD's views on climate change dangers and risks, the GCCs identified four principal climate-related security risks.³²

First, persistently recurring conditions such as flooding, drought, and higher temperatures cause a strain on fragile states and vulnerable populations. This risk also affects changes in patterns of infectious diseases. Increased intrastate and interstate migration is seen as a signature of this, requiring the DOD to increase humanitarian assistance and aid. Second, more frequent or more severe extreme weather events require more substantial involvement of DOD units, personnel, and assets in HADR. Third, rising sea levels and temperature changes lead to a greater chance of flooding in coastal areas, adverse impacts on navigation, damage to port facilities, and displaced populations. This risk requires greater DOD participation in HADR and security cooperation. Finally, the decreasing Arctic ice cover, type, and thickness leads to increased tourism, greater resource extraction, and greater thawing permafrost. In turn, this greater access may increase the need for more search and rescue (SAR) capabilities.³³

While some might assume that DOD officials are just going through the motions in terms of implementing climate change policies, the stipulations for adaptation, and even mitigation, are leading to extensive changes in the department that trickle down into the activities of various U.S. military branches worldwide. According to the DOD, all of the GCCs use their theater campaign plans (TCP), operations plans, contingency plans, and theater security cooperation plans as a means to identify or account for climate risks. Although activities vary, the combatant commanders work with their global partners to build infrastructure such as disaster response warehouses and shelters, training, best practices for mitigation of installation vulnerabilities to provide disaster management and response (in coordination with USAID), and equipping partners and nongovernmental organizations (NGOs) to improve capability and capacity. The GCCs are also sharing with partners across the globe. DOD officials, as a part of this national security report, noted that resources for assessing and responding

³² *Response to Congressional Inquiry on National Security Implications of Climate-Related Risks and a Changing Climate* (Washington, DC: Department of Defense, 2015).

³³ *Response to Congressional Inquiry on National Security Implications of Climate-Related Risks and a Changing Climate*, 3–10.

to climate change impacts are currently provided within existing DOD missions, funds, and capabilities, and the main source of funding for the GCC's HADR comes from the Overseas Humanitarian, Disaster, and Civic Aid (OHDACA) appropriation.³⁴

Under President Obama, the DOD moved from a national security position that ignored climate change as a defined risk to fully embracing climate change as a real and present risk. During the Obama years, national security policy as articulated by the *National Military Strategy* (NMS), NSS, QDR, and strategic guidance directives from the White House moved the narrative about climate change and national security from generalizations to explicit understandings about risk, adaptation, and mitigation. Further, the DOD articulated a defined roadmap outlining how it will approach climate change adaptation and mitigation and tasked its subordinate GCCs to explicitly assess how climate change would impact their areas of responsibility (AORs) and the populations living within them. A more comprehensive approach toward climate change and the risks associated with it evolved in President Obama's second term, and by 2014, such matters as critical infrastructure and considerations of the impact on the Arctic appeared in policy documents. The *Climate Change Adaptation Roadmap* was a bellwether shift for the DOD as the White House demanded a harder look at assessing the actual impact of climate change on the operations and activities of the GCCs. By 2015, the DOD and its subordinate GCCs were able to explicitly articulate the ramification of climate change events in their AORs and how they intended to plan for them.

For example, U.S. Central Command (USCENTCOM) monitored resource scarcity (e.g., water, food, and energy) in its arid AOR and accounted for this factor in its planning for operations in the 20 countries that make up what is commonly referred to as the Middle East, including areas of recent conflicts, such as Afghanistan, Iraq, and Syria. USCENTCOM identified that climate changes heightened competition at the national or subnational level in an already arid region, and this

³⁴ *Response to Congressional Inquiry on National Security Implications of Climate-Related Risks and a Changing Climate*; and "Fiscal Year 2022 President's Budget: Overseas Humanitarian, Disaster, and Civic Aid (OHDACA)" (slide deck, Security Cooperation Agency, Department of Defense, May 2021.)

competition could be more dangerous as actors seek to protect limited resources.³⁵ USCENTCOM focused on nearer-term (five years) projected changes in climate. It factored current and historic climatic conditions into its TCP, especially regarding water scarcity. It has included warning indicators as a part of the deliberate planning process. HADR and security cooperation are identified as lines of effort (LOE).

Most of this climate-related strategic and operational activity came to a halt with the inauguration of President Donald J. Trump in January 2017. The presentation of climate change as a threat to American national security dropped out of national security planning entirely.³⁶ It is unknown to the authors whether threats such as climate change and water scarcity remain in the GCC TCPs today, and these threats remain conspicuously absent from USCENTCOM's most recent posture statement.³⁷

Despite being deemphasized at the strategic level, interest in climate change continued as an area of intellectual and operational concern for the American military during the Trump years. The U.S. Army War College, for example, published *Implications of Climate Change for the U.S. Army* in 2019. The authors made the point that by 2040, decreased freshwater availability and increased demand will lead to decreased food security and food system stability in the water stressed regions where the Army was likely to operate.³⁸ U.S. Naval War College (NWC) created a Climate and Human Security Group in 2017, and teaching climate change and national security electives began in 2020. The NWC hosted the first open and free conference on the subject at a DOD academic institution in 2021. A professor at the NWC now teaches a course using a theoretical, structural, and pedagogical approach titled *Climate Change and National Security*.³⁹

The Biden administration returned to the emphatic and active approach to climate change in American policy pioneered by the Obama

³⁵ *Response to Congressional Inquiry on National Security Implications of Climate-Related Risks and a Changing Climate*, 14.

³⁶ *National Security Strategy*, December 2017.

³⁷ "Posture Statement" (Gen Kenneth F. McKenzie Jr., U.S. Central Command, Senate Armed Services Committee Hearing, 15 March 2022).

³⁸ Col Max Brosig et al., *Implications of Climate Change for the U.S. Army*, War College Study (Carlisle, PA: U.S. Army War College, 2019).

³⁹ Andrea H. Cameron, "Bridging Climate Science and Security: Teaching Climate Change and National Security at the U.S. Naval War College," *Journal of Security, Intelligence, and Resilience Education* 12, no. 3 (2021): 1–7.

administration. President Biden's *Interim National Security Strategic Guidance* in March 2021 mentioned climate change 14 times.⁴⁰ The Department of Defense moved quickly to publish a *Department of Defense Climate Risk Analysis* for the National Security Council in September 2021.⁴¹ In the analysis, water shortages are identified as having a primary impact leading to "heightened social and political tensions, increased likelihood of migration, conflict, and /or competitors using instability to expand influence."⁴² Related to the basins like the Euphrates-Tigris, the DOD argued that increasingly unpredictable rainfall related to climate change could make it harder to resolve disputes over transboundary rivers. Interestingly, the authors continued by stating, "Policy responses to climate change could also have unintended consequences and become sources of dispute, such as policies that impact supply chains or critical minerals." The study advanced two regional hazards for the USCENTCOM AOR. These are "Altered, limited, or constrained environment for military operations" and "instability within and among other nations."⁴³ It continued by claiming that "tackling climate change is a [U.S. government] USG priority, and DoD will incorporate climate considerations into its engagements with allies and partners." The analysis also noted that

there are various classified and unclassified U.S. intelligence products regarding the security risks associated with climate change, including Annual Threat Assessments, the quadrennial Global Trends reports, and the 2016 National Intelligence Council White Paper. In 2020, consistent with 50 U.S.C. § 3060, the Director of National Intelligence established the Climate Security Advisory Council (CSAC), bringing together the Intelligence Community and Federal Science Agencies to advance insights on the national security impacts of climate change.⁴⁴

At the same time, the DOD published the 2021 *Department of Defense Climate Adaptation Plan*, which returned the agency and its institutions to

⁴⁰ Joseph R. Biden, *Interim National Security Strategic Guidance* (Washington, DC: White House, 2021).

⁴¹ *Department of Defense Climate Risk Analysis*.

⁴² *Department of Defense Climate Risk Analysis*, 8.

⁴³ *Department of Defense Climate Risk Analysis*, 9.

⁴⁴ *Department of Defense Climate Risk Analysis*, 14.

the Obama-era tenants of adaptation, resilience, and mitigation.⁴⁵ However, these actions were internal to the DOD as an institution rather than outwardly external in terms of projecting influence or power. Similarly, recent congressional interest in climate change focused on the protection of the homeland and American facilities overseas.⁴⁶ The Biden administration's October 2022 *National Security Strategy* featured climate change as a major threat to the United States and listed water scarcity in the Middle East as a specific effect of climate change.⁴⁷ According to the administration, in turn, "Tensions will further intensify as countries compete for resources and energy advantage—increasing humanitarian need, food insecurity and health threats, as well as the potential for instability, conflict, and mass migration."⁴⁸

In 2022, the administration published the *White House Action Plan on Global Water Security*, which formally recognized that global water security is essential to U.S. national security.⁴⁹ The White House plan neither commits resources nor does it articulate concrete objectives. Rather, it lists activities that the U.S. government might conduct to further global water security, such as improving data collection and sharing and providing technical support for water management. The plan has six additional regional one-page appendixes, one of which is for the Middle East and North Africa, that outline regional issues and provide general statements about water scarcity and management. The large number of dams and transboundary water agreements in the Euphrates-Tigris basin are identified in the Middle East appendix.⁵⁰

The Biden administration published a more comprehensive *U.S. Government Global Water Strategy, 2022–2027* as a follow-up to the White House action plan.⁵¹ Under the *U.S. Government Global Water Strategy*, the

⁴⁵ *Department of Defense Climate Adaptation Plan* (Washington, DC: Department of Defense, 2021), 2.

⁴⁶ Hibbah Kaileh and Kelley M. Saylor, *Climate Change and Adaptation: Department of Defense* (Washington, DC: Congressional Research Service, 2022).

⁴⁷ Joseph R. Biden, *National Security Strategy, October 2022* (Washington, DC: White House, 2022), 9.

⁴⁸ Biden, *National Security Strategy, October 2022*.

⁴⁹ Joseph R. Biden, *White House Action Plan on Global Water Security* (Washington, DC: White House, 2022).

⁵⁰ *White House Action Plan on Global Water Security*, 13.

⁵¹ *U.S. Government Global Water Strategy, 2022–2027* (Washington, DC: USAID and State Department, 2022).

American government will “work through four interconnected and mutually reinforcing strategic objectives.”

1. Strengthen sector governance, financing, institutions, and markets;
2. Increase equitable access to safe, sustainable, and climate-resilient water and sanitation services, and the adoption of key hygiene behaviors;
3. Improve climate-resilient conservation and management of freshwater resources and associated ecosystems; and
4. Anticipate and reduce conflict and fragility related to water.⁵²

In addition to the strategy, there is an annex on “agency specific plans” and an annex identifying “high-priority countries.” In the agency-specific annexes, the DOD noted that it will participate in two missions:

Strategic Objective 3: Improve Climate-Resilient Conservation and Management of Freshwater Resources and Associated Ecosystems.

Strategic Objective 4: Anticipate and Reduce Conflict and Fragility Related to Water.⁵³

The DOD strategy is generally the same as the 2021 documents previously described. Other agencies participate in regional planning, of course, and the integration of action and unity of effort clearly occur at DOD, GCC, and State Department country-team level.

None of the Euphrates-Tigris basin riparian countries are identified as high-priority countries (HPCs). The list is created annually by the USAID administrator using specific criteria in a defined formula to calculate a numerical score. According to USAID, by law, “the U.S. government must focus its investments . . . on those countries and geographic areas where the needs are greatest and to maximize impact and sustainability.”⁵⁴ The HPCs identified will be the primary recipients of U.S. government official water and sanitation development assistance. There are 22 countries on the list, 16 in Africa, 3 in Asia, and 3 in Latin America. In addition to

⁵² *U.S. Government Global Water Strategy, 2022–2027, 1.*

⁵³ “Annex A, DOD,” in *U.S. Government Global Water Strategy, 2022–2027, 1.*

⁵⁴ “Annex B, High-Priority Countries,” in *U.S. Government Global Water Strategy, 2022–2027, 1.*

the startling absence of the Euphrates-Tigris basin, not a single Middle Eastern country is identified as an HPC. It is hard for the authors to reconcile this lack of priority with the known data points regarding water scarcity and water deficits in the Euphrates-Tigris basin; moreover, the authors wonder what such a prioritization of USG resources away from the Middle East means for the riparian states of the Euphrates-Tigris Basin.

American Strategic Interests and Partnerships

American strategic interests in the Euphrates-Tigris basin reflect America's larger strategic interests in the region and the Middle East. These interests date from the ending of the Second World War, when America ceased to be an oil exporter and became an importer of Middle Eastern oil. Throughout the Cold War, the United States sought to contain the USSR and to maintain a balance of power in the region, while safeguarding a supply of oil from friendly states. The Iranian Revolution in 1978–79, the collapse of the Soviet Union in 1991, the failure to resolve the Palestinian question, and the GWOT in the twenty-first century hardly altered these fundamental policies. The Middle East has dropped from supplying one-third of America's oil in 1973 to one-fifth in 2008. In 2022, petroleum from the Middle East had dropped to 11 percent of total petroleum imports.⁵⁵ Despite those countries achieving de facto energy independence, the continuing and reliable supply of energy commodities remains central in all ways to American strategic interests in the Middle East.

Even though the United States imports significantly smaller amounts of oil from the Middle East, its strategic interests remain tied to the region. This is because petroleum is a globally priced commodity—the centralized pricing and management of the world's supply of oil makes its actual point of origin increasingly irrelevant. The keystone of American interests in the Middle East is therefore not related to the actual import of oil into the United States but rather one of maintaining regional stability and guaranteeing peaceful relations among its community of nations. In the near term, the stabilization of Syria and Iraq are central to these issues. Social or political collapse in either nation could lead to a failed-state sce-

⁵⁵ U.S. Energy and Information Administration, "Oil and Petroleum Products Explained," fact sheet, 22 April 2022.

narios wherein these nations become a haven for terrorist networks and a launching pad for forces seeking to destabilize the region. Conversely, if Iraq and Syria emerge as stable countries, they will have an overall positive effect on the region. There are other factors that affect American strategic interests as well, especially those dealing with bilateral relationships with large Middle Eastern states and the problem of a nuclear Iran.

The principal contradiction in defining American strategic interests in the Euphrates-Tigris basin today involves American policy toward the Kurds in Syria. Relations with Turkey have been very rocky since the 2003 invasion of Iraq, and recent American support for Israel over the Golan Heights, Gaza, and Jerusalem have further weakened this historically strong relationship. American support for the Syrian Kurds, described in more detail in chapter 4, has brought American-Turkish relations almost to the breaking point.⁵⁶ In late 2022, the Turkish interior minister accused the United States of supporting the People's Protection Units' (YPG's) terror attacks in Istanbul.⁵⁷

Geopolitical Reality Confronts American Policy

The policies described in this chapter compete rather than overlap or complement each other and thus drive the hard geopolitical decisions that will determine the future of the basin. The key determinant in the foreseeable future is "What will the Americans do?" given that American policy rests on the maintenance of stability and regional security. Turkish interests are pinned to economic self-sufficiency and the sovereignty of its national territory. The Kurds of Iraq and Syria have policies with a range of outcomes from independence or autonomy within an existing state to a return to the status quo antebellum. In terms of decision making, circumstances and past practice suggest the Americans, Turks, and Iraqi Kurds will likely be proactive. Meanwhile, Iraq clings to policies designed to hold the country together as a nation-state, while Syria struggles to put the nation-state back together. Thus, Iraqi and Syrian decisions might be more reactive

⁵⁶ Jim Zanotti and Clayton Thomas, *The Kurds in Iraq, Turkey, Syria, and Iran* (Washington, DC: Congressional Research Service, 2019), 2.

⁵⁷ Nazlan Ertan, "Turkey Points to Kurdish Militants for Deadly Istanbul Bombing," *Al-Monitor*, 14 November 2022.

than those of their neighbors. Iran has little to decide about activities in the basin other than to continue to act as an agent of instability.

Americans are caught between the Realpolitik of acting on the geopolitical realities in the Euphrates-Tigris basin or acting on principle and policy. Depending on one's point of view, the keystone, or the albatross, in 2022, is what the Americans will do about Rojava. The continuing military and economic assistance from the United States enables and perpetuates the existence of an independent statelet sitting astride the Syrian Euphrates River. While this has the appearance of a Wilsonian policy supporting self-determination and democracy, the physical presence of American soldiers and robust heavily armed YPG/Syrian Democratic Forces (SDF) prevent a resurrection of ISIS as well as prevents a Syrian and Russian military offensive to restore the territorial integrity of Syria. This suits American objectives such as countering terrorism and weakening Russian influence in the region. At the same time, American support of Rojava confronts the explicit and publicly stated national security interests of long-time ally Turkey as well as the national security interests of the unified Iraqi polity.

Turkey remains poised to conduct large-scale cross-border military operations to create a demilitarized safe zone along the Syrian-Turkish border. President Bashar al-Assad continues to rely on Russian partners to maintain his regime. Iraq continues to suffer under a dysfunctional central government, which hinges on the cooperation of the Kurdistan Regional Government (KRG), which depends on the relations between the Jalal Talabani and Masoud Barzani clans. American interventions, done in the name of defeating ISIS and improving regional stability, have created an intractable geopolitical situation. For the Euphrates-Tigris basin, the three riparians of 2014 have transformed into a de facto five riparians in 2022. As a matter of reality versus policy, in the end, the United States will have to choose between long-time ally Turkey or counter-ISIS partner Kurdish Rojava.⁵⁸ Is the geopolitical return on the strategic investment of supporting the Syrian Kurds worth the cost of turning Turkey away from the West?

⁵⁸ For further context and commentary see Richard Outzen, "The Logic Behind Turkey's Fifth Syrian Operation," *Caravan*, Hoover Institute, 6 September 2022.

American Security Planning in Iraq

The United States maintains strong bilateral security and economic relations with Iraq through its embassy in Baghdad and a consulate in Erbil. The DOD maintains an Office of Security Cooperation–Iraq, which operates under the authority of the American ambassador and, after 2021, the DOD transitioned its military presence in Iraq to a noncombat advisory and training mission.⁵⁹ According to the Congressional Research Service, “President Biden requested \$358 million in counter-IS train and equip funds for Iraq in 2023, including funds to aid the Iraqi military, Counter Terrorism Service, and selected Ministry of Interior forces. Of the request, \$265 million would support KRG Peshmerga stipends, sustainment, and equipment.”⁶⁰ Additionally, USAID also operates in Iraq to promote democracy, governance, humanitarian assistance, stabilization, and human rights.⁶¹

At the operational level, American security planning and coordination in the Euphrates-Tigris basin is greatly hindered by the geographic constraints of its combatant command architecture—Turkey is in the U.S. European Command (USEUCOM) AOR while Iraq and Syria are in the USCENTCOM AOR. Making coherent planning more complicated, the nongeographic combatant commands, such as U.S. Special Operations Command (USSOCOM) and U.S. Transportation Command (USTRANSCOM) (a.k.a. functional combatant commands or FCC) have global responsibilities that include the AORs of the GCCs. Operational-level security planning for the Euphrates-Tigris basin involving the DOD, therefore, automatically excludes unitary command and control. Similarly, American security planning within a particular nation is based on the country team approach (with DOS as the lead agency having coordination authority but not command authority), which is also hindered by a lack of unitary command and control. Furthermore, it must be noted the

⁵⁹ U.S. Government Accountability Office, “Iraq: Characteristics of the Office of Security Cooperation–Iraq,” fact Sheet, 21 November 2019, 1–4; U.S. Government Accountability Office, “Iraq: Characteristics of the Office of Security Cooperation–Iraq,” fact Sheet, 21 November 2019, 1–4; and Christopher M. Blanchard, *Iraq and U.S. Policy* (Washington, DC: Congressional Research Service, 2022), 1–2.

⁶⁰ Though USAID is an independent government agency, it does receive policy guidance from the State Department. Blanchard, *Iraq and U.S. Policy*.

⁶¹ USAID, “USAID Iraq Country Profile,” fact sheet, accessed 20 November 2022.

country team approach was notably unsuccessful in Vietnam, Afghanistan, and Iraq. These problems guarantee a lack of unity of command, a principle of war, in American efforts to stabilize the Euphrates-Tigris River basin.

In terms of security planning, the Euphrates-Tigris Basin is an open-ended problem for the United States. At the strategic level, balancing ends, ways, and means is, likewise, almost impossible given the number of variables and the uncertainty of congressional support and funding. In 2022, American security planning in the Euphrates-Tigris basin is best described as transactional and point-to-point rather than deliberate and long-term. Regardless of these constraints, the United States has a long-term strategic interest in the stability of the Euphrates-Tigris Basin which, in turn, is strongly linked to the national interests of the riparian nation-states.

The United Nations

The UN established the United Nations Assistance Mission for Iraq (UNAMI) in 2003 under the authority of a Security Council resolution that was later extended. The mission coordinates the humanitarian and development efforts of the United Nations' agencies, funds, and specialized programs.⁶² The UN also maintains a second mission in Iraq, United Nations Investigative Team to Promote Accountability for Crimes Committed by Da'esh/ISIL (UNITAD). Altogether, the United Nations Country Team (UNCT) in Iraq comprises 19 resident and 5 nonresident agencies. The UN's current strategic plan for Iraq is titled the *United Nations Sustainable Development Cooperation Framework (UNSDCF) 2020–2024*.⁶³ A strategic priority for the UN in Iraq is promoting natural resource and disaster risk management and climate change resilience.⁶⁴ While water management and allocation are not mentioned explicitly, the UN lists using and managing natural resources, including transboundary issues, as strategic outcomes to increase resilience to climate change and environmental stress.⁶⁵

⁶² "The UN in Iraq," United Nations, accessed 20 November 2022.

⁶³ *United Nations Sustainable Development Cooperation Framework* (New York: United Nations, 2019).

⁶⁴ *United Nations Sustainable Development Cooperation Framework*, 14.

⁶⁵ *United Nations Sustainable Development Cooperation Framework*, 21.

Other than water or oil and natural gas, transboundary issues concerning natural resources are difficult to pinpoint.

A nonprofit watchdog asserts that the 2022 UNAMI budget for its missions in Iraq is about \$100 million, with the United States providing \$22 million, and the missions are staffed by about 800 UN employees.⁶⁶ The particulars of the expenditures are difficult to determine, but the UN framework identifies that its efforts are aimed at strengthening Iraqi institutions rather than in rendering direct assistance.⁶⁷

The European Union

The European Union conducts a diplomatic mission called the Delegation of the European Union to Iraq, which maintains the interests of the EU presidency in Baghdad and Erbil.⁶⁸ In 2022, the EU has seven ongoing military missions and eleven ongoing civilian missions, including the mission in Iraq. The EU civilian missions conduct nonmilitary missions such as humanitarian assistance, improving the rule of law, and post-conflict stabilization tasks.⁶⁹ Of note in the EU's approach to Iraq is that it maintains formal relations with both the Iraqi government and the KRG.

The EU is politically and institutionally committed to reducing the impact of human-produced global warming that is affecting climate change. In November 2021, the EU published an important study, *Climate Change, Water and Future Cooperation and Development in the Euphrates-Tigris Basin*, which was funded by the EU's Horizon 2020 research and innovation program.⁷⁰ The study focused on three climate-related water challenges that affect risks in the basin: (1) livelihoods and food security, (2) political stability and violence, and (3) interstate conflict and cooperation. The study

⁶⁶ "Iraq (UNAMI)," Better World Campaign, accessed 20 November 2022.

⁶⁷ "Executive Summary," in *United Nations Sustainable Development Cooperation Framework*, 6.

⁶⁸ "Who We Are," Delegation of the European Union to Iraq, accessed 20 November 2022. See also European External Action Service (EEAS), "The EU and Iraq," EEAS Fact Sheet, 9 July 2019.

⁶⁹ *EU Missions and Operations, EU Common Security and Defence Policy (CSDP)* (Brussels, Belgium: European External Action Service 2022), 1.

⁷⁰ André Mueller et al., *Climate Change, Water and Future Cooperation and Development in the Euphrates-Tigris Basin*, Cascades Report (Potsdam, Germany: European Union CASCADES, 2021).

also contained four recommendations to limit the impact of climate related changes in the basin:⁷¹

1. Help individual basin countries reform water management in water-intensive sectors.
2. Help the region devise adaptation options that strengthen overall water security.
3. Support the conditions that enable advancements in institutionalized cross-border water cooperation.
4. Help strengthen the water governance system in the riparian countries.

Whether the EU might be willing to fund the structures that might achieve these outcomes is problematic in 2022.

NATO and NGOs

NATO began a training mission in Iraq in 2004, but it was withdrawn in 2011 when agreement could not be reached regarding the mission's legal status. In the wake of the defeated ISIS offensive into Iraq, NATO established a new mission in Iraq (NMI) in 2018 at the request of the Iraqi government. The current NATO mission is a noncombat and capacity-building advisory mission comprising several hundred military personnel.⁷² NMI is designed to help strengthen Iraqi security institutions and forces to prevent the return of ISIS, to fight terrorism, and to stabilize the country.

A large number of humanitarian nongovernmental organizations (NGOs) operate in Iraq in 2022. The NGO Coordination Committee for Iraq lists 113 international NGOs, 111 national NGOs, and 7 NCCI observers in 2021.⁷³ These include such well known NGOs as the International Committee of the Red Cross (ICRC), Médecins Sans Frontières (or Doctors Without Borders), Catholic Relief Services, Islamic Relief, Oxfam, and Save the Children International.

⁷¹ "Executive Summary," in *Climate Change, Water and Future Cooperation and Development in the Euphrates-Tigris Basin*, 3–6.

⁷² "NATO Mission Iraq," NATO, 27 May 2022.

⁷³ "About NCCI," NGO Coordination Committee for Iraq, 14 July 2019.

Conclusion

There is an abundance of external agencies, missions, and organizations in Iraq today that have aspirational objectives designed to stabilize the country's political and economic systems. Most of the better-funded external agencies are focused on the stabilization of the government and reviving the capability and capacity of Iraq's military rather than on more effective usage of natural resources and water. The American efforts largely target northern Iraq and the KRG rather than the Shia south, which would be the most severely affected by water deficits. Little of the current external agency potential in Iraq's Euphrates-Tigris basin is funded or organized to deal with water-related problems and shortages. With that said, the combined American, intergovernmental, alliance, and NGO architecture now in place in Iraq might offer possibilities and economies of scale in assisting Iraq solve its water deficits before they reach crisis proportions.

CHAPTER 4

Geography, the Kurds, and Water

The Kurdish people live today in Turkey, Syria, Iraq, and Iran. Although they share a common heritage, language, and culture, the Kurds are not a unitary political entity. Geographically, the Kurds live between the headwaters of the Euphrates-Tigris Rivers and the lower reaches of the basin in southern Iraq. Historically, the Kurds were mostly organized into tribes and clans and a country named Kurdistan has never existed. In 1920, the Treaty of Sèvres contained a section titled “Kurdistan” (Section III, Articles 62–64), which provided a path to autonomy and possible independence for the Kurds in what is now Turkey.¹ However, the treaty was never ratified and never came into force, leaving the Turkish Kurds as citizens of the new Turkish republic. Iraqi Kurds received some degree of autonomy in 1970 under the Ba‘athist regime, but this quickly boiled over into a quasiwar that lasted until 1991.² In the mid-1990s, a bitter internecine Kurdish civil war broke out between the factions led by Masoud Barzani and Jalal Talabani. Since 2003, the Iraqi Kurds have become an autonomous gov-

¹ See the Treaty of Peace between the Allied and Associated Powers and Turkey signed at Sèvres, 10 August 1920, section III. For context and historical commentary, see Edward J. Erickson, *The Turkish War of Independence: A Military History, 1919–1923* (Santa Barbara, CA: Praeger, 2021), 60–67.

² Bryan R. Gibson, “The Secret Origins of the U.S.-Kurdish Relationship Explain Today’s Disaster,” *Foreign Policy*, 14 October 2019.

ernate and, in 2014, the Syrian Kurds established an independent statelet along the Turkish border. The United States is held by many Middle Easterners as responsible for this situation and a significant population in Turkey, Iraq, and Syria view America as the enabler of Kurdish aspirations.

The question of Kurdish autonomy and possible independence in Iraq and Syria has been the subject of much debate, and the sharing of oil and water resources has been a central factor in that discussion. In the Western media in 2022, hotter temperatures and less water flow in the Euphrates-Tigris basin are constantly reported and have superseded oil as an item of global interest.

This chapter addresses the policies and impact of the Kurdistan Regional Government (KRG), which controls the northern portion of the Tigris River in Iraq, and the Kurdish statelet of Rojava, which controls much of the Euphrates River in Syria. Moreover, policies that expand irrigation and agriculture in the Kurdish regions further complicate the already tenuous water situation in the southern non-Kurdish provinces of Iraq. This chapter will analyze this situation and attempt to answer the following questions:

1. Do the KRG's water and agricultural policies compete with or complement those of the Iraqi federal state?
2. When completed, will the KRG's projected water projects harm the downstream Arabs of Iraq?
3. Does Rojava have actual water management policies in 2022?
4. In a whole-of-basin approach to the Euphrates-Tigris, are the KRG and Rojava riparian partners in water management and water allocation?
5. What effect does American policy have on the KRG and Rojava?

Geography and Tigris Water Resources

The Kurdish governorates in northern Iraq border Turkey to the north, Iran to the east, and Iraq proper to the south (map 4.1). Elevations in the Kurdish mountains average about 2,400 meters and rise to more than 3,600 meters in the Zagros Mountains. The region can be divided into three geologic zones: the northern range of the Zagros Mountains, the central tran-

sitional mountain range, and the southern plains along the Tigris River.³ In millimeters (mm), annual precipitation totals corresponding to the zones are more than 500mm, 300–500mm, and below 300mm, respectively.⁴ The region has a Mediterranean climate with hot, dry summers and cool, wet winters. Approximately 80 percent of the region’s precipitation falls between the months of December and March.

The four major rivers in the Kurdish region are the Tigris, Great Zab, Little Zab, and Diyala. The Tigris, which forms the border of the Dohuk governorate for 138 kilometers before leaving the region, and the Great Zab have their headwaters in Turkey; the sources of the Little Zab and the Diyala are in Iran. The flow of the Tigris at the beginning of the twenty-first century as it enters Iraq was 21 billion cubic meters (BCM), and an additional 23 BCM was added from runoff within Iraq, nearly all of which comes from rivers in the Kurdish region.⁵ All tributaries to the Tigris enter from its left bank. The Great Zab contributed a flow of 13 BCM at its confluence with the Tigris; the Little Zab, 7 BCM; and the Diyala, 5.5 BCM. The al-Adhaim, a minor river, contributed less than 1 BCM.⁶ These numbers were all approximations of annual averages, and totals from one source may not accurately compare with numbers from another due to temporal variance and instrumental imprecision. Flow rates in 2022 are reported to have dropped precipitously.⁷

For surface water storage, the Kurdish region has two major dams: Dokan Dam on the Little Zab has a potential live storage capacity of 6.8 BCM, and Derbendi Khan Dam on the Diyala can store 3 BCM. Dohuk Dam has a capacity of 52 million cubic meters, and 12 small dams in the region have capacities ranging from 35,000 to 380,000 cubic meters.⁸ Total storage capacity in the Kurdish region is an estimated 10 BCM. However,

³ Carlo Travaglia and Niccolo Dainelli, *Groundwater Search by Remote Sensing: A Methodological Approach* (Rome: Food and Agriculture Organization of the United Nations [FAO], 2003), 3.

⁴ Zoran Stevanovic and Miroslav Markovic, *Hydrogeology of Northern Iraq*, vol. 1, *Climate, Hydrology, Geomorphology and Geology* (Rome: FAO, 2004).

⁵ Stevanovic and Markovic, *Hydrogeology of Northern Iraq*, vol. 1, 28.

⁶ UN-ESCWA and BGR (United Nations Economic and Social Commission for Western Asia; Bundesanstalt für Geowissenschaften und Rohstoffe), “Chapter 2–Tigris River Basin,” in *Inventory of Shared Water Resources in Western Asia* (New York: United Nations, 2013), 108.

⁷ “Iraq Is Waiting for a New Opponent in the Tigris because of the Carrot Dam,” *Haberler*, 19 August 2022.

⁸ “Ministry of Agriculture and Water Resources,” Kurdistan Regional Government, accessed 10 January 2023.

Map 4.1. The Kurdistan region



Source: courtesy of U.S. Business Council in Iraq, adapted by MCUP.

the current drought in the region has reduced the amount of water in the reservoirs. The dams associated with these reservoirs have electricity-generating capabilities of 120,000 and 37,000 kilowatt hours, respectively. The partially completed dam on the Great Zab would have a storage capacity of 8.3 BCM and produce 2,500 megawatt hours of power.⁹

The Kurdish region is part of the foothills aquifer system, one of five major systems in Iraq. Current renewable groundwater recharge in northern Iraq is 1.1 BCM/year. Karst (soluble rock) formations in the border folds zone show the potential to hold significant groundwater reserves. In fact, the Kurdish region is the most promising area of Iraq for

⁹ Stevanovic and Markovic, *Hydrogeology of Northern Iraq*, vol. 1, chap. 2.

groundwater development, having water quality sufficient for potable and irrigable uses. However, the transmissivity, or flow, in the region is high, meaning that depletion of the aquifer can easily occur if recharge rates are poorly understood.¹⁰

Water management and water use throughout Iraq are critically dependent on the north, where the main water resources of the Tigris River are located. The Tigris receives a significant amount of water from its left-bank tributaries that drain from the Zagros Mountains. The average annual flow of the Tigris entering Iraq is estimated at 21 BCM, and it is assumed that up to 50 percent of the Tigris's yield downstream of Baghdad originates in Iraq.¹¹ Water resource studies in the north were carried out in the past by outside companies, but limited documentation is available for analysis today because previously operational and well-equipped hydrological stations were destroyed. A water resources and irrigation project, which began under the United Nations' oil-for-food program in 2002, planned for at least 30 hydrologic recordings for northern Iraq's major rivers, but this work was not started and several years of network observations, such as collecting data analysis and correlation with the historical data, are still required.¹²

In 2008, the KRG began the bidding process for a feasibility study for three additional dams—one on the Great Zab, one on the Shamdinan (main tributary of Great Zab), and one on the Little Zab and tenders were extended in 2013. It is not clear if these projects were coordinated with the central Iraqi Ministry of Water Resources and data regarding their actual completion and operation is unclear. Continued development within the boundary of the KRG is bound to have an impact on the south, although it is difficult to quantify at this time (map 4.2). Increased salinization of the Tigris in southern Iraq has already been attributed to reduced flow due to upstream and northern tributary use.¹³

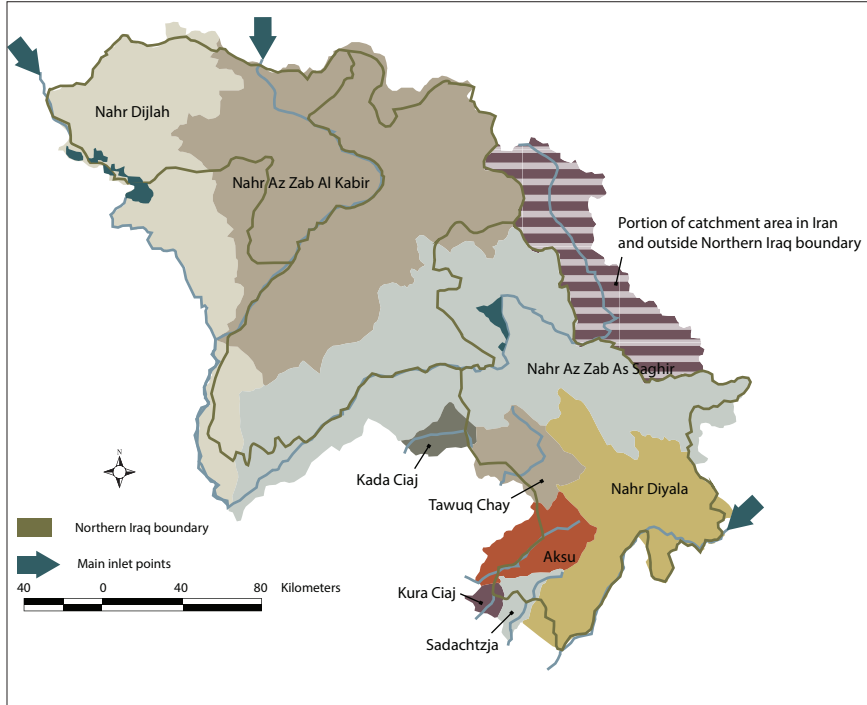
¹⁰ Stevanovic and Markovic, *Hydrogeology of Northern Iraq*, vol. 1, chap. 1.

¹¹ Stevanovic and Markovic, *Hydrogeology of Northern Iraq*, vol. 1, chap. 3.

¹² Stevanovic and Markovic, *Hydrogeology of Northern Iraq*, vol. 1; and "About the Programme: Oil-for-Food," Office of the Iraq Programme: Oil-for-Food, accessed 10 January 2023.

¹³ Sadik B. Jawad, "Integrated Water Resources Management of Diyala River Basin in Central Iraq Using System Dynamics Modeling" (unpublished research proposal, 2005), 15.

Map 4.2. Watersheds in the Kurdistan region



Source: adapted from Carlo Travaglia and Niccolo Dainelli, *Groundwater Search by Remote Sensing: A Methodological Approach* (Rome: Food and Agriculture Organization of the United Nations, 2003).

The Kurdistan Regional Government

In 2020, the KRG population has been estimated at 6,171,083 and the annual growth rates approximately 3 percent.¹⁴ The peculiar nature of the Iraqi federal state regarding the Kurdish areas has created “a state within a state.” It is noteworthy that the language of the KRG’s official website has been moderated considerably from what was described as the language of a siege mentality in the 2014 first edition of this work.¹⁵ The relationship between the KRG and the central Iraqi government is fragile, and the authorities granted to the federate are contested. Increasingly the KRG is acting as an independent player in affairs related to natural resources,

¹⁴ *Opportunities for Investment in Agriculture and Water Resources Sectors in Kurdistan Region–Iraq* (Erbil, Iraq: Ministry of Agriculture and Water Resources, KRG, 2020), 11.

¹⁵ “Agenda,” Kurdistan Regional Government, accessed 13 September 2022.

especially oil and water. This is the result of its status as a nearly autonomous region as established under the articles of the Iraqi Constitution.

The KRG and the Iraqi Constitution

The 2005 Iraqi Constitution was a bitterly contested and controversial document that pushed the debate and resolution of many key issues into the future. The constitution that emerged was a poor compromise solution that became necessary to achieve ratification.¹⁶ There are overlapping checks and balances that exceed those found in the U.S. Constitution, and the Iraqi federal government can be characterized as weak and decentralized. Section 4 of the Iraqi constitution outlines powers of the federal authorities. Of interest to this study is Article 110, which contains powers that are exclusive to the federal authorities including foreign policy and negotiating international agreements as well as policy “connected to water resources from outside Iraq.”¹⁷ Article 111 deals with oil and gas revenues and mandates that such resources and revenues are the property of the Iraqi people. Section 5 of the Iraqi Constitution (titled “Powers of the Regions”) was included in the 2005 version to rally the Kurds of northern Iraq to the cause of the central government. Under this section, provinces have the right to hold referendums so that they may form a united region.¹⁸ Regions have a legislative council and a president, which are elected by secret popular ballot. Under the constitution, regions may manage internal affairs such as education, social planning, cultural affairs, and local development projects, but they are prohibited from assuming powers reserved exclusively to the federal government. Effectively, the management of natural resources such as water, oil, and gas belong to the federal government rather than to regions or provinces.¹⁹

The Kurdish Regional Government and the Iraqi State

The foundations of the KRG originate from the time of the Gulf War in 1991 when the Kurds, supported by the United States, established what

¹⁶ Republic of Iraq Const., 2005.

¹⁷ Republic of Iraq Const., § 4, art. 110.

¹⁸ Republic of Iraq Const., § 5, chapt. 1, art. 119.

¹⁹ Republic of Iraq Const., § 4, art. 109–15.

amounted to an independent national state. Protected, encouraged, and heavily subsidized by the American government, the Kurds built a stable polity between 1991 and 1995, which fractured in a civil war. However, the Kurds recovered under a negotiated settlement to create a stable government. Kurdish expectations in post-invasion Iraq in 2003 included a spectrum of possibilities that ranged from independence to autonomy within a federal Iraq dominated by Kurdish politicians. The Kurds maintained and refused to disarm the Peshmerga, security forces that were trained and equipped in the American style as a conventional army. During the transitional period from 2003 through 2005, as the rest of Iraq devolved into anarchy, the Kurdish region remained stable. U.S. policy during this period discouraged autonomy and sought to bring the Kurds into the Iraqi government as a secular moderating force that might combine with an increasingly marginalized Sunni population to balance a hostile Shia population.²⁰ This was consistent with American policy toward Turkey, a NATO ally that has long opposed an autonomous or independent Kurdish polity.

The two principal Kurdish political parties, the Kurdistan Democratic Party (KDP) and the Patriotic Union of Kurdistan (PUK), orchestrated the formation of the region in 2006, becoming the first Iraqi federated region formed under the new constitution. In an unusually friendly manner, the KDP and PUK alliance produced Masoud Barzani as the region's president while Jalal Talabani became the country's first Kurdish president. These men, who were formerly bitter tribal enemies and competitors, appeared well matched and complementary in these roles—the diplomatic and suave Talabani was a fluent English speaker, whereas the nationalistic Barzani dressed in a military uniform with a traditional Kurdish headscarf. The KRG government rapidly established itself by creating a bureaucracy mirroring the federal government that appears to exceed the limitations imposed on “regions” in the new constitution. For example,

²⁰ Aram Rifaat, “U.S.-Kurdish Relations in Post-Invasion Iraq,” *MERIA (Middle East Review of International Affairs)* 11, no. 4 (December 2007).

the KRG has established robust consulates in Tehran and Ankara, which have effectively become quasi-embassies.²¹

Despite the Talabani presidency and significant Kurdish representation in the Iraqi parliament, relations between the KRG and the central government continued to erode between 2008 and 2012. The status of Kirkuk, which was to have been determined by a referendum conducted under the rules of article 140 of the Iraqi Constitution, has never been resolved and continues to be a point of contention between the central government and the Kurds. One report concluded that there can be no successful resolution of the Kirkuk issue because of the competing sensitivities of the Arabs, Kurds, and Turks.²² This line of thinking leads some to speculate that the best solution for Kirkuk is to place the city under some form of federal control, perhaps similar in governance to Baghdad, which enjoys an independent status under the Iraqi Constitution. The Iraqi federal government in 2022, as presented in chapter 2, continues to be politically fragmented and dysfunctional.

*The Kurdish Ministry of Natural Resources*²³

The policies of the KRG appear at odds with the concept of a national unity government and strong central state. For example, the 2005 Iraqi Constitution established Kurdish and Arabic as the two official languages in Iraq, thus allowing schools in the Kurdish-controlled regions to teach the curriculum only in Kurdish, resulting in an entire generation of young Kurds who are unable to speak or read Arabic today. Moreover, the well-trained and heavily armed Peshmerga have never been fully integrated into the Iraqi armed forces, and they remain largely outside the authority of the Iraqi Ministry of Defense. The KRG is avowedly expansionistic and has set its sights on annexing the oil-rich city of Kirkuk into the region and, to accomplish this, the Kurds have been actively engaged in population engineering aimed at changing the demographics of the city to achieve

²¹ See, for example, Beston Husen Arif, “KDP-PUK Strategic Agreement and Its Consequences for the Governing System in the Kurdistan Region of Iraq,” *Journal of Asian and African Studies* (2022), <https://doi.org/10.1177/00219096221146747>.

²² *Turkey and the Iraqi Kurds: Conflict or Cooperation?*, Middle East Report no. 81-13 (Washington, DC: International Crisis Group, 2008), 19–21.

²³ For more on the information covered in this section, see “Oil,” Ministry of Natural Resources, KRG, accessed 15 September 2022.

a Kurdish majority. There are even hints that the Kurds desire to annex portions of the northern metropolis of Mosul as well.²⁴ Both cities are surrounded by productive oil fields.

Of note to this study are the policies of the KRG relative to natural resources, particularly oil and natural gas, which provide a template for understanding how the KRG approaches the ownership of natural resources. In 2007, the KRG began to supplant the role of the federal government's constitutional mandate as the controlling entity over the region's oil fields and reserves. By 2008, the KRG Ministry of Natural Resources had opened bids for oil and gas exploration and development independently of the federal ministry of oil and, within a year, began to export oil. This has become the cause of much internal discord between the Kurds and the central Iraqi government because, under the constitution, oil is a federal and national resource. However, little if any of the KRG's oil revenue reaches the coffers of the central government, further exacerbating ill will and tensions between the parties.

According to an energy consultancy in the summer of 2022, An independent review of oil output and exports in Iraq's semi-autonomous Kurdistan region for the first three months of 2022 showed what is at stake in a row with Baghdad over sovereignty. The quarterly report, by accountancy firm Deloitte, showed the Kurdistan Regional Government (KRG) banked over \$1bn [billion] from oil sales, the highest for any quarter in three years. Exports, which mostly go by pipeline to the Turkish port of Ceyhan, were sold at an average \$86.73/bl [per barrel], the report said. But it highlighted a downward trend for exports from the beginning of the year, from 12.43mn bl [million barrels] in January to 11.30mn bl in February and 11.19mn bl in March. The dips in February and March coincide with a ruling by Iraq's supreme federal court that deemed the KRG's oil and gas law unconstitutional, since when the federal government has been taking steps to seize control of oil production and exports in the northern region.²⁵

²⁴ "Protests in Mosul over Annexing Parts of City to Kurdistan," *Kurdish Globe*, 4 July 2009.

²⁵ "Iraq KRG Oil Sector 1Q 2022 Audit Reveals High Stakes," *Argus*, 19 July 2022.

Figure 4.1. Iraqi banknote depicting Dokan Dam (on the right), Kurdistan, northern Iraq



Source: Central Bank of Iraq, adapted by MCUP.

ABC News further noted that Iraq’s oil ministry will act soon to annul the Kurdish oil deals.²⁶ Whether the Kurds will submit to a decision is doubtful.

Since the KRG’s oil and gas is piped through Turkey and Iran, Baghdad exerts no control over its export and has no ability to interdict or stop its export. The revenue stream produced by the export of the KRG’s energy is significant and continues to be a point of constitutional contention between Kurds and their fellow Arab citizens. In the authors’ view, the KRG’s intransigent positions on the ownership and proceeds of energy produced in the Kurdish regions of Iraq provide a template for understanding how the KRG will approach water. This is reinforced by the fact that the KRG independently opened tenders for dams on the Greater and Little Zab Rivers without consultation of or approval from Baghdad. Therefore, it is probable that, in a future of restricted or reduced water flow in the Tigris River and its tributaries, the KRG will act in its own interests rather than those of the Republic of Iraq. This would mean that the KRG, like its approach to energy, would be uncooperative in matters of water allocation and water management.

²⁶ “Oil Minister Says Iraq to Act to Annul Kurdish Oil Deals,” ABC News, 7 July 2022.

The Kurdish Ministry of Agriculture and Water Resources

The Kurdish Ministry of Agriculture and Irrigation is sometimes seen in print as the Ministry of Water Resources. The ministry's mission aims at achieving "self-sufficiency of basic foods and water, through the best usage of natural resources, financial and human resources and also the maximum utilization of foreign expertise and advanced technology."²⁷ The ministry has established a protective position for its agricultural industry by passing regulations that "ban the import of vegetables into the region for the purpose of protecting domestic agricultural production and promoting farmers to increase their production, and at the same time help them market their products." The ministry has also been very active in bringing foreign technical advisors and funding into the KRG independently of oversight by the Baghdad government. In 2022, the ministry is actively constructing new irrigation systems, including fostering efficient water usage through economic incentives. The ministry aims to construct new "strategic dams" in the region through public-private partnerships.²⁸ All of which portends a larger agricultural industry and, in turn, greater use of the available water.

Geography and Euphrates Water Resources

Data on the Euphrates River as it flows through Syria is problematic because of the ongoing civil war and, in 2022, parts of the basin in Syria should be considered as ungoverned spaces (map 4.3 shows the areas of Syria that are not under the control of the Syrian government). Geographically, the Syrian portion of the Euphrates River covers 661 kilometers. Three tributaries flow into the Euphrates in Syria — the Sajur, the Balikh, and the Khabour Rivers — which are all fed by tributaries or groundwater from Turkey. These three subbasins are therefore shared between Syria and Turkey.²⁹ Except for seasonal tributaries south of the Khabour, the Euphrates has no other tributaries in Syria or Iraq. Their contributions

²⁷ *Opportunities for Investment in Agriculture and Water Resources Sectors in Kurdistan Region–Iraq* (Erbil, Iraq: Ministry of Agriculture and Water Resources, KRG, n.d.), 9.

²⁸ *Opportunities for Investment in Agriculture and Water Resources Sectors in Kurdistan Region–Iraq*, 48. See page 49 for a comprehensive chart of the nine strategic dams (in Arabic).

²⁹ "Chapter 1, Euphrates River Basin," in *Inventory of Shared Water Resources in Western Asia* (Beirut: United Nations Economic and Social Commission for Western Asia, 2013).

depend on the intensity and volume of precipitation and, increasingly, on water use and drainage in upstream irrigation areas. In Iraq, there are no major surface water contributions to the Euphrates except for rare runoff events generated by heavy storms.

Historically, the natural annual flow of the Euphrates at the Syrian-Turkish border was around 30 BCM. However, data records for the last 70 years show a negative trend, indicating a decrease in mean annual flow to about 25 BCM.³⁰ A 2013 report showed that

For the common period 1974–1998, the comparison between the stations shows an obvious reduction in the mean annual flow volume from 25.1 BCM at Jarablus to 22.8 BCM at Hit and 14.7 BCM at Hindiyah. Droughts and the construction of dams account for the diminishing flow volumes along the mainstream. For the period 1990–2010 mean annual flow volume at Hussaybah is lower than at Jarablus, which suggests a water consumption of about 6 BCM between the two stations. The flow is also reduced between Hussaybah and Hindiyah but a complete data record was not available for the most downstream station Hindiyah.³¹

Along its course in Syria, the Euphrates River receives groundwater from aquifers in the western part of the river catchment. The discharge quantities are, however, insignificant in comparison to the total river flow. In the eastern part of the catchment in Syria, the Euphrates River receives important inflows from spring discharges. However, it must be noted that in northern Syria, agriculture is partly rain-fed with seasonal supplementary irrigation. “Nevertheless, Syria depends largely on the Euphrates as more than 50% of the blue water used in the country is abstracted from the basin.”³²

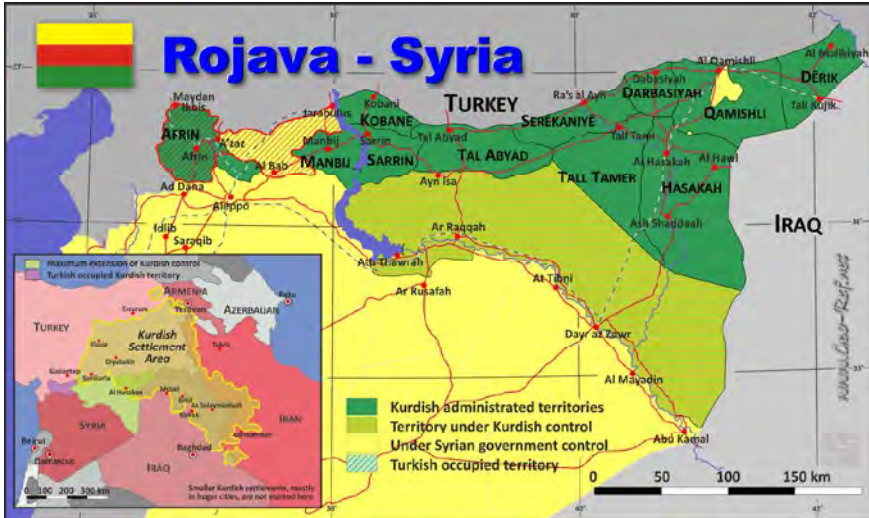
Politically, the 661-kilometer-long Syrian portion of the Euphrates River is contested between the parties in the ongoing Syrian Civil War. In 2022, control of the first 70-plus kilometers of the Euphrates as it enters Syria is split with Turkish-backed rebels on the right bank and rebel YPG/

³⁰ “Chapter 1, Euphrates River Basin,” 58.

³¹ “Chapter 1, Euphrates River Basin,” 59.

³² “Chapter 1, Euphrates River Basin,” 65.

Map 4.3. Rojava, Syria, and areas of Kurdish control



Source: Geo-Ref.net, adapted by MCUF.

SDF forces on the left bank. After that point, the YPG/SDF controls the river for the next 200 kilometers, including the massive Tabqa Dam, as it flows south to a point in the vicinity of al Jazrah. From there to the Iraqi border, the YPG/SDF controls the left bank while al-Assad’s Syrian government forces control the right bank. How long this political landscape will remain in its current form is problematic at best.

Rojava

Rojava is an independent statelet in northeast Syria with a population estimated at 2–4.6 million (not all of whom are Syrian Kurds).³³ However, a constantly shifting flow of refugees makes an accurate count difficult, but a fair estimate may be around 3 million people in the areas controlled by the YPG and SDF. The administration of Rojava is dominated by the PYD, which is an offshoot of the Turkish PKK. The PYD carries forward many of the revolutionary socialist ideologies of the PKK into what is presented to the world as a democratic polity. The ideology of the PYD is

³³ “Rojava in Syria: Growing Local Democracy and Defending Ecology in the Midst of Conflict,” Rapid Transition Alliance, 1 October 2019.

Figure 4.2. Inefficient groundwater pumping to fields near Rojava



Source: photo by Frederick Lorenz.

characterized by decentralized populist local councils, the advancement of women’s rights, a communal economic system, and a society based on the good of the many.³⁴ As a polity, Rojava is described as governed by democratic confederalism.³⁵ Its military arm is the American armed and trained YPG.³⁶ In 2022, the actual extent of the territory controlled by Rojava and the associated Kurdish SDF is unclear (map 4.3 delineates the approximate areas of control in 2022), but is true that, since 2015, Syrian Kurds and associated rebel forces control almost all of the entire left bank of the Euphrates River from the Turkish to the Iraqi border.

In 2022, Rojava is a de facto statelet with a loosely organized political administration. However, there is consensus among geopolitical ob-

³⁴ Cihad Hammy and Thomas Jeffrey Miley, “Lessons from Rojava for the Paradigm of Social Ecology,” *Frontiers in Political Science* 3 (10 January 2022): 4–5, <https://doi.org/10.3389/fpos.2021.815338>.

³⁵ Jim Zanotti and Clayton Thomas, *The Kurds in Iraq, Turkey, Syria, and Iran* (Washington, DC: Congressional Research Service, 2019), 2.

³⁶ See Michael Knights and Wladimir van Wilgenburg, *Accidental Allies: The U.S.–Syrian Democratic Forces Partnership Against the Islamic State* (London: I. B. Tauris, 2021) for a comprehensive treatment of the YPG and its military history through 2021.

Figure 4.3. Khabur River surrounded by debris in Rojava



Source: photo by Frederick Lorenz.

servers and regional specialists that the continuing existence of Rojava depends upon the support of the United States and the tolerance of Turkey.³⁷ Rojava's future in a post-conflict scenario is extremely uncertain with possibilities ranging from the region's eventual incorporation into a democratized and federalized Syrian republic to full blown occupation by Turkey. Rojava's economy depends on American assistance and on selling crude oil trucked to neighbors from the formerly Syrian-owned oil fields, making Rojava something of a petrostate.³⁸ The domestic economy is largely agricultural and relies heavily on irrigation from the Euphrates River dams and irrigation systems.

Since the 1970s, northeast Syria has relied on the Tabqa Dam, more commonly known as the Euphrates Dam, which is the largest dam in Syria. ISIS seized the Tabqa Dam in 2014 and held it until 2017. During

³⁷ Knights and van Wilgenburg, *Accidental Allies*, 10.

³⁸ The term *petrostate* refers to a small, oil-rich country where central institutions are weak and wealth/power lie in the hands of few. See Emma Ashford, "The Problem with Being a Petrostate," *Foreign Policy*, 19 June 2022.

this time, the dam sustained damage and fell into disrepair. Although it was on an American “no-strike” list, Coalition air strikes on 26 March 2017 inflicted more damage on the dam.³⁹ In May 2017, American-backed Kurdish SDF forces recaptured the town of Raqqa and the Tabqa Dam. It is unclear in 2022 exactly who controls the dam, but it is certain that Syrian Kurds, either the PYD or the SDF, hold and operate the hydroelectric and irrigation infrastructure. It is equally unclear what capacities have been maintained but, once again, it is certain that both the electrical and water supply in the region have decreased significantly. To what extent this is due to inadequate repair or inefficient operation or to the well-known problem of the decreasing flow of the Euphrates River remains to be seen.⁴⁰

According to a recent article,

The dam was intended to power a hydroelectric power station with eight turbines capable of producing 880MW per hour and irrigating an area of 640,000 hectares on either side of the Euphrates River. The dam never reached its full potential in either of these objectives, and the power it produces is nowhere near enough to meet the needs of the millions of people now living in the autonomous regions of northeast Syria. (On a good day, the dam receives about 300M/s of water and can produce 200MW/h of electricity.) Electricity is therefore normally only available for four to 12 hours a day, most communities, therefore, rely on crude diesel generators to make up the gap. This crude diesel, known as “mazut,” is also used to power cars and for heating homes. Mazut is the main source of air pollution in northeast Syria, while the earth suffers run-off pollution from oil extraction using low-quality, outdated equipment. (Tabqa is also supplemented by one small oil-powered power station and another smaller dam upstream).⁴¹

³⁹ Dave Phillips, Azmat Khan, and Eric Schmitt, “A Dam in Syria Was on a ‘No-Strike’ List. The U.S. Bombed It Anyway,” *New York Times*, 20 January 2022.

⁴⁰ “NGOs in Northeast Syria Warn of Low Water Levels in Hydroelectric Dams,” *Al-Monitor*, 25 May 2021.

⁴¹ Matt Broomfield, “Rojava Is Trying to Build a Green Society, but Turkey Is Starving It of Water and Power,” *Novara Media*, 15 February 2021.

In terms of water management, the Rojava administration aspires to become a sustainable green ecology and economic system. However, much of this effort seems to be generated from nongovernmental organizations (NGOs), such as the Mesopotamian Ecology Movement and Make Rojava Green Again. In the apparent absence of a functional Rojavan water and agriculture ministry, information from NGOs provides almost all of what is known about the current situation on the ground in the Kurdish held areas of northeast Syria.⁴² The known decrease in available water for irrigation is compounded by a severe regional drought crippling Syrian farmers. A recent report from the Dutch NGO PAX asserted “north-east Syria’s wheat harvest at around 400,000 tons in 2021, 60 percent less than the previous year’s takings.”⁴³ Among the area’s pastoralists, livestock herds have halved because of the unavailability of fodder and water. There is consensus between the UN and NGOs that Syria is edging toward a food crisis this year in an area that international relief organizations have little ability to influence or to render meaningful aid.

The United States maintains a large base in Syria at al Tanf, near the intersection of the Syrian, Iraqi, and Jordanian borders, and in 2022 some 900 American soldiers were deployed in Syria.⁴⁴ Included within that number are hundreds of Americans who are deployed in Rojava as well as in the SDF-controlled areas of northeastern Syria, such as al Hasakah and ar Raqqah Provinces. The American presence is primarily to train and equip the PYG/SDF and to conduct counterterrorism missions, both of which are aimed at preventing the resurgence of ISIS. The United States has military-to-military agreements in place in Syria with Russia and Turkey, which involve the establishment of “safe zones,” joint patrolling, and engagement deconfliction in “deconfliction zones.”⁴⁵ In 2022, the duration of the American presence in Syria is open ended and its end state and outcome uncertain.

⁴² Alannah Travers, “Conflict and Climate Fragmenting Rojava: New Report,” Rûdaw, 16 February 2022.

⁴³ Peter Schwartzstein and Wim Zwijnenburg, *We Fear More War. We Fear More Drought. How Climate and Conflict Are Fragmenting Rural Syria* (Utrecht, Netherlands: PAX, 2022), 8.

⁴⁴ “Why Does the US Still Have Forces in Syria?,” *Al Jazeera*, 24 August 2022.

⁴⁵ James Dobbins et al., *Extending Russia: Competing from Advantageous Ground* (Santa Monica, CA: Rand 2019), 105–7, <https://doi.org/10.7249/RR3063>.

The United States and the Kurds

Since the end of the First Gulf War in 1991, the United States has favored and fostered Kurdish autonomy in Iraq. Operations Provide Comfort I and II and Northern Watch protected the Iraqi Kurds, enabling them to achieve autonomy and build substantial military capacity. In 2003, they assisted the Americans in liberating Kirkuk and its surrounding area. In the years following the establishment of the KRG, the United States treated the KRG as a full bilateral diplomatic, military, and economic partner. Later, the KRG's Peshmerga was instrumental in defeating ISIS in Iraq in 2016 and in recovering Mosul in the summer of 2017. In addition to the U.S. affirmation of the KRG's autonomy, 32 countries, the UN, and the EU maintain consulates to the KRG in Erbil (rather than consulates to the Republic of Iraq in the Kurdish provinces).⁴⁶ It is easily argued in 2022, that the KRG is accepted internationally as a de facto independent polity.⁴⁷

The United States provides (and has provided) military, economic, and humanitarian aid directly to the KRG, rather than through the Baghdad government. In 2016, when the Iraqi Army completely collapsed in the face of the ISIS invasion of Iraq, the Peshmerga stood firm and proved combat capable. It is easily argued that, without the Peshmerga and the Iraqi militias, Iraq would have fallen to ISIS. This has endeared the Peshmerga to the American military and is one of the reasons why the United States continues to provide military aid directly to the KRG. For example, the United States pledged \$250 million in military aid directly to the KRG in 2020.⁴⁸ Some of this aid — 150 Humvees, transport vehicles, fuel transport vehicles, and various weaponry — were distributed directly to the 14th and 16th Peshmerga Brigades in late 2020.⁴⁹ In January 2021, the United States provided \$12.5 million in military aid and equipment directly to the Peshmerga.⁵⁰ The Baghdad government knows this, of course,

⁴⁶ See "Diplomatic Representations in Kurdistan," KRG, accessed 14 September 2015.

⁴⁷ See "Foreign Relations: A Strong and Trusted Global Partner," Ministry of Foreign Relations, KRG, accessed 14 September 2022.

⁴⁸ Mustafa Shilani, "US Pledges Nearly \$250 Million in Military Equipment to Kurdistan Region," Kurdistan24, 15 September 2020.

⁴⁹ Mustafa Shilani, "Washington Delivers Advanced Military Aid to Kurdistan Region," Kurdistan24, 10 November 2020.

⁵⁰ Alvarro Escalonilla, "US State Department Gives \$12.5 Million in Military Aid to the Peshmerga," Atalayar, 8 January 2021.

but the United States easily bypasses the Iraqi Ministry of Defence. Mirroring direct military aid, in terms of humanitarian and economic aid, the bulk of American assistance is being provided to the areas in Iraq north of Baghdad and, most heavily, in the KRG, Mosul, and Kirkuk.⁵¹

Similarly, the United States continues to train and equip the PYG in northern Syria to maintain a proxy fighter in Syria positioned against a return to ISIS. President Donald Trump attempted to pull American forces out of Syria entirely in December 2018, but was persuaded otherwise by the DOD and Congress. The United States continues to provide significant military aid to the PYD; according to Turkish media, the United States provided \$2 billion in military aid to the YPG in 2016–21, rising to \$3 billion counting the contributions of the Gulf States.⁵² In 2022, the U.S. defense budget of \$778 billion allocated \$177 million in aid to the YPG. Subject matter experts specializing in the region (e.g., Michael M. Gunter, Henri J. Barkey, Hakan M. Yavuz, and Soner Çağaptay) believe that support for the YPG will continue in the near term but that, in the end, the United States will not commit to long-term support for the Syrian Kurds.⁵³

The Challenges Facing Iraq

In terms of the allocations and management of water in the Euphrates-Tigris basin, Iraq's challenges in 2022 are far more complicated than they were in 2014. More detail is provided in chapter 5. Previously, allocation and water management of the basin conveniently fell into the hands of three riparian nation-states. In 2022, allocation and water management are made far more complex by the Kurdish situation because the Euphrates River in Syria is largely controlled by rebel Kurdish forces (Rojava and the SDF) and the upper Tigris River in Iraq is controlled by the KRG. In the previous situation, before the Syrian Civil War, three nation-states approached Euphrates-Tigris water management on a unitary whole-of-basin basis. It would be problematic today to assume that the KRG and Rojava/SDF would be cooperative partners in water man-

⁵¹ *Iraq-Complex Emergency* (Washington, DC: USAID, 2022).

⁵² Betül Usta, "Despite Turkey's Concerns, US Provides \$2B Support to YPG Terrorists," *Daily Sabah*, 28 September 2021.

⁵³ Esra Gürçay, "The U.S.-YPG Relationship: U.S. Foreign Policy & the Future of the Kurds in Syria and Turkey," Middle East Policy Council, accessed 14 September 2022.

agement regimes or regional planning endeavors. How Iraq balances its relationship with the independent and autonomous Kurds regarding Turkish and Syrian sensibilities will be critically important in the future.

The federal Iraqi government faces difficult decisions in its relationship with the KRG over the thorny issue of who owns the country's natural resources. The Iraqi Constitution definitively answers this question and the Iraqi courts have consistently reaffirmed that natural resources are federally owned and federally managed. However, the KRG refuses to abide with the legal decisions on the Iraqi Constitution by effectively hijacking the Kurdish region's oil and gas resources. If this behavior by the KRG about energy repeats itself over water as the supplies of water decrease, the federal Iraqi government will face even more difficult decisions. While the hijacking of oil and gas revenues mainly affects the income of the federal government, a similar hijacking of water resources affects the well-being and livelihood of the downstream Iraqi Arabs, who make up most of the people in Iraq.

Iraq is the downstream riparian with the most to lose as climate change brings hotter temperatures and less water flow in the Euphrates-Tigris River (see chapter 5). How Iraq deals with such a predictable and dismal future is a huge challenge. Petro dollars certainly provide a revenue stream, but whether the dysfunctional federal government can efficiently turn the nation to solving these problems is another issue. Iraq will certainly need help from the United States and from the international community. But, in 2022, the Iraqi government has distanced itself from the United States and shows signs of further estrangement. How Iraq balances its relationship with the United States against those of neighboring Iran and its own internal Shia community will also become increasingly important in the future.

Assessment of Kurdish-Related Water Issues on Iraq

Based on the authors' research, we can provide some tentative answers to the questions posed at the beginning of the chapter:

1. *Do the KRG's water and agricultural policies compete with or complement those of the Iraqi federal state?* For the moment, the KRG and the Baghdad government do not appear to have differences in public

policy matters on Tigris River water.⁵⁴ However, the Iraqi minister of water resources recently said that climate change will turn the country into “a land without water by 2040.”⁵⁵ We judge that during the next 15 years that the better-organized, more efficient, and American-backed KRG would probably complete and expand their planned projects, thus throwing them into competition with the downstream Iraqi Arab populations. This is magnified by the assessment that the KRG will treat water as a resource like it treats oil as a resource, thus becoming increasingly uncooperative in water allocation and water management as climate change negatively affects the Tigris River and its tributaries in the future.

2. *When completed, will the KRG’s projected water projects harm the downstream Arabs of Iraq?* There is no question that increases in the KRG’s planned expansion of its agricultural sector will require increased irrigation, thereby reducing the Tigris River’s flow and more than likely increasing agricultural runoff loaded with fertilizers and pollutants as well.
3. *Does Rojava have actual water management policies in 2022?* Rojava has aspirational objectives in water management and for the greening of its economy. However, there is neither an administrative architecture or apparatus for this nor is there funding available to achieve its publicly stated narrative. Moreover, the technical expertise to achieve Rojava’s aspirations is nonexistent at the present time.
4. *In a whole-of-basin approach to the Euphrates-Tigris, are the KRG and Rojava riparian partners in water management and water allocation?* The KRG is a de facto Tigris River riparian partner now and it has a mature and talented civil service as well as technical expertise in the civilian sector. However, if the KRG continues its current political trajectory, it will be increasingly autonomous in the foreseeable future and it will act in its own self-interest regarding its natural

⁵⁴ For detailed information, see “The General Authority for Irrigation and Reclamation Projects,” Iraqi Ministry of Water Resources; and “Ministry of Agriculture and Water Resources,” KRG, accessed 14 September 2022.

⁵⁵ Dale Gavlak, “UN, Experts Warn of Serious Water Problems for Iraq,” Voice of America, 20 June 2022.

resources. This is especially probable if the Baghdad government collapses or becomes even more dysfunctional than it is today.

We project the life expectancy of Rojava as a Euphrates River riparian partner to be short-lived. While Rojava exists in 2022, it will probably not exist in the long term (especially should Donald Trump or a similarly minded American president return to office in 2025). Alternative scenarios include the al-Assad regime regaining full control of northeast Syria or restoring federal control to at least some areas along the banks of the Euphrates River.

5. *What affect does American policy have on the KRG and Rojava?* The Middle Eastern policies of the United States favor the Iraqi Kurds, who are seen as courageous fighters, Western thinkers, and stable partners in an unstable region. The United States will certainly continue to support the KRG; however, this inevitably weakens the Baghdad government as well as creates distrust of the United States among the Shia and Sunni populations of Iraq. By enabling higher levels of KRG autonomy, the United States may be fostering the dissolution of Iraq as a nation-state.

Rojava as a state exists entirely on the funding, military support, and goodwill of the United States. Absent a revival of ISIS, American aid to the Syrian Kurds will surely decline in the future. Moreover, American aid to the Syrian Kurds and rebels could evaporate quickly should the United States decide to repair its weakened Turkish-American strategic partnership. Alternatively, a revived al-Assad regime would surely, at some future date, attempt to reclaim the northeast territory of Syria. In any reasonable scenario, Rojava has a limited future, and the uncertainty of its continued existence contributes to regional instability.

Overall, it is obvious that the geography of the KRG and the Syrian Kurdish controlled areas of the Euphrates-Tigris basin add far greater complexity to effective water allocation and water management in the future. It is equally persuasive to argue that contemporary American policies favoring the KRG and Rojava/SDF rather than Iraq and Turkey contribute more to regional instability than to stability. In fact, American policy re-

garding Rojava and the SDF is increasingly alienating Turkey from its historical role as a reliable and friendly partner of the United States. These are hard truths for Americans because any solution to the water problems in the Euphrates-Tigris basin will ultimately depend on a friendly and cooperative Turkey as the principal upstream riparian, a governable state in Syria, and a functional government in Baghdad.

CHAPTER 5

Water Deficit and the Impact of Climate Change

This chapter will attempt to answer a preliminary question mentioned in the introduction as well as several related questions. First, what are the current and future demands for fresh water in the Euphrates-Tigris basin? Is there a fresh water deficit in the basin and, if so, how can this be measured? What will be the impact of major water and development projects, including the GAP (Southeastern Anatolia Project) in Turkey? In particular, how will Iraq, as the downstream riparian, be affected by these projects? The situation in Syria is relevant to Iraq since the entire flow of the Euphrates passes through Syria before it reaches Iraq. Finally, how will climate change impact the situation in the next 10–20 years?

It should be stated at the outset that water deficit is a subjective concept, based on uncertain statistics such as increasing populations and changing patterns of agriculture. Simply stated, *water deficit* refers to the difference between water supply and water demand. But in the Middle East, nothing is as simple as it seems. First, who are the “riparians” who geographically share the waters of the basin? The twin rivers of the Euphrates and Tigris originate in Turkey and traverse Syria and Iraq on their way to the Persian Gulf. The Euphrates (Turkish: *Firat*) is the dominant river in terms of volume to Syria, while the Tigris (Turkish: *Dicle*) provides a greater portion of Iraq’s water needs. Iran is a major regional player

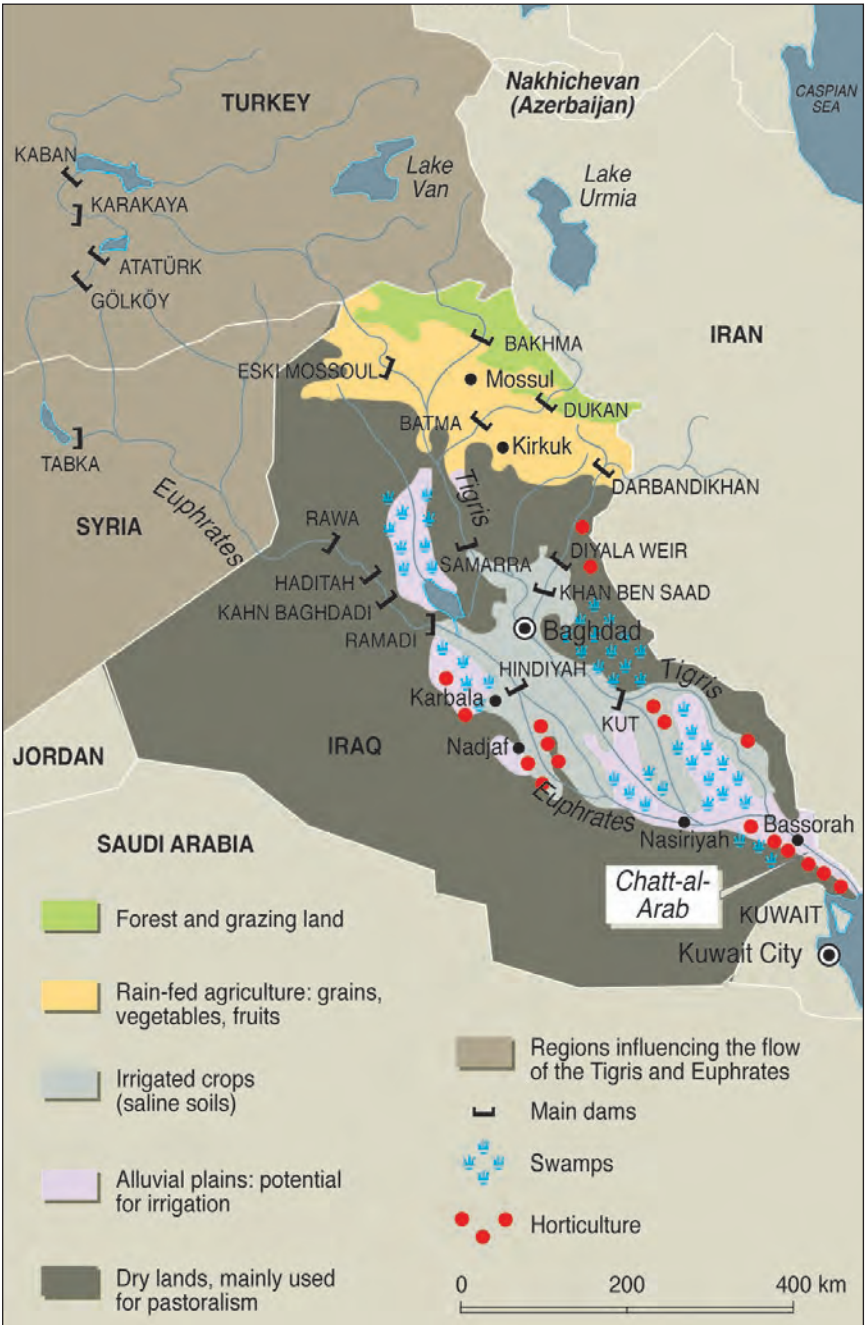
in terms of politics, economics, and military affairs, but increased dam building in Iran is already having an impact that will be assessed later in this chapter. The term *riparian* is used here to describe the three principal countries in which the twin rivers flow — Turkey, Syria, and Iraq— including special consideration of the Kurdish entities in Iraq and Syria.

Water Quantity and Water Quality

Large volumes of water flowing in rivers are not easy to calculate and compare. Water quantity in this section will be given in billion cubic meters (BCM) and flow rates in cubic meters per second (CMS). There is room for confusion because water volume is sometimes given in cubic kilometers, and one cubic kilometer happens to be the same volume as one BCM. It is more common in the United States to describe volumes of water in acre-feet, the volume of water it would take to cover one acre to a depth of one foot. This term is common in many U.S. water management agreements; the Colorado River Compact, for instance, divided 15 million acre-feet (MAF) of water per year among seven western states. As a point of comparison, 1 MAF is the equivalent of 1.235 BCM, and a flow rate of 1 CMS equals 3.53 cubic feet per second (CFS), the common U.S. measurement for the rate of flow. In this chapter, in addition to BCM and CMS, we will also be using hectares, a unit of land measurement common in the Middle East; 1 hectare (10,000 square meters) equals approximately 2.47 acres.

Water quality is a factor that is often overlooked in water basin research, but the impact of declining quality in the Euphrates-Tigris basin has been greater, and more immediate, than declining water quantity. Rivers may not literally dry up, but water quality will reach a point where agriculture becomes impossible and human health is seriously affected. Statistics for water quality are even more difficult to research than for water quantity, but statistics on salinity have become more available in the past 10 years. For large agricultural projects such as the GAP in Turkey, irrigation water will inevitably return as groundwater or to the river itself as return flow. The water quality prognosis for the Euphrates-Tigris basin is precarious and will be covered in greater depth later in the chapter.

Map 5.1. The Euphrates-Tigris River basin, including main dams and land use



Source: map by Philippe Rekacewicz, UNEP/GRID-Arendal, adapted by MCUP.

Groundwater

Groundwater is generally overlooked in the analysis of river basins, not merely because it is below the surface, but because the data is less obvious and available.¹ Groundwater in aquifers is an important resource for crop irrigation and drinking water in Turkey. It also sustains streams during dry periods. Groundwater takes months to rebound from drought, since it must be slowly and steadily replenished by surface moisture seeping through permeable soil and rock to the water table. Remote sensing technology now can monitor and measure depletion of groundwater resources. One NASA study in 2021 estimates a 25-percent reduction in soil moisture in the root zone—the top meter (39 inches) of soil—as of 11 January 2021 in the Konya area of Turkey.² This implies a corresponding depletion of groundwater as a result of a three-year drought.

News reports in 2022 indicate that Turkish water resources are shrinking at an alarming rate, and this of course implicates future conditions for the downstream neighbors. The chair of the Turkish Water Policies Association noted that “drinking and utility water drawn in the last 27 years is twice as much as our population growth. In other words, while our population has increased by 45 percent in the last 27 years, drinking and utility water withdrawals have increased by 100 percent.”³

All questions of freshwater water availability relate to the fundamental issue of supply and demand. In his book, *The Middle East Water Question*, Dr. Tony Allan predicted a steadily increasing water deficit for the Middle East and North Africa (MENA) region as demand outstrips supplies in this century.⁴ Water demand can be reduced by conservation or similar means, but that requires careful planning and an effective national regulatory system. A water management expert at the Istanbul Policy Center stated in 2021 that “instead of trying to reduce our water demand, or decrease the amount lost through broken pipes and leaks, we

¹ Abhijit Mukherjee et al., *Global Groundwater: Source, Scarcity, Sustainability and Solutions* (Amsterdam: Elsevier Press, 2020), 85, <https://doi.org/10.1016/B978-0-12-818172-0.00046-3>.

² Kasha Patel, “Turkey Experiences Intense Drought,” NASA Earth Observatory, 11 January 2021. More detail on NASA’s remote sensing can be found in chapter 7.

³ “Turkey’s Groundwater Sources Shrinking, Report Says,” *Hurriyet Daily News*, 30 November 2021.

⁴ J. A. Allan, *The Middle East Water Question: Hydropolitics and the Global Economy* (London: I. B. Tauris, 2002), 11.

are just focused on creating more supply by building new dams.”⁵ But this approach has limitations and will certainly contribute to a more difficult situation in the long term.

It is widely accepted that 90 percent of the surface flow of the Euphrates originates in Turkey.⁶ But a basic understanding of hydrology and the water cycle reveals that surface waters regularly interchange with groundwater, and this exchange includes contaminants. In 2022, the Syriac (Aramean–Assyrian–Chaldean) press reported that Turkey’s complete cutoff of the Khabur River during the past two years could soon lead to a humanitarian catastrophe in northern Syria.⁷ Since the Euphrates flows through Syria and on to Iraq, any reduction in flow will have major consequences downstream.

Water Information as a State Secret

One of the challenges of research on this subject is the widely varying and inconsistent figures available. Turkey has a sophisticated and comprehensive monitoring system tied to the operation of its dam system that is centralized in Ankara at the Directorate of State Hydraulic Works (DSI). Syria has not been able to effectively monitor water data during the past 10 years due to armed conflict and other restraints. Although some improvements in data availability have been noted during the past several years, release of data is selective and still viewed as a matter of state security. When data becomes available in a scientific publication, it is difficult to analyze in the absence of a central repository. This can be compared to the cooperative water management systems in Europe and North America, which have relatively plentiful water, transparent data mechanisms, strong economies, and a high level of cooperation between riparian states. And when there is a water dispute in the United States or Europe, there are judicial mechanisms available to resolve the issue. This is not true for the international waters of the Euphrates-Tigris basin (see chapter 6 for more detail).

⁵ Jennifer Hattam, “Climate Shifts and Rising Demand Leave Turkey Battling Ground Water Stress,” Prevention Web, 10 May 2021.

⁶ See, “AQUASTAT–FAO’s Global Information System on Water and Agriculture: Country Profile–Turkey, 2008,” Food and Agriculture Organization of the United Nations (FAO), accessed 27 November 2022.

⁷ “Decreased Flow of the Euphrates and Khabur Rivers Foretell Potential Humanitarian Catastrophe in North and East Syria and Iraq,” *SyriacPress* (blog), 5 November 2022.

Each riparian state that has control of water statistics knows the political significance of the numbers, and the figures may differ by a factor of five to one. This is a phenomenon common in the Middle East wherein each state tends to release numbers that will support its own position. For instance, the upstream riparian tends to underestimate the amount of water available for release downstream. The downstream state may overestimate the amount available upstream and underestimate the amount available within its own borders. Upstream states are reluctant to reveal water quality measurements that might show pollution levels released downstream. Downstream states, in turn, will try to avoid data that shows the inefficient and wasteful use of their own precious water supply. But the new technology described in chapter 7 may provide at least a partial solution to revealing and sharing water data.

Water Optimists and Water Pessimists

Secrecy issues are further complicated when “outsiders” attempt to evaluate the conditions in a particular basin. Outsiders might be grouped into two widely divergent camps—water pessimists and water optimists. How can we reconcile the view of doom and gloom with a more benign perspective? One scholar described the issue this way:

It is a paradox that the water pessimists are wrong but their pessimism is a very useful political tool which can help the innovator to shift the eternally interdependent belief systems of the public and their politicians. The water optimists are right, but their optimism is dangerous because the notion enables politicians to treat water as a low policy priority and thereby please those who are prospering under the old order.⁸

Even if there were some agreement on the amount of water available, there are so many factors affecting demand, including predictions of population increases and efficiency of use, that the determination of a possible water deficit becomes more a matter of art than science. The imprecision of current estimates is immense, and population predictions are specula-

⁸ Allan, *The Middle East Water Question*, 3.

tive for most water basins in the next 20 years. What should be a reasonable per capita estimate of water usage in the dynamic political economies of the future? There are wide variations when considering water demand for food, domestic, drinking, municipal, industrial, and leisure purposes. Should we consider “virtual” water, the amount of water embedded in imported food that will naturally replace water that is evident and drawn locally as surface or groundwater?⁹

In this chapter, we will attempt to arrive at some conclusions, using data from the countries concerned and from experts who monitor the situation. United Nations standards consider countries with a per capita water availability below 1,000 cubic meters (CM) per year to be in water deficit.¹⁰ Although the underlying figures are controversial, this measure provides some basis for comparison.

Turkey: The Dominant Riparian

Turkey stands on the dividing line between Europe and Asia and has tremendous diversity in terms of its population, geography, and climate. The population of Turkey is about 85 million, with 65 percent of its inhabitants living in urban areas.¹¹ The poorest and least developed region of Turkey is the Southeastern Anatolia region, which has been subject to a long-standing conflict between the government and Kurdish separatists.

In the 1950s, the government’s economic policies attempted to revive agriculture by bringing mechanization to Turkey. The results of these policies were generally successful in moving the primitive Turkish economy into the twentieth century. In practical terms, however, these economic and agricultural plans tended to develop only the western areas of the country. Thus, while Thrace, the Aegean areas, and the Anatolian heartland of Turkey gained much, the Southeastern Anatolian region fell further behind, as did the expectations and the hopes of the local populace.¹²

⁹ Allan, *The Middle East Water Question*, 13.

¹⁰ “Water Facts: Water Scarcity,” UN Water, accessed 27 November 2022.

¹¹ “Turkey Population,” World Population Review, accessed 27 November 2022.

¹² For more on this issue, see Hasan Acar, “The Effect of Democratization Process on Economic Agriculture in Turkish Political Life (1950–1960),” *Kırklareli Üniversitesi Sosyal Bilimler Dergisi* 4, no. 1 (2020).

The Turkish government in Ankara was aware of conditions in the rural southeast and the limited opportunities facing its inhabitants. The solution was the long-held dream — dating back to the Ottoman Empire — of building dams to benefit the region (see chapter 1 for more detail). In the 1930s, Kemal Atatürk proposed the construction of a series of dams with the idea of harnessing the mighty Euphrates and Tigris Rivers.¹³ Both rivers originate in the rugged mountains overshadowing Southeastern Anatolia, and at the time millions of gallons of cold, clean water poured through the basin. However, a lack of money combined with the rigid structure of the existing five-year plans made such a project seem impossible. Politicians periodically attempted to secure funds for development but failed in the face of more pressing economic priorities. It was not until the 1960s that the idea of developing the twin rivers became politically viable.

By the second half of the twentieth century, Turkey was searching for sources of electrical power at the same time as it was beginning to reach the limits of agricultural development. The time had finally come to convert the Ottoman dream into a viable concept for development. The vision for the taming of the Euphrates and Tigris was uncomplicated and predicated on a series of dams to produce hydroelectric power and unlimited water for irrigation. For 50 years, these dams were the central and immutable intellectual bedrock of the vision. It is more than just dams and irrigation ditches — it is the vast project known as the GAP.

The GAP

The GAP is a large-scale and multisector regional development project with major implications for the region. It is one of the major river basin development projects in the world and the largest and most comprehensive project ever carried out in Turkey. The project in southeastern Turkey involves eight provinces covering a vast area that includes Turkey's most desolate and poorest regions.

The project area includes 41 percent of the total watershed of the Tigris and Euphrates Rivers within Turkey, and when fully developed it

¹³ Ilektra Tsakalidou, "The Great Anatolia Project: Is Water Management a Panacea or Crisis Multiplier for Turkey's Kurds?," *NewSecurityBeat* (blog), Environmental Change and Security Program, 5 August 2013.

Figure 5.2. Karkamis Dam on the Euphrates River, southern Turkey



Source: photo by Frederick Lorenz.

will provide irrigation for 1.7 million hectares (nearly 4 million acres), or 20 percent of Turkey’s irrigable land. The GAP Master Plan map indicates the locations of dams and areas currently under development. The GAP includes 13 major irrigation and hydropower schemes that involve the construction of 22 dams and 19 hydroelectric power plants on the Euphrates and Tigris. The GAP will eventually double Turkey’s hydroelectric capacity from 1984 levels and is expected to generate 22 billion kilowatt hours (kWh) per year, a substantial portion of Turkey’s electric power needs. Current generation levels indicate that GAP dams are already producing a significant part of the country’s economically viable hydropower.¹⁴

The original GAP Master Plan called for full development by 2010. In 2016, the GAP’s hydroelectric production was estimated to be at approximately 96 percent of capacity, but the irrigation infrastructure was estimated to be only 37 percent complete, far behind the objectives described

¹⁴ *Turkey 2021: Energy Policy Review* (Washington, DC: U.S. Energy Information Administration, 2021).

in the original master plan.¹⁵ The regional economic growth also failed to match the predicted development indicated in the plan. Turkey's historic economic performance, discussed more fully in earlier chapters, has been the primary factor in slowing the completion of the GAP.

In 1990, John F. Kolars and William A. Mitchell conducted a study of the GAP in Turkey and developed an estimate of water availability until 2040. Kolars and Mitchell cautioned that the projected data was highly conjectural and depicts a "worst case scenario." It should also be noted that figure 5.4—adapted from their book—deals only with the Euphrates, but it has significance because of Syria's heavy reliance on the waters of the Euphrates and the relative capacity of the Euphrates in the basin.¹⁶ Despite these qualifiers and more than 20 years after the chart was produced, it still seems reasonably accurate.

The GAP has developed more slowly than predicted in 1990, but declining flows in the Euphrates and Tigris have nevertheless been noted. In Kolars and Mitchell's chart, the average natural flow of the Euphrates is designated by the constant line at the top of the chart, given as 33,460 MCM/yr (million cubic meters per year). The increasing depletion of the Euphrates is evident by reading the chart from left to right. The intersections of the cubic meter per second measures—shown by "cms" dash lines—denote the years in which certain levels of flow may be reached. The solid lines (with stars for years) indicate the amount of water predicted to reach Syria.

Turkey has an exemplary record of telling the story of the GAP and presenting the project in the best light. Turkey has long maintained that it is not water rich and will need to fully develop its own water resources to provide for a growing population (see chapter 2 for more detail). Turkey today is determined to fully exploit its water resources; Turkey travels essentially the same path as the United States in the 1930s, its hydrologic imperative based on a strong sense of national destiny. Perhaps that is

¹⁵ Murat Kankal et al., "Status of Hydropower and Water Resources in the Southeastern Anatolia Project (GAP) of Turkey," *Energy Reports* 2 (November 2016): 123–28, <https://doi.org/10.1016/j.egy.2016.05.003>.

¹⁶ John F. Kolars and William A. Mitchell, *The Euphrates River and the Southeast Anatolia Development Project* (Carbondale: Southern Illinois University Press, 1991), 131.

Map 5.3. GAP water resource project



Source: courtesy of the Directorate of State Hydraulic Works (Turkey), adapted by MCUP.



one reason why Turks bridle at the notion of Americans (and Europeans) lecturing them about the use of their own natural resources.

Slow progress on the irrigation infrastructure of the GAP indirectly benefits the downstream countries by delaying the inevitable impact on water resources. As noted above, although the total irrigation diversions are still behind schedule, nearly all the hydropower projects are finished. Once constructed, dams devoted exclusively to hydropower do not significantly reduce the flow of rivers and might be considered a “nonconsumptive use.” But dams do change the flow rates in rivers and often bring about unintended environmental consequences. Economic and political factors may have slowed the pace of the GAP’s completion, but its full development seems inevitable and the major impact downstream is certain to be felt in the next 10–15 years. This seems to confirm the data in the chart published by Kolars and Mitchell in 1991 and reproduced here (see figure 5.4).

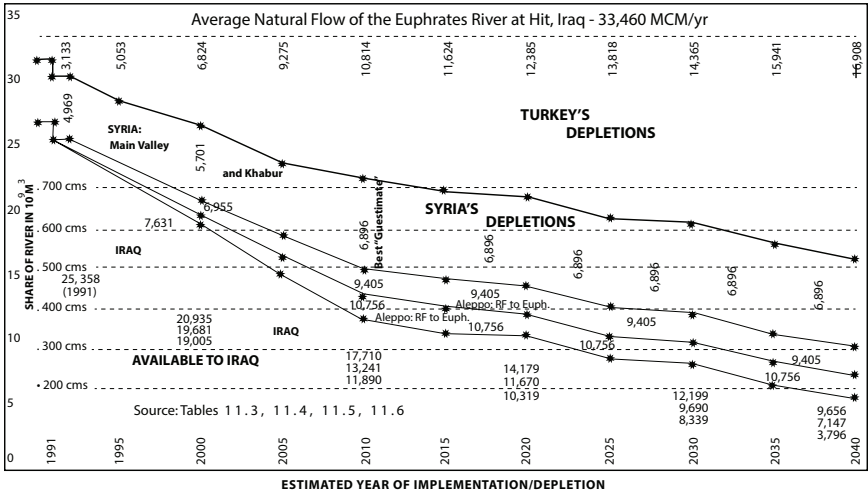
The development of the GAP initially represented an issue that carried universal political appeal throughout Turkey. For many, the GAP represents a source of great national pride; it is financed without the benefit of international financial organizations or the World Bank. The GAP was intended to bring industrialization and growth to a poor region of the country and reduce the dangers of separatism. Some critics today would classify the GAP as a failure; one source claims that in 2020 only 13 of the 19 hydroelectric power plants in the project have been completed. Although the target of the project was to provide irrigation systems for 1.8 million hectares, only 558,507 hectares of land have been opened for irrigation.¹⁷ The author claims that the GAP has failed to bring the promised prosperity and employment to the region, let alone to the southern province of Urfa, the center of the project.

Iraq: Water and Security

Over the centuries, the plentiful water resources of the Euphrates and Tigris Rivers promoted widespread and organized cultivation along their riverbanks, leading to the development of Mesopotamian civilization. His-

¹⁷ Nurcan Baysal, “How Turkey’s Most Ambitious Development Project Failed,” Ahval News, 4 August 2020.

Figure 5.4. Projected sequential depletion of the Euphrates River, 1990–2040



Source: reproduced by permission from John Kolars and William Mitchell, *The Euphrates River and the Southeast Anatolia Development Project* (Carbondale: Southern Illinois University Press, 1991), figure 2.

torically, agriculture was the primary economic activity in the region, but the past century has brought monumental political and economic change. In 1918, after the collapse of the Ottoman Empire, the modern boundaries of Iraq were drawn by the victorious Western powers (see chapter 1). This carving up of the region was based purely on the self-interest of the great powers, with little regard for the three major ethnic/religious groups living in the region: the Shiites, Sunnis, and Kurds. There was no concern by the Western powers that water resources of the Euphrates-Tigris, once the dominion of the Ottomans, would now be divided among three states. And the failure to provide an independent homeland for the Kurds would lay the groundwork for additional instability.

The population of modern Iraq in 2020 was about 40 million, and the median age was 21 years. The population is growing at an annual rate of about 3 percent.¹⁸ The climate in Iraq is mainly of the continental, subtropical semiarid type, with the north and northeastern mountain regions having a Mediterranean climate. Rainfall is seasonal and occurs mainly

¹⁸ "Population of Iraq from 1800 to 2020," Statista, accessed 27 January 2023.

between December and February, except in the northern mountains, where it occurs from November to April.

Approximately 20 percent of Iraq's population depends on irrigated agriculture for their livelihood and subsistence, and Iraq has transitioned from a being a food-producing country that can cover its needs to becoming a major food importer. Several decades of sanctions, violent conflict, ineffective government policies, extreme weather events, and water scarcity have contributed to the situation.¹⁹ Furthermore, the so-called Islamic State of Iraq and the Levant (ISIL) crisis that began in 2014 spurred displacement of entire communities, limited access to inputs and markets, and resulted in the targeted destruction of agricultural infrastructure by armed groups.²⁰

Iraq was the first state in the Euphrates-Tigris basin to construct a major water project in the twentieth century. Known as the Hindiyah Barrage and completed in 1913, it was intended to resurrect the system of canals that had been inoperable since the Middle Ages. Three dams—the Dokan, Derbendi Khan, and Hamrin—were finished in 1958, 1962, and 1981, respectively. Additional dams were planned for Dohuk and Bikhma in the 1990s, but the Iran-Iraq War, the first Gulf War, and the deteriorating economy delayed the projects.

Mosul Dam is located on the Tigris about 60 km northwest of Mosul in Iraq. It is the biggest dam in Iraq with storage capacity of 11.11 BCM at normal operational level (330 m above sea level). The dam was poorly designed and constructed and suffered from water seepage under its foundation since it first began operating in 1986. Grouting operations were implemented with the assistance of international donors to overcome this problem. ISIS occupied the dam site on 8 August 2014, and it was seized back from the hands of ISIS on the 16th of the same month. After that, the Iraqi Ministry of Water Resources rebuilt the damaged parts and developed a new grouting and maintenance program.²¹ Now, the dam appears to be safe at 319 m water level in its reservoir.

¹⁹ *Agriculture Value Chain Study in Iraq: Dates, Grapes, Tomatoes, and Wheat* (Baghdad, Iraq: UN Food and Agriculture Organization, 2021), ix.

²⁰ *Agriculture Value Chain Study in Iraq*.

²¹ Nadir Al-Ansari et al., "Mosul Dam Problem and Stability," *Engineering* 13 (2021): 105–24, <https://doi.org/10.4236/eng.2021.133009>.

Iraq has long suffered from inefficient, centrally controlled agricultural policies that adversely affected agricultural productivity and contributed to land degradation.²² Mounting pressures to produce more food for the region's growing population led to the adoption of aggressive but poorly managed water development programs. Water management infrastructure in Iraq now consists of 9 large storage dams and 12 major barrages (low water-control structures on main rivers that help to raise the water level to better distribute water via irrigation canals), along with thousands of kilometers of drainage canals, irrigation canals, levees, and dikes. Iraq has more than 500 major pumping stations meant to distribute water to farms and cities that cannot be reached by gravity canals. These pumping stations are currently in disrepair due to years of neglect by the Saddam regime and the looting that occurred immediately following the U.S.-led invasion.²³

Iran's contribution to the water balance in the Euphrates-Tigris basin is significant—comprising about 20–30 percent of the flow of the Tigris to Iraq. Thus, increased dam building in Iran in the next 10 years, much of it financed by China, will have an impact on the basin that needs to be assessed. A recent article reported that dam building in Iran could lead to the next armed conflict with Iraq.²⁴ In 2021, Iraq planned to file a lawsuit against Iran for water cuts, according to Iraq's Minister of Water Resources Mahdi Rashid Al Hamdani. He claimed that Iraq has received only one-tenth of what it was receiving in the past from Iran, while water from Turkey also fell by almost two-thirds.²⁵

Iran's water development is certain to collide with water demands in Iraq. Because of increased development activity and water withdrawals inside Iran, further study is required to evaluate the impact on the flow of the Tigris entering Iraq. What is clear at present is that Iran's role as a

²² Tobias von Lossow, *More than Infrastructure: Water Challenges in Iraq* (Wassenaar, Netherlands: Planetary Security Initiative and Clingendale, 2018).

²³ Eugene Z. Stakhiv, "Fact Sheet," Iraqi Ministry of Irrigation, 4 July 2003, 1, author's collection.

²⁴ Banafsheh Keynoush, "Water Scarcity Could Lead to the Next Major Conflict Between Iran and Iraq," Middle East Institute, 18 March 2021. Iran has been accused of diverting the Tigris to the north and violating international law prohibiting harmful disruptions in natural river flows.

²⁵ Muhammad Jawad Adib, "Iran, Iraq Exchange Accusations over Water Flow," *Al-Monitor*, 25 January 2022.

riparian country in the Euphrates-Tigris basin and as a significant part of water management in the basin can no longer be ignored.

Iraq's Surface Water Resources and Infrastructure

The total natural runoff of the Euphrates watershed is estimated to amount to between 27.0 and 35.1 BCM/year, while the Tigris watershed, including its tributaries, is between 41.2 and 58.3 BCM/year.²⁶ These estimates vary considerably between sources, and the lack of consistency is due to two reasons: the scarcity of data released by qualified authorities; and the high variability of the flow recorded at gauging stations. Nevertheless, in the amount of natural contribution of the two rivers to Iraq, it is generally acknowledged that the amount of surface runoff has been reduced by upstream impairment on the order of 30 percent. This impact is forecasted to increase further in the next 20 years, reducing the water available to Iraq by as much as 60 percent.²⁷

The Euphrates and the Tigris were at one time subject to large and occasionally disastrous floods. The level of water in the Tigris could rise at the rate of more than 30 CM/hour.²⁸ In the southern part of the country, immense areas were regularly inundated, levees often collapsed, and villages and roads were built on high embankments. Lake Tharthar, an artificial reservoir, was planned in the 1950s to protect Baghdad from the ravages of the periodic flooding of the Tigris by storing extra water discharge upstream of the Samarra Barrage. The completion of the principal Turkish dams in the past 20 years has reduced seasonal fluctuations in the basin. Since Iraq is the most vulnerable of the four riparian nations on the Euphrates-Tigris, the availability of surface water from the upstream countries is of critical concern.

The U.S.-led invasion and occupation of Iraq had the potential to create major opportunities for the people of Iraq through the reestablishment of their water resources. In the summer of 2003, the senior advisor to the new Iraqi Ministry of Water Resources (MOWR) was optimistic:

²⁶ Dogan Altinbilek, "Development and Management of the Euphrates-Tigris Basin," *Water Resources Development* 20, no. 1 (March 2004): 15–33, <https://doi.org/10.1080/0790062031001635584>.

²⁷ "Country Report: Water Resources in Iraq," Fanack Water, 6 December 2022.

²⁸ "Country: Iraq," Climate Knowledge Portal, World Bank, accessed 27 January 2023.

Iraq can become the contemporary “California of the Middle East.” A functioning “plumbing system” already exists in Iraq. It has a lot of “wear and tear,” as much-needed routine maintenance, primarily on the numerous pumps and pumping stations, has been deferred. There is probably sufficient water flowing through the system to meet current needs, and even future demands, if water were managed more efficiently.²⁹

In July 2003, the Iraqi MOWR issued a one-year strategic plan.³⁰ It included an ambitious schedule for privatization of water facilities, the reestablishment of water-use fees, conducting an inventory of all waterworks and pumping stations, and a plan for emergency repairs. In 2003 and 2004, the water infrastructure of Iraq suffered from looting and damage, further reducing the capacity of the beleaguered system.³¹

In the fall of 2003, the U.S. Congress approved an \$18.4 billion Iraq reconstruction program, with about \$4.3 billion set aside for water and public works, but by the summer of 2004 the continuing violence from the insurgency prevented real progress in reconstructing the water infrastructure.³² Administrative costs for large Western firms, when added to the security costs, further reduced the amount available for reconstruction. By the summer of 2004, the new U.S. ambassador was attempting to reallocate funds and streamline procedures to get the money in the hands of Iraqi firms. This was designed to revitalize the process and make progress despite the increasing security problems. The process was largely unsuccessful, however, and by the spring of 2011 major deficiencies in the system remained. By the time most U.S. forces departed Iraq in the summer of 2011, the grand vision for a “California of the Middle East” had not been achieved.

²⁹ Stakhiv, “Fact Sheet.”

³⁰ *2003 Strategic Plan* (Baghdad: Ministry of Water Resources, Republic of Iraq, 2003). Authors’ collection.

³¹ *2003 Strategic Plan*.

³² *Rebuilding Iraq: Status of Funding and Reconstruction Efforts*, GAO-05-876 (Washington, DC: Government Accountability Office, 2005).

Iraq's Groundwater

Although surface water is the main source of water supply in Iraq, groundwater is an essential source of supply in the desert areas, which cover about 55 percent of the country, and in some parts of the south. The number of hand-dug wells may be several times greater than that of drilled wells, but reliable statistics are not available. Water quality is less than favorable in much of Iraq, and in many places, groundwater development is already impossible.³³ See figure 1 groundwater map from the *Strategy for Water and Land Resources of Iraq* (SWLRI) report. Even in areas where groundwater quality is acceptable, excessive pumping is likely to cause intrusion from saline sources nearby. Moreover, water quality can vary tremendously within the subsurface region, with higher salinity levels the deeper one goes.³⁴

Today, Iraq is estimated to have approximately 200 BCM of groundwater, but the exploitable amount is estimated to be only about 1.2 BCM, based on 2018 figures.³⁵ The “exploitable amount” figure for groundwater is subject to some speculation. It considers such factors as the economic and environmental feasibility of extracting groundwater, the physical possibility of pumping, and the minimum requirements for sustainability and recharge. Groundwater interchanges regularly with surface water as part of the hydrologic cycle, and it is vulnerable to the same threats from decreasing water quantity and quality. Regulation and measurement of groundwater extraction in Iraq faces the same problems evident in all sectors, such as a shortage of funding, high rates of inefficiency, and a questionable security environment. Ultimately, groundwater resources in Iraq are important, but a lack of data and monitoring makes their contribution difficult to consider.

Iraq's annual groundwater recharge rate is not well documented or understood. The Iraqi government, in cooperation with the United Nations Educational, Scientific, and Cultural Organization (UNESCO), is

³³ *Strategy for Water and Land Resources of Iraq, 2015 to 2035* (SWLRI) (Baghdad: Ministry of Water Resources, Republic of Iraq, 2014). Authors' collection.

³⁴ Hussein Al Sudani, “Groundwater in Iraq, Reality, Future, and Proposal” (presentation, General Studies and Investigations of Groundwater in Iraq, September 2018), <https://doi.org/10.13140/RG.2.2.13908.14721/1>.

³⁵ Sabbar A. Saleh, Nadhir Al-Ansari, and Twana Abdullah, “Groundwater Hydrology in Iraq,” *Journal of Earth Sciences and Geotechnical Engineering* 10, no. 1 (2020): 155–97.

Map 5.1. Iraq's hydrogeological zones



Source: Fanack Water, adapted by MCUP.

currently studying the country's aquifers to better understand the potential of these systems.³⁶ Groundwater storage is sensitive to availability of surface water; changes in withdrawal from wells can affect the volume of available groundwater. If the amount of surface flow entering Iraq from its upstream neighbors is reduced as forecasted, there will also be a significant impact on groundwater systems.³⁷

³⁶ "Advanced Survey of Hydrogeological Resources in Iraq Phase-II (ASHRI-2)–Second Official Launching" (meeting, UNESCO, Erbil, Iraq, 2–3 December 2014).

³⁷ "Country Report: Water Resources in Iraq."

Water Master Plan for Iraq

Water governance and planning is critical for Iraq in an unprecedented time. The current water crisis far exceeds previous experiences with water scarcity and acute shortages. Iraq faces declining quantity and quality of water, outdated and damaged infrastructure, and inefficient water use. These conditions have uncovered deficiencies in existing water governance, severely threatening Iraq's economic, political, and security situation.³⁸

In 2003, the United States identified the need for an updated water resources master plan project for the Iraqi MOWR. The issues noted above were already apparent and needed to be addressed in a comprehensive manner in a national-level water plan update. The plan update was designed to be a phased undertaking comprising a first year (phase I) that puts the issues in context and priority, followed by four years of detailed sector studies, coordinated planning, and investment studies. The master plan proposal made in 2003 was never completed, but in the spring of 2011 a similar project was finally underway.³⁹

The Strategy for Water and Land Resources in Iraq (SWLRI) report for 2015–35 was released in 2014. It predicts a massive decline in available fresh water from the riparian neighbors from 38.482 BCM in 2020 to 28.487 BCM in 2035. The report paints a stark picture, and Iraq has already begun a steady decline in its ability to meet its water needs. The report predicted that by 2020, Iraq will “hit a wall” and will not have enough quantity and good quality fresh water to meet its development needs.⁴⁰

The SWRLI report warned that if major reform of the water sector was not accomplished, dire consequences would result. Additionally, the report noted that the anticipated low quantity of available water will disrupt some water uses altogether, such as feeding the Mesopotamian Marshlands or maintaining a minimum flow rate for power plants. This alarming trajectory can be averted only with major reform of water usage

³⁸ *Water Governance in Iraq—Enabling a Gamechanger* (n.p.: Water, Peace, and Security Organization and Clingendael, 2022).

³⁹ Nadhir Al-Ansari, Ammar A. Ali, and Sven Knutsson, “Iraq Water Resources Planning: Perspectives and Prognoses,” *International Journal of Civil and Environmental Engineering* 5, no. 8 (May 2013): 617–84, <https://doi.org/10.4236/eng.2013.58080>.

⁴⁰ *Strategy for Water and Land Resources of Iraq, 2015 to 2035* (SWLRI), 1.

and allocation, and fully resolved “only by reaching an agreement with Iraq’s upstream riparian neighbors.”⁴¹ The question of international agreements on water will be covered in the next chapter of this book. Finally, the report provided the “building blocks for needed reform and the data and analytical tools necessary to negotiate, adapt, and plan.”⁴²

Implementing the 2014 national strategy would have required significant legal and institutional reforms, but no progress was made due to multiple factors.⁴³ The government of Iraq envisioned spending \$175 billion USD to implement SWLRI during a 20-year period. Of this, approximately \$12 billion USD was for rehabilitating and building new water infrastructures such as dams, barrages, and regulators. An additional \$13 billion USD was sought for rehabilitating existing irrigation projects. Developing new irrigation projects was estimated at \$33 billion USD more. Investment across the municipal water sector was estimated at an additional \$80 billion USD. These capital resources never materialized; in 2018, for example, the budget for MOWR was 18 billion Iraqi dinars—more than \$15 million USD—less than 0.2 percent of the original budget.

The Iraqi parliament in 2022 authorized the MOWR to update the 2014 strategy. MOWR apparently has the budget to start working on such an update and hopes to have this work completed by 2026 at the latest. Updating the 2014 strategy might require at least 2–3 years. The government of Italy provided much of the funding for the plan, and contractors based in Italy are still engaged in the latest versions of project.⁴⁴ But without a fundamental change in the underlying conditions, and reform of the water sector in Iraq mentioned in the report, there is little prospect for improvement. A strategic plan and national monitoring are essential, but it would be a mistake to wait for the results of the plan before making the next important decisions to protect Iraq’s water supply.

⁴¹ *Strategy for Water and Land Resources of Iraq, 2015 to 2035* (SWLRI), 21.

⁴² *Strategy for Water and Land Resources of Iraq, 2015 to 2035* (SWLRI), 21.

⁴³ Michael Mason, “Infrastructure under Pressure: Water Management and State-making in Southern Iraq,” *Geoforum* 132 (June 2022): 52–61, <https://doi.org/10.1016/j.geoforum.2022.04.006>.

⁴⁴ “Long-term National Strategy for Water and Land Resources (Iraq),” HydroNova, accessed 27 November 2022.

Challenges for Iraq

Agricultural products traditionally account for a significant proportion of Iraq's exports, but this has been reduced by the recent turmoil related to continuing armed conflict and population displacement. Agriculture still uses about 80 percent of Iraq's average annual water supply and is therefore critical to freshwater development and management.⁴⁵ As noted previously, salination of much of the irrigated land results in reduced crop yields and high salinity in the rivers, which creates problems for the municipal water supply as well as ecological issues that threaten the restoration potential of the marshlands drained by Saddam Hussein.⁴⁶

The reliance on supply-side dam building rather than demand-side efficiency and conservation measures is a problem typical in developing countries. In the case of Iraq, the strategic water and land resources project, which was recently initiated, should be of assistance. Also, the use of better technology, including basin-wide modeling, should help the government of Iraq make the right choices when it comes to developing its water resources. But the right choices for an outside analyst are not always the same when viewed from the perspective of an Iraqi politician. This is a sensitive topic that will be discussed later in chapters 6 and 7.

The Real Threat: Salinity and Other Chemicals

Salinity has long been a significant but rarely measured threat in the basin. High water-salinity levels were largely responsible for the decline of the Sumerian civilization (see chapter 1), and the same mistakes are being repeated today. Local leaders focus on obvious water infrastructure, such as dams and canals, without looking carefully at the long-term consequences of construction. Unfortunately, the hidden threat from salinity and other chemicals is not fully understood by local leaders or used in the planning process.

High salt levels pollute drinking water and can make agriculture impossible. Salt levels are related to water quantity; during low water levels,

⁴⁵ Mustafa Hussein Al-Furaiji et al., "Evaluation of Water Demand and Supply in the South of Iraq," *Journal of Water Reuse and Desalination* 6, no. 1 (2016): 214–26, <https://doi.org/10.2166/wrd.2015.043>.

⁴⁶ Paolo Mastrocola and Paolo Polo, "Iraqi Marshes," *Fanack Water*, 30 May 2017.

salt levels tend to increase, aggravating the situation. Other parameters such as heavy metals, nutrients (phosphorus and nitrogen), bacteria, and biota characteristics in the Euphrates and Tigris are not well known but will eventually be essential to perform a complete assessment. But even with limited monitoring capability, it is unnecessary to wait for a full picture. Action needs to be taken because the salinity figures alone are enough to justify alarm.

Salinity refers to the saltiness or dissolved salt content of a body of water and is a general term used to describe the levels of different salts, such as sodium chloride, magnesium, calcium sulfates, and bicarbonates. *Total dissolved solids* (TDS) are a measure of the combined content of inorganic and organic substances contained in a liquid in suspended form. TDS is a common water quality measurement in freshwater systems, and salinity is usually the major factor in the definition of TDS. Although TDS is not generally considered a primary pollutant, it is commonly used as an indicator of the presence of a range of chemical contaminants. Fresh water is generally considered to have less than 1,500 milligrams per liter (mg/L) of TDS; brackish water 1,500–5,000 mg/L; and saline water more than 5,000 mg/L. The United States established a secondary water quality standard of 500 mg/L to provide for the potability of drinking water.⁴⁷

Data indicating salinity levels in the Euphrates-Tigris basin is difficult to obtain from the riparian parties, but newly released research has recently improved the situation.⁴⁸ Historic data is a national security matter for Turkey, for that will show a “baseline” on which all future discharges would have to be measured. Agricultural return flow is only one part of the problem; increasing population along the river and the flow of untreated sewage in Syria also contribute to the predicament for Iraq. But the primary cause of manufactured salination is the salt conveyed through irrigation return flows. All irrigation water derived from rivers or groundwater, however “sweet” or fresh, contains salts that remain in the soil after

⁴⁷ Gilbert M. Masters and Wendell P. Ela, *Introduction to Environmental Engineering and Science*, 3d ed. (Upper Saddle River, NJ: Prentice Hall, 2007); and “TDS and PH Fact Sheet,” Safe Drinking Water Foundation, accessed 27 November 2022.

⁴⁸ Ali Chabuk et al., “Classification Maps for TDS Concentrations in the GIS Along Euphrates River, Iraq,” *Water Air & Soil Pollution* 232 (July 2021), <https://doi.org/10.1007/s11270-021-05236-7>.

the water has evaporated. Ultimately, farmland becomes unworkable, and this is already occurring in many parts of Syria and Iraq.

Several studies, including the development of sophisticated models, indicate the critical nature of the problem. An early study was conducted by Jon Martin Trondalen and published as part of the UNESCO Water and Conflict Resolution Series. One important observation of this book was the fact that the large reservoir volumes in the Euphrates-Tigris basin (mostly in Turkey and Syria) have contributed to lower water quality. The longer detention periods, as compared to natural runoff, allow for increased stagnation and an increase in TDS levels.⁴⁹

The Trondalen report looks at a several scenarios, with different flow levels as the Euphrates enters Syria and then Iraq and varying concentrations of TDS as the agricultural return flow reaches the river. In figure 5.1, runoff data and salinity data are representative of the situation before construction and operation of reservoirs and before extensive irrigation withdrawals. The model irrigation extraction sites and corresponding return flow sites are also shown in this figure.

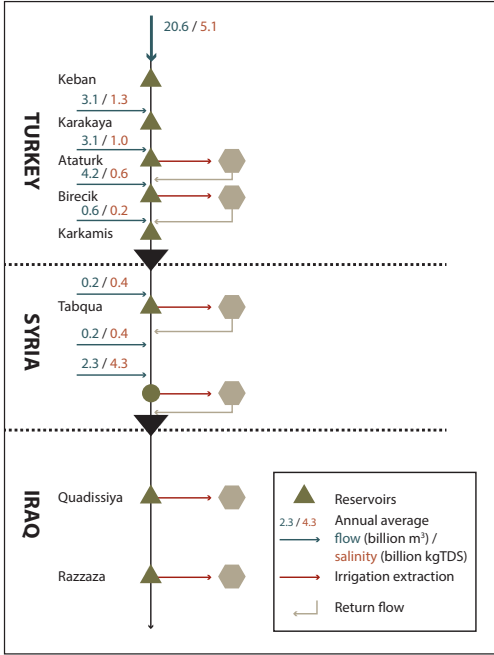
In table 5.1, the model shows that with Turkey and Syria's "full irrigation target" of 10 BCM each, the salinity levels at the Turkey-Syria border could average 317 mg/L and 1,395 mg/L at the Syria-Iraq border. Trondalen concluded that "unless a river basin agreement is reached in a relatively short time, the water quality will reach a level in which water from the Euphrates is no longer suitable for *drinking or agricultural purposes*" (emphasis added).⁵⁰ All the statistics point to the dangerous salinity levels for the Euphrates at the Turkish-Syrian and Syrian-Iraqi borders. A recent study concludes that Water Pollution Control needs to be a high priority for Iraq's water sector.⁵¹ Further research is needed to determine the full impact of the predicted level of salt on the agrarian economy and human health in the region.

⁴⁹ Jon Martin Trondalen, *Water and Peace for the People: Possible Solutions to Water Disputes in the Middle East* (Paris: UNESCO, 2008).

⁵⁰ Trondalen, *Water and Peace for the People*, 241.

⁵¹ *Action Needed: Three Priorities for Iraq's Water Sector* (The Hague, Netherlands: Water Peace and Security Partnership and Clingendael, 2022).

Figure 5.6. Model structure and annual average input data for natural runoff and salinity



Source: reproduced by permission from *Euphrates River and the Tigris River Water Resources Management: Water Resources Analysis Methodology*, figure 8-1; and Jon Martin Trondalen, *Water and Peace for the People: Possible Solutions to Water Disputes in the Middle East* (Paris: UNESCO, 2008).

Waterborne Disease in Iraq

On 29 August 2016, a series of briefings were held in Washington, DC, for Douglas A. Silliman, the newly named U.S. ambassador to Iraq. During the briefing on water issues, his greatest interest was waterborne disease, based on several reports provided to him.⁵² Public health is today viewed as a security issue, and this chapter will address the emerging field of global health metrics, with specific application to Iraq and the Euphrates-Tigris basin.

Armed conflict in Iraq has directly and indirectly exacerbated long-standing waterborne disease issues. Throughout the country, outbreaks of cholera, typhoid fever, malaria, and many other diseases have followed

⁵² Frederick Lorenz (unclassified briefing, Bureau of Intelligence and Research, State Department, 29 August 2016). Topics at the program included economics, energy, and the current political situation.

Table 5.1. Simulation statistics on selected scenarios

Parameter	Scenario				
	Natural runoff	Full irrigation target		60% irrigation target	
		A1	A2	B1	B2
Assumptions/input data					
Minimum flow at Turkish-Syrian border (m ³ /s)	-	450	450	450	450
Return flow concentration (mg TDS/l)	-	700	3,500	700	3,500
Return flow ratio (%)	-	20	20	20	20
Initial salinity concentration in reservoirs (mg/l) (Turkey/Syria/Iraq)	-	300/400/500			
Net irrigation target (billion m³/year)					
Turkey	-	10	10	6	6
Syria	-	10	10	6	6
Iraq	-	36	36	21.6	21.6
Net irrigation obtained (billion m³/year)					
Turkey	-	9.2	9.2	6	6
Syria	-	9.4	9.4	6	6
Iraq	-	9.7	9.7	15.1	15.1
Flow at borders (m³/s)					
Turkish-Syrian border:					
Average	1,006	681	681	781	781
Minimum	493	450	450	463	463
Syrian-Iraqi border:					
Average	1,091	467	467	671	671
Minimum	535	264	264	331	331
Calculated salinity concentrations at borders (mg TDS/l)					
Turkish-Syrian border:					
Average	268	317	517	303	434
Maximum	330	369	623	352	533
Syrian-Iraqi border:					
Average	400	746	1,395	573	906
Maximum	493	967	1,841	753	1,295

Notes:

1. The results presented in the table are annual average values based on dynamic simulations with a time step of one week during a 40-year period. The results will diverge from simple steady state calculations.
2. In addition to the results presented in the table, calculations have been performed on the Euphrates River in Iraq to the point of confluence with the Tigris River. The model calculations show no significant changes from the border to the point of confluence, but this is mainly due to the assumptions made (no return flow, no increased evaporation). In practice, return flow will occur and the river will become more saline downstream.

Source: adapted from *The Euphrates River and the Tigris River Water Resources Management: Water Resources Analysis Methodology* (Muscat, Oman: Center for Environmental Studies and Resource Management, 2006), table A; and Jon Martin Trondalen, *Water and Peace for the People: Possible Solutions to Water Disputes in the Middle East* (Paris: UNESCO, 2008).

every war. The World Health Organization defines *global public health security* as the activities required, both proactive and reactive, to minimize the danger and impact of acute public health events that endanger people's health across geographical regions and international boundaries.⁵³

Al Basra can provide a focus for this discussion and good examples for this analysis. In the summer of 2018, al Basra faced a full-blown crisis, when at least 118,000 people were hospitalized due to symptoms doctors identified as related to water quality. In August, hundreds of people poured into al Basra's hospitals with rashes, abdominal pain, vomiting, and diarrhea, overwhelming their staff and available stocks of medicine. By 16 August, the al Basra Health Directorate identified water contamination as a likely cause, and its director, Riyad Abd al-Amir, called on people to boil all water before drinking or cooking with it.⁵⁴

The U.S. government has a project to assist in Basra, but the challenges seem to quickly outpace external efforts.⁵⁵ One project is reported to be "currently rehabilitating seven major water treatment units in the Shatt al-Arab, Al Qurna, and Abi Al Khaseeb districts of Basra. . . . The investments made in these water treatment units will ensure access to potable water to over 100,000 residents."⁵⁶ But recent reports and studies from the area indicate that massive infrastructure problems remain, and few residents have reliable access to potable water.⁵⁷

The Impact of Climate Change

Climate change is likely to have numerous and diverse impacts, including impacts on human health, natural systems, and the built environment.⁵⁸ Since global climate change will likely affect fundamental drivers of the hydrological cycle, it may have a large impact on water resources and

⁵³ "Health Security," WHO, accessed 27 November 2022.

⁵⁴ *Basra Is Thirsty: Iraq's Failure to Manage the Water Crisis* (New York: Human Rights Watch, 2019).

⁵⁵ USAID, "Iraq Community Response and Resilience Program," fact sheet, updated 4 February 2021.

⁵⁶ "Improving Access to Clean Water for over 100,000 Residents in Basra," UNDP, 4 August 2021.

⁵⁷ Michael Mason, "Infrastructure under Pressure: Water Management and State-making in Southern Iraq," *Geoforum* 132 (June 2022): 52–61, <https://doi.org/10.1016/j.geoforum.2022.04.006>.

⁵⁸ See reports of the Intergovernmental Panel on Climate Change (IPCC) for more information. *AR6 Synthesis Report: Climate Change 2023* (Geneva, Switzerland: IPCC, forthcoming).

water resource management. An understanding of the problem begins with a basic understanding of the science and the potential implications of climate change on the realm of water resources. The following is a summary of the worldwide consequences described in one report:

- increased runoff and earlier spring peak discharge in many glacier- and snow-fed rivers;
- warming of lakes, reservoirs, and rivers in many regions, with effects on thermal structure and water quality;
- decreased river flow in dry regions by 10–30 percent at midlatitudes, much of this in already water-stressed latitudes;
- increased extent of drought-affected areas;
- short-term heavy precipitation to increase flood risk; and
- increased number, duration, and intensity of heat waves.⁵⁹

As indicated, millions of people are now impacted by droughts and floods, and climate change is likely to increase both the magnitude and number of hydrological extremes. Information about climate change is not only essential for water managers and planners, but also increasingly important as a security factor in national planning (see the introduction of this book).

According to the findings of the climate change projection studies carried out for Turkey, the annual average temperature increase is predicted to range between 1°C and 2°C for the 2016–40 period, between 1.5°C and 4°C for the 2041–70 period, and between 1.5°C and 5°C for the 2071–99 period. According to certain forecasts, the temperature increases during the final 30 years of this century (2071–2100) will be 3°C in the winter and 8°C in the summer.⁶⁰ If these figures are accurate, the amount of water reaching Syria and Iraq will show massive declines even without the impact of increasing population and the development of the GAP described in this book.

⁵⁹ Carol Howe, Joel B. Smith, and Jim Henderson, eds., *Climate Change and Water: International Perspectives on Mitigation and Adaptation* (Denver, CO: IWA Publishing and American Water Works Association, 2010), 6.

⁶⁰ *6th State of Environment Report for Republic Turkey* (Ankara: General Directorate of Environmental Impact Assessment, Permit, and Inspection, Ministry of Environment and Urbanization Directorate General of Environmental, 2020), 84.

It is wise to be skeptical of water figures released by a government, particularly when the government has an interest in demonstrating that it has no “excess water” to share, and to bear in mind that climate change predictions require a certain degree of conjecture. Turkey has a long-standing position that it is not “water rich,” and recent reports certainly support that position.⁶¹ Turkey treats detailed water data as a state secret and knows that a release of (even accurate) data will rarely serve its own interests. As an example, the work of Trondalen mentioned earlier in this chapter is unlikely to be embraced by Turkey because it shows in stark detail the negative impact of Turkish agricultural policies on Syria and Iraq. But Turkey can use current climate change data (even though speculative) to support its own long-standing positions.

Climate change impacts on Iraq are difficult to quantify, but some observations can be made. One of the biggest problems for Iraq is desertification, and large sections of once-productive farmland have already been abandoned. On 8 May 2022, the Iraqi Ministry of Agriculture warned that 90 percent of Iraqi agricultural land has experienced or is at risk of desertification soon due to climate change and water disputes with Iran and Turkey.⁶²

Converging Crises

In November 2021, the EU released an important climate change study with a focus on the Euphrates-Tigris basin. The Cascades consortium is an EU-funded organization that identifies how the risk of climate change might “cascade into Europe.”⁶³ The 2021 study focuses on three different risks that are affected by climate-related water challenges: (1) livelihoods and food security, (2) political stability and violence, and (3) interstate conflict and cooperation.⁶⁴ The second part of the study is particularly relevant here, and the report notes that serious questions still exist about the level of security risk that is driven by climate change.

⁶¹ “Türkiye’s Policy on Water Issues,” Ministry of Foreign Affairs, Republic of Türkiye, accessed 27 November 2022. “Contrary to the general perception, Türkiye is neither a country rich in freshwater resources nor the richest country in its region.”

⁶² Salam Zidane, “Climate Crisis Worsens Desertification in Iraq,” *Al-Monitor*, 1 June 2022.

⁶³ “About,” Cascades, accessed 27 November 2022.

⁶⁴ Andre Mueller et al., *Climate Change, Water and Future Cooperation and Development in the Euphrates Tigris Basin* (Potsdam, Germany: Cascades, 2021), 3.

As climate impacts affect security issues precisely through their interaction with other socio-economic and political factors, their contribution to a specific conflict is inherently difficult to isolate and contrast with the effects of other factors. It is also questionable to what extent such an exercise would yield useful insights for addressing interconnected climate security risks (which require integrated solutions rather than interventions that single out particular factors). From the above debate, we conclude that climate impacts on security in the Euphrates-Tigris basin must be studied and understood in the broader socio-economic and political context of the region.⁶⁵

Climate change will certainly have a negative impact on the situation in Iraq, and the risk is interconnected with many other factors. For example, salination of agricultural lands is connected and mentioned earlier in this chapter, and Iraq seems condemned to relive the same problems faced by the Sumerians (see chapter 1). Poor drainage networks and primitive irrigation methods lead to salt accumulation in the soil. Leaders make poor decisions based on self-interest and a lack of careful planning. All this is likely to be aggravated by climate change, which will result in decreased soil moisture, increasing soil erosion, and wetland modification. This will necessarily have an impact on food production and the overall economy.

In 2022, we are witnessing a convergence of crises—political, public health, economic, and military—in addition to climate change. In a recent article, Thomas Homer-Dixon and Johan Rockström observed that this is not a mere coincidence, and the world may be confronting something more persistent and dangerous. This seems to be driving “risk amplification and acceleration” to new levels. Although we have experts to evaluate the risk of a particular threat, few are equipped to understand the “synchronization” of risk that we are now facing. The authors propose a collaboration of think tanks and institutes to study the “polycrisis” and help formulate the necessary response. Without that, according to the

⁶⁵ Mueller et al., *Climate Change, Water and Future Cooperation and Development in the Euphrates Tigris Basin*, 38.

authors, we could see a breakdown of the global order and a time of perpetual crisis.⁶⁶

Iraq seems beset by a “perfect storm” of conditions, both manufactured and natural, that will challenge every effort to improve the lives of the Iraqi people. No single solution is apparent, but water conservation measures and following best practices in water management can make a difference.

Projections for Freshwater Deficit for Iraq: 2035 and Beyond

Computing future water availability and demand is an inexact science, and it is in the interest of each state to overstate demand. Upstream parties are likely to understate water availability within their own borders and criticize downstream parties for waste and inefficiency. International agencies have nonetheless developed several studies looking at regional water demand, and the results are specific enough to reach some conclusions.

These conclusions pose potential problems for food security, especially for a basin that has no significant water-sharing agreements. Caution must be used when comparing the renewable water resources of different countries because the estimates are often influenced by competing national interests. Annual averages also disguise large seasonal and long-term variations.

The Dilemma: Managing Supply versus Managing Demand

In dealing with a potential water deficit, a government has several options. In the Middle East, there is a tendency to look to “new water” or building infrastructure such as dams and canals to remedy the problem. *New water* can be distinguished from naturally occurring water, such as precipitation, surface water, and groundwater. New water would include “produced” water from human intervention, including dams, pipelines, and transported water.⁶⁷ The United States went through the “hydraulic imperative” phase from the 1930s until the 1970s, before the U.S. environ-

⁶⁶ Thomas Homer-Dixon and Johan Rockström, “What Happens When a Cascade of Crises Collide,” *New York Times*, 13 November 2022.

⁶⁷ Allan, *The Middle East Water Question*, 43.

mental movement took hold and slowed it down. The shortcomings of the United States' approach only became apparent years later, and it might be said that lessons learned in those years could be useful to developing countries facing some of the same issues.⁶⁸ The United States is now in the somewhat unique position of removing dams that were built during the boom years of dam construction.⁶⁹

It is often more politically palatable to build a dam—it gives obvious results and is often seen as a sense of national pride. It is much more difficult to deal with water conservation and control demand, particularly when there may be vested interests such as farmers, politicians, and landowners who benefit from the status quo. Ruling parties will typically promote public works projects as a means of garnering and maintaining support. In Iraq, there are ambitious plans to build more dams despite studies (such as the SWLRI report cited previously) indicating that additional dams will not reduce the anticipated water deficit.⁷⁰ Scientific methods and models suggest that more can be achieved by improving the efficiency of existing systems than by building new ones.

Mitigation or Adaptation?

Mitigating the impact of climate change requires action to address the root causes of the problem. This will have to involve reducing the flow of heat-trapping greenhouse gases into the atmosphere, either by reducing output of the sources or enhancing the “sinks” that can store these gases. The goal of mitigation is to “stabilize greenhouse gas levels in a timeframe sufficient to allow ecosystems to adapt naturally to climate change, ensure that food production is not threatened, and to enable economic development to proceed in a sustainable manner.”⁷¹ In November 2022, the United Nations convened the 27th Plenary Conference on Climate Change (COP

⁶⁸ One classic text on the water situation in the American West is Marc Reisner, *Cadillac Desert: The American West and Its Disappearing Water* (New York: Penguin Books, 1986; rev. ed. 1993).

⁶⁹ For a report on the Elwha Dam removal, see Elizabeth Castillo, “Elwha River Transformed 10 Years after Dam Removal,” OPB, 2 August 2022.

⁷⁰ Soukayna Lakhsassi, “Locals Be Dammed,” CSIS, 13 April 2022.

⁷¹ IPCC, *Climate Change 2014 Mitigation of Climate Change: Working Group III Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2014), 4.

27) with mixed results.⁷² Only time will tell if the political leadership can effectively deal with the problem.

Adaptation involves adjusting to actual or expected future climate. Throughout history, people and societies have adjusted to and coped with changes in climate with varying degrees of success. Climate change (drought in particular) has been at least partly responsible for the fall of early civilizations in the Euphrates-Tigris basin (see chapter 1 for more detail). Earth's climate has been relatively stable for the past 10,000 years, and this stability allowed for the development of our modern civilization and agriculture. Enjoyment of modern life assumes that humans will not see drastic changes in the next century. But as the climate changes, adaptation becomes essential and the faster it changes, the more difficult it will be.

The goal of adaptation is to reduce risks from the harmful effects of climate change such as sea-level rise, more intense extreme weather events, or food insecurity. The U.S. Department of Defense (DOD) recognizes that climate change is a national security priority, integrating climate considerations into policies, strategies, and partner engagements.⁷³ In a 2022 report, the DOD outlined progress on certain "priority actions" to address the problem, including actions taken by the Army, the Air Force, and the Navy.⁷⁴

For Iraq, climate adaptation can focus on internal water governance. The SWLRI report indicated two pathways to improve the situation in Iraq, the first is not dependent on agreements with Turkey or Iran to provide more water. But the first path (adaptation) will require drastic internal reform measures:

It is planning for the worst, assuming the implementation of 100% of the planned development projects in Turkey, Syria and Iran and preparing the strategic plan for integrated water management

⁷² COP27 refers to the United Nations Climate Change Conference or Conference of the Parties of the UNFCCC. "Decisions Taken at the Sharm El-Sheikh Climate Change Conference," UNFCCC, November 2022.

⁷³ "Spotlights: Tackling the Climate Crisis," Department of Defense, accessed 27 November 2022.

⁷⁴ *Climate Adaptation Plan: 2022 Progress Report* (Washington, DC: Department of Defense, 2022).

across Iraq based on what Iraq will receive water based on the assumption mentioned.⁷⁵

This seems to suggest that Iraq needs to first focus on adaptive measures and not put its hopes on receiving more water from upstream. The SWLRI report recommended infrastructure improvement, an investment strategy, and the restoration of southern marshes as a way forward.⁷⁶ Improving water governance within Iraq, including the regulation of water demand, will be essential if real progress is to be made.

A Summary of the Regional Water Deficit

Predictions always entail some degree of guesswork, but the evidence is clear that the region is already in serious water deficit, and in the next 10–20 years conditions will further deteriorate. The chart produced by Kolars and Mitchell for the Euphrates in 1991 is remarkably accurate and consistent with new data currently available (see figure 5.4). As the development of the GAP in Turkey nears completion, there will be an inevitable reduction in both quantity and quality of water to the downstream countries. Syria is vulnerable and contributing in its own way to the difficulties downstream in Iraq. Iraq's increasing reliance on the Tigris has advantages, but the new dams under construction by Iran will further reduce the flow.⁷⁷ Based on these considerations, the situation for Iraq in the next 10 to 20 years is certainly grave.

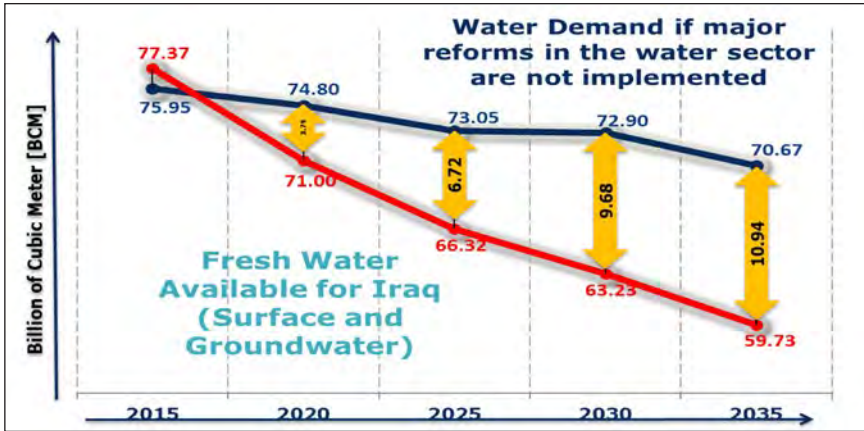
In the past 10 years, several sophisticated computer tools and models have been developed to provide planning tools for water managers. Chapter 7 provides a more detailed description of these models with recommendations for their use in the region. Water quality will certainly decline as agricultural production increases and Turkey and Syria fully develop their water resources. The immediate threat will be increasing salinity in the next 10–15 years as much of the water in Iraq could become unusable.

⁷⁵ *Strategy for Water and Land Resources of Iraq, 2015 to 2035* (SWLRI), 5.

⁷⁶ *Strategy for Water and Land Resources of Iraq, 2015 to 2035* (SWLRI), 17.

⁷⁷ John Kolars and William Mitchell, *The Euphrates River and the Southeast Anatolia Development Project* (Carbondale: Southern Illinois University Press, 1991).

Figure 5.7. Iraq’s water balance without the implementation of the SWLRI strategy



Source: *Strategy for Water and Land Resources of Iraq, 2015 to 2035 (SWLRI)*, adapted by MCUP.

Some comparative data is available. Per capita availability of fresh water in cubic meters (CM) in Turkey: 7,873 CM in 1962 and 2,757 CM in 2018.⁷⁸ This can be compared to the same data for Iraq: 4,587 CM in 1962 and 916 CM for 2018.⁷⁹ Water stress can be another way of looking at the water deficit for a particular country. The Food and Agriculture Organization (FAO) maintains records of freshwater withdrawals as a proportion of the available freshwater resources. For Turkey, the rate went from 28.83 CM in 2003 to 47.51 CM in 2019.⁸⁰ For Iraq, the rate went from 47.14 CM in 2018 to 79.51 CM in just one year.⁸¹ Recall that fresh water withdrawals in Turkey directly impact the availability of fresh water in Iraq.

The 2014 SWLRI report mentioned earlier in this chapter predicts the following discrepancy between fresh water supply and demand: in 2025, 6.72 BCM; and in 2035, 10.94 BCM.⁸²

⁷⁸ “Renewable Internal Freshwater Resources Per Capita (Cubic Meters)–Turkiye,” World Bank, accessed 27 November 2022.

⁷⁹ “Renewable Internal Freshwater Resources Per Capita (Cubic Meters)–Iraq,” World Bank, accessed 27 November 2022.

⁸⁰ “Level of Water Stress: Freshwater Withdrawal as a Proportion of Available Freshwater Resources–Turkiye,” World Bank, accessed 27 November 2022.

⁸¹ “Level of Water Stress: Freshwater Withdrawal as a Proportion of Available Freshwater Resources–Iraq,” World Bank, accessed 27 November 2022.

⁸² See *Strategy for Water and Land Resources of Iraq, 2015 to 2035 (SWLRI)*, related chart, 1.

The study noted certain required “urgent actions” in water and land resource management and several critical structural and institutional changes that must be implemented from the outset to avoid irreparable harm.

A review of the available data seems to favor the “water pessimist” approach described at the beginning of this chapter. For Iraq, the authors predict special challenges because the country is faced with dysfunctional politics and a crisis of governance. If Iraq can solve these problems, and the economy improves, it should be able to satisfy the needs of a growing population. This point is noted in the SWLRI report. In a best-case scenario, Iraq could have a positive water balance and the ability to harness and store water. But Iraq will have to overcome many obstacles, both internal and external, to make progress.

Although the level of water scarcity (or water deficit) in the next 20 years is difficult to measure precisely, Iraq is in serious jeopardy and can be expected to experience continued crisis conditions as available freshwater declines. We are not likely to see a classic “water war,” though it will be a grave danger, nonetheless. Another point can be made here: failure to deal with the problems at a relatively early stage will eventually multiply problems beyond the reach of realistic remedial action. It remains to be seen what the continuing crisis will look like, or what the implications will be for regional security. The final chapter of this book will attempt to provide possible courses of action.

CHAPTER 6

Hydropolitics and the Law

Politics plays an important role in decisions to manage water resources and often hampers parties from reaching reasonable solutions to transboundary disputes. *Hydropolitics*—that is, politics affected by the availability of freshwater resources—is an intricate, multilevel interaction between riparian states that involves domestic political and strategic international concerns. Domestic politics plays both an obvious and often subtler role. Ruling parties will typically promote public works projects as a means of garnering votes. Cultural differences must be considered as well; in the Arab world, in particular, the ruling powers prefer to appear consistently strong, and admitting a weak or inferior position on water issues may not be in the best interests of the regime.

This chapter reviews the political, economic, and legal factors that influence hydropolitics and security in the Euphrates-Tigris basin. The positions of the affected parties on water issues will be described, as well as several incidents that demonstrate the potential for conflict. In the 1975 incident between Syria and Iraq, the nations nearly went to war over water, and during the 1998–99 crisis between Turkey and Syria there was a claim that Turkey was using water as a weapon. Iran’s role in the region’s political, economic, and security spheres is important in the short and long term. At the time of this writing, the landscape was changing daily, with

continued instability in Iraq, fragmentation in Syria, and the emerging water crisis in the region.

A Multilayered and Complex Game

In this book, power dynamics at the international level are described in chapter 2, chapter 3 looks at the role of external actors, including the United States. Chapter 4 describes the prospects for more “riparian” players in the basin, and chapter 5 demonstrates that the three primary riparian states on the Euphrates and Tigris face serious issues of decreasing water quantity and quality. This chapter looks beyond geopolitics to examine the subject of hydropolitics—or water politics—providing an investigation of the basin to look at the positions of the parties and the potential for conflict.¹ River basins that cross international boundaries present increased challenges to effective water management, where solutions are beyond the power of a single riparian. Water resources and water flows vary in space and time and political boundaries often ignore the critical resource, creating the potential for conflict.

This book looks at water through an international security lens, and the ultimate question is whether the conditions in the Euphrates-Tigris basin are likely to lead to conflict or cooperation. Thus, the ability of the concerned states in the region to resolve these questions in a peaceful manner is the next issue. Can the disparate positions described above be reconciled in the foreseeable future?

For our purposes, hydropolitics can be considered a specialized subject within international relations, and there has been a long-term debate on whether the “low” politics of water can be addressed in advance of “high” politics based on national sovereignty.² The functionalist theory of international relations argues that states will willingly transfer sovereignty over matters of public concern to a common authority.³ The European Union (EU) is perhaps the most successful example of this approach; although it was originally based on limited economic cooperation, it even-

¹ Aaron T. Wolf, “Hydropolitics,” *Water Encyclopedia*, accessed 31 January 2023.

² Jerome Delli Priscoli and Aaron T. Wolf, *Managing and Transforming Water Conflicts*, International Hydrology Series (Cambridge, UK: Cambridge University Press, 2009), 34, <https://doi.org/10.1017/CBO9780511551536>.

³ David Mitrany, *The Functional Theory of Politics* (New York: St. Martin’s Press, 1975).

tually grew into a system of “pooled sovereignty” with its own courts and even a common foreign policy.

In contrast to the functionalist approach, the realists respond that state adversaries on the high political level will generally not cooperate on lower levels such as the economy, welfare, and water. This debate continues in the Jordan basin today, and some argue that the issues of regional water sharing cannot be broached until the larger political issues of territory and refugees are resolved between Israel and the Palestinians.⁴ But every basin is different and, compared to the Jordan, the prospects for the Euphrates-Tigris are relatively good. This book will take the position in the following chapters that progress can be made on the “low” politics of water, and that this could eventually lead to an overall improvement in stability and regional relations.

Water politics plays out at many levels, and the dynamics at the domestic level are important to understand international issues. At the local level, water will not play a political role unless it is evident.⁵ Users must be aware that the resource is limited, and there is a need to compete for access. In some Middle East countries, few recognize the problem because the government has been able to import virtual water (see the introduction for further discussion of this term), and this is supported by a robust political economy.⁶ In the Euphrates-Tigris basin, water scarcity will not be evident when the problem is not yet severe even though the government fails to properly regulate the resource. If a farmer is over pumping the aquifer—with no charges or fees, and there is enough water (for now)—the problem is not evident, and the government knowingly tolerates a blind spot on water deficits. Vested interests control the water sector, and they are not comfortable with bad news. When the government is beholden to these interests, developing a clear plan to deal with water deficits may not be politically feasible. With an autocratic government, there is no interest in raising the issue, either internally or externally.

⁴ Miriam R. Lowi, *Water and Power: The Politics of a Scarce Resource in the Jordan River Basin* (Cambridge, UK: Cambridge University Press, 1993), <https://doi.org/10.1017/CBO9780511598708>.

⁵ Tony Allan, *The Middle East Water Question: Hydropolitics and the Global Economy* (London: I. B. Tauris, 2002), 163.

⁶ Allan, *The Middle East Water Question*, 41.

Figure 6.1. Ancient ruin on Birecik Lake above Birecik Dam, Euphrates River, southern Turkey



Source: photo by Frederick Lorenz.

In the “constructed politics” surrounding national water resources, the first duty of government should be to *assert* water rights, gain *recognition* of them, and then attempt their *attainment*. But on the decentralized and chaotic international stage, the first phase is still underway, and the last stage is “*impossible*,” according to J. A. “Tony” Allan. This is particularly true in the Euphrates-Tigris basin, and Allan observed that Turkey was making “facts on the ground” as a means of asserting its own water rights.⁷

As Turkey is the upstream riparian, the impact of such facts is particularly emphatic. The engineering works have had negative impacts in reducing the average, albeit unreliable, flow at the Syrian border by almost

⁷Allan, *The Middle East Water Question*, 215, emphasis added.

45 percent, from approaching 30 cubic kilometers (same as billion cubic meters [BCM]) per year to less than 16 cubic kilometers per year. The positive impact is that the flow has become a reliable average flow.⁸

Even when a position is argued at the international level, the public version may not reflect the actual position or the position that is asserted between diplomats of the concerned countries. When the Iraqi legislature makes a demand of Turkey, or the Arab League calls for recognition of Syria's historic water rights, the real audience may not be Turkey. Asserting water rights, if it is done at all, may be aimed at a domestic audience, or even international agencies that have the potential to provide resources.

The positions of the riparian countries on water resources are provided below, but the reader should not assume that all the parties have clear and consistent positions. Even with Turkey, the easiest of the three to determine, the positions have shifted over time.⁹ In the case of Syria, the positions have been very difficult to determine due to the autocratic and opaque nature of the regime. In the case of Iraq, the position is rapidly developing and shifting as the government of Iraq grapples with internal disorder and tries to develop a more assertive foreign policy.

Turkey's Position on Water Resources

The Turkish position on transboundary waters has been consistent and open, and it can be found on the Turkish Ministry of Foreign Affairs website.¹⁰ Its position begins with the argument that Turkey is not water rich:

Contrary to the general perception, Türkiye is neither a country rich in freshwater resources nor the richest country in the region in this respect. Turkey is situated in a semi-arid region, and has only about one fifth of the water available per capita in water rich regions such as North America and Western Europe. Water rich countries are those which have 10.000 cubic meters of water per capita yearly. This is well above the 1.350 cubic meters per capita

⁸ Allan, *The Middle East Water Question*, 261.

⁹ Ayşegül Kibaroglu, *Turkey's Water Diplomacy: Analysis of Its Foundations, Challenges and Prospects* (London: Anthem Press, 2021), 49, <https://doi.org/10.2307/j.ctvwh8bgf>.

¹⁰ See "Türkiye's Policy on Water Issues," Republic of Türkiye Ministry of Foreign Affairs, accessed 29 November 2022.

in Türkiye. By the year 2030 this amount will decline to 1,000 m³ per capita/year with an expected population of 100 million.¹¹

Today, Turkey maintains that it utilizes only 40 BCM of water, leaving 70 BCM unused. But due to “infrastructural constraints” the unused water represents “a resource which Turkey’s economy needs and plans to draw upon with increasing efficiency in the future.”¹² For more details on Turkey’s plan to exploit its water resources, see chapter 5. In that chapter, it was explained that the irrigation infrastructure of the GAP (Southeastern Anatolia Project) is behind schedule but completion of the project will result in a much higher diversion of water flow from the Euphrates and Tigris. Regarding the GAP, the Turkish position is clear:

For many decades, Southeastern Anatolia was the least economically developed region in Turkey, lagging far behind the rest of the country. Thanks to the GAP, this situation is now starting to change. The impact on the economy of the region is dramatic. Many Turkish crops will double or even triple. The GAP will provide food self-sufficiency in Turkey and will create 3.3 million jobs.¹³

Turkey is aware of the water pollution question and the concerns being raised about high salinity levels in Turkey’s agricultural return flow to the rivers mentioned earlier in chapter 3. Turkey claims that it is working to alleviate the problem and that the downstream parties are largely responsible for the pollution levels:

In point of fact, both Syria and Iraq have a poor environmental record where water is concerned. Both countries use the Euphrates to drain off industrial pollution and sewage, thereby creating an alarming level of pollution in the lower courses of the river and the [Persian] Gulf.¹⁴

¹¹ “Türkiye’s Policy on Water Issues.”

¹² *Water: A Source of Conflict or Cooperation [sic] in the Middle East?* (Ankara: Ministry of Foreign Affairs, Republic of Turkey, n.d.), 2.

¹³ *Water*, 5.

¹⁴ *Water*, 7.

Turkey has often looked to U.S. history for policy justification, comparing Turkey's level of development to the great era of U.S. water infrastructure development. This is also a way to respond to perceived U.S. (and EU) criticism of Turkey's development policies. One Turkish diplomat remarked:

The universal nature and relevance of the GAP has been highlighted by various authorities and experts, one of whom is Dennis Avery, the former Head of the Global Food Policy Institute and who is also an agricultural economist. He pointed out the importance of the GAP by stating, "We are on the eve of the greatest farming opportunity in history and it is precisely at that moment that Turkey is creating a new California."¹⁵

Turkey also makes it clear that the GAP is more than just an agricultural development; it represents a key part of Turkey's plan for hydro-power and energy production. It is further emphasized that "per capita energy consumption in Turkey is only one sixth of that of the EU average and [an] increase in the energy consumption means improving the quality of life of the Turkish citizens. Turkey, which is neither [an] oil nor natural gas producer, plans to meet the rising energy need in several ways. Hydropower is especially appealing in that it is cheap and clean."¹⁶

An essential component of Turkey's position on water resources is that the Tigris-Euphrates must be viewed as a single basin. In this view, shortages of water from one river must be compensated by taking water from the other.¹⁷ This has an important strategic benefit for Turkey, particularly with respect to Iraq, because the Tigris provides Iraq with a significant volume of water. Moreover, Iraq has already constructed a canal to bring water from the Tigris to the Euphrates basin, a strategy that seems to support Turkey's position on this point.

In 1987, during the filling of the lake behind Atatürk Dam, Turkey agreed with Syria to provide a minimum of 500 cubic meters per second

¹⁵ Mithat Rende, *The Global Water Shortage and Turkey's Water Management* (Ankara: Ministry of Foreign Affairs, Republic of Turkey, 2004), 5.

¹⁶ *Water*, 7.

¹⁷ Kibaroglu, *Turkey's Water Diplomacy*, 20.

(CMS) at the point where the Euphrates enters Syria. This was designed to be only a temporary measure, but it has assumed greater importance in the absence of a comprehensive agreement concerning water allocation. Turkey has at various times restated its nonbinding commitment to providing the 500 CMS flow in the Euphrates, although accurate data on the amount of flow is not readily available.¹⁸ There is no Turkish commitment regarding flows of the Tigris, and Turkey's contribution to the flow of the Tigris is comparatively less important to Syria and Iraq than its contribution to the Euphrates.

In terms of water quality, no comprehensive study has ever been completed, and Turkey maintains that the GAP will have no significant environmental impact on its downstream neighbors (for more details on water quality, see chapter 5). Nevertheless, there is great concern about water quality in Syria and Iraq, where the waters of the Tigris and Euphrates are considered the lifeblood, and recent independent studies reveal what may be the real threat: high salinity levels that will make the water unusable for drinking and agriculture. If Syria and Iraq have their own data to support claims of deteriorating water quality, they have not made it available to interested parties. This data gap contributes to an atmosphere of charge and denial, with little hard evidence available to support the respective positions.

Turkey's three-stage plan has long been a foundation of its position on the water question. The plan was originally proposed during the joint technical committee meetings between Turkey, Syria, and Iraq.¹⁹ The plan—in full the *Three-Stage Plan for Optimum, Equitable and Reasonable Utilization of the Transboundary Watercourses of the Tigris-Euphrates Basin*—was first introduced during the fifth meeting of the joint technical committee between 5 and 8 November 1984. The stages of the plan are as follows:

- Stage 1: inventory studies for water resources to involve the exchange of available data, including water use and loss at various agreed sites.

¹⁸ Mark Dohrmann and Robert Hatem, "The Impact of Hydro-Politics on the Relations of Turkey, Iraq, and Syria," *Middle East Journal* 68, no. 4 (2014): 567–83.

¹⁹ For a detailed examination of the plan, see Ayşegül Kibaroglu, *Building a Regime for the Waters of the Euphrates-Tigris River Basin* (The Hague, Netherlands: Kluwer Law International, 2002), 252.

- Stage 2: inventory studies for land resources, including soil classification, crop patterns, irrigation, and requirements for existing and planned projects.
- Stage 3: evaluate land and water resources, including total water consumption and the “economic viability” of planned projects.²⁰

Of course, Turkey is confident that when the final evaluation is completed, its superior efficiency, economic capacity, and geographical features will place it in the strongest position to ensure “equitable utilization” of the waters. For their part, the downstream states have been reluctant to engage in a basin wide planning process. Factors driving this reluctance, which are discussed in chapter 2, have provided additional obstacles to cooperation on the water issue. Without some agreement on reliable data and fundamental needs for each party, integrated management of the Euphrates-Tigris basin will not be attainable.

Historic Claims on Water Resources

Syria and Iraq have at times claimed “acquired rights” relating to ancestral irrigations on the Euphrates and Tigris Rivers.²¹ One dimension of this claim stems from the existing downstream irrigation systems and water installations. Iraq has 1.9 million hectares (about 4.5 million acres) of agricultural land in the Euphrates basin, including the ancestral irrigation systems from the Sumerian era. Iraq also has established diversion and irrigation installations, although maintenance and efficiency are well below international standards. During the initial filling of the lake behind Atatürk Dam in 1992, Iraq accused Turkey of violating international law by not informing Iraq of its intentions in a timely way and by reducing the amount of flow below the committed level. In addition, Iraq argued that Turkey would cause damage to the downstream riparian states by building new dams and irrigation systems.

²⁰ Kibaroglu, *Building a Regime for the Waters of the Euphrates-Tigris River Basin*, 252–55.

²¹ A. von Bogandy and R. Wolfrum, eds., “The Waters of the Euphrates and Tigris: An International Law Perspective: A Study by Adele J. Kirschner and Katrin Tiroch,” *Max Planck Yearbook of United Nations Law* 16 (2012): 335.

Syria and Iraq have long argued that the amount of water released by Turkey in both the Tigris and the Euphrates is inadequate.²² They rely on claims of prior appropriation (usually defined as “first in time, first in right”) and seek to enforce the requirement that Turkey not cause “significant harm” to its downstream neighbors. This provision is contained in the United Nations’ 1997 Convention on the Law of the Non-navigational Uses of International Watercourses (a.k.a. Watercourses Convention), a treaty that was never signed by Turkey.²³ Turkey refuses to agree with this approach and argues that the quantity of water needed for irrigation should be determined by applying identical criteria to each of the three countries, as mentioned in the three-stage plan. Syria and Iraq contend that each country must be free to choose the criteria to determine its own water needs and those determinations should not be questioned by the other riparian states. Despite these conflicting positions, all users are nevertheless pressing ahead with plans to increase the burden on the rivers. The result of this approach is that the total amount of planned water utilization by the three riparian countries far exceeds the total flow capacity of the Euphrates. For further discussion of projected water deficit, see chapter 5.

Syria and Iraq have regularly accused Turkey of not notifying them in advance about planned water installations. Such notification is required by the Watercourses Convention.²⁴ From Turkey’s point of view, it is not party to the convention, and all necessary data pertaining to its planned water schemes can be conveyed to Syria and Iraq during joint technical committee meetings. This committee, envisioned as a forum to discuss regional water matters, was set up with the Protocol of the Joint Economic Committee meetings, held between Turkey and Iraq in 1980. Syria later joined this group meeting in 1983.²⁵ Since the joint technical committee has not met formally since 1993, a useful regime does not currently exist for sharing information.

²² Bogandy and Wolfrum, “The Waters of the Euphrates and Tigris,” 341.

²³ *Convention on the Law of the Non-navigational Uses of International Watercourses*, 1997 (New York: United Nations, 1997).

²⁴ *Convention on the Law of the Non-navigational Uses of International Watercourses*, 1997, art. 12.

²⁵ Kibaroglu, *Turkey’s Water Diplomacy*, 105.

Figure 6.2. Iraqi Ministry of Water Resources building, Baghdad



Source: photo by Frederick Lorenz.

Iraq's Position on Water Resources

Turkey's reliance on Iraqi oil in the 1970s and 1980s created a long-standing mutual dependency; oil and water will always be important components of their bilateral relations.²⁶ Iraq's oil potential places it in a strong position to resist Turkish leverage on water resources, although its geographic position as the lowest riparian nation on the Euphrates complicates the issue. This is partially offset by Iraq's control of several tributaries of the Tigris, as well as its ability to transfer water from the Tigris to the Euphrates. Iraq was essentially unable to interact on water issues with the other riparian countries due to war, sanctions, and defiance of the international commu-

²⁶ See Frederick M. Lorenz and Edward J. Erickson, *The Euphrates Triangle: Security Implications of the Southeastern Anatolia Project* (Washington, DC: National Defense University Press, 1999), 22–23.

nity. But even now, Iraq seems unable to establish a functional policy on water issues.

Iraq's position on the water issue can be pieced together from various announcements and claims of officials: Iraq has historic rights to more water, and action will be required very soon to avoid a major crisis.²⁷ But achieving any progress on the international stage will require much more than occasional statements of Iraqi officials. International support will be required, and some detailed suggestions will be provided in the final chapters of this book.

Asymmetric Power

In terms of negotiation theory, several studies have been devoted to the power dynamics of river basins where one party is geographically, politically, or militarily dominant.²⁸ Although water rights in the Euphrates-Tigris basin are still in the "assertion" phase and few serious negotiations on water allocation have occurred, it is useful to examine the role of power and how it impacts cooperation.²⁹ *Power* in negotiations has been defined as one party's ability to get the other party to do something they would not otherwise do.³⁰ One study concluded that traditional elements of power (as in the case of Turkey) are not the only sources of power in the basin.³¹ The study also provides an explanation of why the successful interactions between the parties in the Euphrates-Tigris basin have been primarily bilateral.

An example of this bilateralism can be seen in Turkey's 1987 agreement with Syria (mentioned earlier in this chapter), in which Turkey agreed to provide 500 CMS (about 16 BCM per year) of the Euphrates at the Turkish-Syrian border. Although there is no agreement on the measurements, reports indicate that Turkey complied with this agreement

²⁷ Yousef Ali, "Iraq's Water Crisis: Legal and Diplomatic Options," *Iraqi Thoughts*, 22 February 2018.

²⁸ A leading book on the subject uses the term *mutual gains bargaining*; see Roger Fisher, William Ury, and Bruce Patton, *Getting to Yes: Negotiating Agreement without Giving In*, 2d ed. (New York: Penguin, 1991).

²⁹ See Allan, *The Middle East Water Question*, 216.

³⁰ Robert A. Dahl, "The Concept of Power," *Behavioral Science* 2, no. 3 (1957): 201–2.

³¹ Marwa Daoudy, "Asymmetric Power: Negotiating Water in the Euphrates and Tigris," *International Negotiation* 14, no. 2 (2009): 361, <https://doi.org/10.1163/157180609X432860>.

Figure 6.3. Historic suspension bridge over the Euphrates in Syria (ca. 2011) that was later destroyed



Source: photo by Frederick Lorenz.

at an average level of 900 CMS, at least until 2002, but noncompliance could be observed in later years.³² The weak monitoring capability of the Joint Technical Committee was not a useful mechanism to induce Turkey's compliance.

In 1989, Syria and Iraq agreed to share the waters of the Euphrates between them at a scale of 42 percent for Syria and 58 percent for Iraq, based on the amount released by Turkey to Syria. As these examples make clear, the only water-sharing agreements in the basin are bilateral and consistent with the power asymmetry in the region. There is no incentive for Turkey to enter any multilateral arrangements with Syria and Iraq, and Turkey prides itself on dealing directly with any problems with the concerned countries.³³ It is important to remember that the two bilateral arrangements mentioned above are not useful water allocation agreements

³² Daoudy, "Asymmetric Power," 376.

³³ Kibaroglu, *Turkey's Water Diplomacy*, 121.

at all, particularly when the parties involved refuse to release flow data that might demonstrate a violation. Also, in the event of a dispute, there is no effective international mechanism for resolution, a topic that will be discussed in more detail later in this chapter.

Linkage Strategies

Complex interlinkages underlie the negotiation strategies that led to the water sharing agreements in 1987 and 1989, and the evolution continues today. Beginning in 1984, Syria's support of the Kurdistan Workers Party (PKK) and its leader Abdullah Öcalan represented an important bargaining chip that enhanced Syria's position in the negotiation process and had an impact on Turkey's security alternatives.³⁴ The 1987 protocol agreed that no party would support violent groups in the other's territory. The expulsion of Öcalan and his later capture in 1999 helped to resolve the issue between Syria and Turkey and improved economic relations—as well as opening the formerly restricted border. But today, the situation between Turkey and Syria is much more complicated, based on the presence of Kurdish “terrorist” elements in Syria (see chapter 4 for more detail).

Turkey has often emphasized the policy of “benefit sharing” rather than focusing on sovereignty issues.³⁵ This is an ambiguous concept that attempts to borrow some of the standards of “optimal and equitable” allocations contained in the Watercourses Convention and apply them in a political-economic framework.³⁶ Turkey has embraced the concept in its foreign policy, mentioning that the benefits can be shared “within the basin.”³⁷ Some reports and conclusions about linkages are overstated or fail to understand the complexities of the situation. In one article, for example, it was claimed that Turkey offered water for an Iraqi crackdown on Kurdish rebels.³⁸ But it would be nearly impossible to trade a particular volume of water for Iraq's compliance with this type of request, and the

³⁴ Kibaroglu, *Turkey's Water Diplomacy*, 15.

³⁵ Daoudy, “Asymmetric Power,” 381.

³⁶ Halla Qaddumi, *Practical Approaches to Transboundary Water Benefit Sharing* (London: Overseas Development Institute, 2008), 4–6.

³⁷ “Türkiye's Policy on Water Issues,” section titled “Turkey's Transboundary Water Policy.”

³⁸ Jane Arraf, “Turkey Offers Water for Iraqi Crackdown on Kurdish Rebels,” *Christian Science Monitor*, 11 August 2009.

lack of transparent flow data is only one of the problems. How to monitor compliance on either side is another unanswered question.

Potential linkages exist today in the basin, and the interdependent economic relation between Turkey and Iraq could provide hope for future cooperation. The real linkages in the Euphrates-Tigris basin will not be the direct trading of water for oil or a crackdown on separatist Kurds. But a rising economic tide in northern Iraq and Southeastern Anatolia could make many things possible. The linkages can only build slowly as a sharing of economic benefits that bind the countries together and lay the foundation for cooperation in the water sector.

Time as Power

Power in relational terms is usually defined by possession or structure, with the latter being defined as the available economic and military resources.³⁹ It has already been shown that Turkey has a fundamental power dominance among the riparian countries, and geography is an important factor. But power can also be described in temporal terms: Turkey is in a unique position in the basin because the continued development of the GAP can only increase the “facts on the ground” and strengthen its hand in any future negotiations. A 2009 study indicated that the GAP will eventually withdraw as much as 70 percent of the Euphrates natural flow and about 40–50 percent of its observed flow.⁴⁰

The issue of water quality underlies all other water questions, but the first *GAP Master Plan* in 1989 did not include the water quality impact of the return flows from irrigation. So, the risk of salination and waterlogging for downstream countries has never been addressed. The high levels of pollution will pose a greater threat to Syria and Iraq than the declining water quantity (see chapter 5). Through its Ministry of Foreign Affairs, Turkey makes its position quite clear:

Turkey is well aware of the risks involved and will be even more vigilant than it already is in curbing pollution. In point of fact, both Syria and Iraq have a poor environmental record where water is concerned. Both countries use the Euphrates to drain off indus-

³⁹ Daoudy, “Asymmetric Power,” 365.

⁴⁰ Daoudy, “Asymmetric Power,” 370.

trial pollution and sewage, thereby creating an alarming level of pollution in the lower courses of the river and the [Persian] Gulf.⁴¹

Denial of water quality problems may strengthen Turkey's bargaining position in the short term, but it will eventually lead to a crisis and instability that will require monumental efforts to overcome.

Turkey's refusal to provide detailed information on water quantity and quality, coupled with superficial efforts and commitments at cooperation, could be viewed as a long-term strategy. Time is power for Turkey in the strategic environment of the Euphrates-Tigris basin. And perception can also be an important source of power—the belief that Turkey can use water as a strategic weapon may be more important than its actual ability to cut off the water supply.

Can Turkey Use Water as a Strategic Weapon?

Some outside observers assume that Turkey's control of the waters of the Euphrates allows it to manipulate the flow of water, and thus use water as a strategic weapon in any potential conflict with its downstream neighbors.⁴² As noted earlier in this chapter, Syria, in large part as political leverage in response to the water policies of Ankara, supported the PKK and its militant activities between 1984 and 1998. The PKK conducted both terrorist and military actions in eastern and southeastern Turkey, and according to Ankara, the group has claimed more than 30,000 lives. Although never stated overtly by Syria, it has been speculated that Syria's support of the PKK was the only lever it had against Turkey's overuse of the waters of the Euphrates.⁴³ This raises several important factual questions: What is Turkey's real ability to use the GAP as an instrument of foreign policy?

Can the flow of water leaving Turkey be manipulated? If so, how quickly and what impact will it have on Turkish hydropower generation

⁴¹ See "Water Pollution," in *Water*.

⁴² See Mark Adams, *Water and Security Policy: The Case of Turkey* (Washington, DC: National Defense University Press, 2002), 59. In this piece, Adams examines previous Turkish responses to crises with Syria and Iraq. He mentions that "turning off the taps" was an option for Turkey without looking at the underlying difficulties in the water faucet approach.

⁴³ Adams, *Water and Security Policy*, 55.

and irrigation systems? Careful research reveals that Turkey has a very limited ability to use the GAP as an instrument of foreign policy, and this will continue in the years ahead. Because Turkey is short on fossil fuel, it is highly dependent on the electrical power generation of the GAP. In the future, Turkey will increasingly depend on the smooth, regulated, and efficient functioning of the GAP system and would have to disrupt its own economy and electric generation to punish the downstream riparians.⁴⁴

Turkey must maintain a careful balance between hydropower production and delivery of water for irrigation needs. This is particularly true for Atatürk Dam, which generates a large quantity of electricity spread throughout the grid that supports the rest of Turkey. Excessive water removed for irrigation is unavailable for power generation at Atatürk Dam; this balance can be observed and studied using the various models that will be mentioned in the following chapter. Excessive downstream releases lower the water levels below the Sanliurfa water connections in Atatürk Reservoir. Lowering water levels in reservoirs to increase the ability to “turn off the tap” would essentially shut down the irrigation system in central Turkey. Manipulation of water levels would also have an immediate impact on power production throughout Turkey in a system that is heavily dependent on hydropower.

An essential factor in any Turkish manipulation of water levels or downstream flow would be the requirement to impound water behind the dams within Turkey. This would require a reduced volume in advance; the three major reservoirs on the Euphrates—Keban, Karakaya, and Atatürk—have a total capacity of about 90 BCM.⁴⁵ Two other downstream dams—Birecik and Karkamis—have negligible importance and serve mainly as surge controls for Atatürk Dam. Of the 90 BCM available for main storage, about 43 BCM is dead storage—the amount of water stored below the level of the exit channels—and can be ruled out of any regional

⁴⁴ John Kolars was the leading independent expert on scientific issues in the basin, cited earlier in chapter 5. His paper, “Potential for Manipulation of Euphrates River Flow by Turkey,” on file with Frederick Lorenz, concludes that Turkey cannot easily manipulate water flow in the Euphrates for the reasons stated here.

⁴⁵ Dogan Altinbilek and Cecilia Tortajada, “The Atatürk Dam in the Context of the South-eastern Anatolia (GAP) Project,” in *Impact of Large Dams: A Global Assessment*, ed., Cecilia Tortajada, Dogan Altinbilek, and Asit K. Biswas (Berlin: Springer, 2012), 171–79, https://doi.org/10.1007/978-3-642-23571-9_8.

water manipulation scenario. The remaining 47 BCM of live storage is not necessarily available for “punishing” downstream users since it must be maintained for power production and irrigation offtakes.⁴⁶ Any effort to manipulate water levels would require substantial advance preparation and would have direct internal consequences for Turkey. It is not simply a matter of “turning off the spigot.” If there were any attempt to hold back significant amounts of water, there would first have to be a significant drawdown of live storage, and this would be easily detectable by watching water levels within the reservoirs. Such a scenario makes the availability of remote sensing and information technology even more important as a predictor of potential conflict.

The theory that Turkey can simply turn off the tap is not realistic from both engineering and practical standpoints. Even if Turkey could manipulate water levels, under what conditions would it undertake such an action? Could it be in response to terrorist activity originating in Syria or Iraq? And what about the threat of an independent Kurdistan? Turkey would first have to weigh the use of the “water weapon” against the negative impact on its own economic, irrigation, and power capabilities, however. And lower volumes of water will not necessarily achieve the intended impact, particularly against nonstate actors. Nonetheless, the perception that Turkey can use water as an instrument of foreign policy should not be discounted, and perception can be very important in international relations. During interviews in Baghdad and Amman, the authors found a consensus among water professionals that Turkey had the power to manipulate and reduce water levels to punish downstream countries. This makes it increasingly important to find ways to lessen the rhetoric and move toward increased cooperation.⁴⁷

Prospects for Cooperation

The late 1990s and early 2000s witnessed an improvement in the relations among the coriparian states and enabled the reactivation of cooperation

⁴⁶ Altınbilek and Tortajada, “The Atatürk Dam in the Context of the Southeastern Anatolia (GAP) Project,” 175.

⁴⁷ Informal interviews with midlevel GAP and Directorate of State Hydraulic Works officials were conducted by coauthor Lorenz in the summer of 1997, and again in 2003 and 2009. Since that time, the level of suspicion regarding Turkey has only increased.

over water management between Turkey and Iraq.⁴⁸ The U.S. invasion in 2003 and later the Syrian Civil War changed everything. As noted in chapter 2, the riparian geopolitics of the region have made any form of international cooperation much more difficult. Despite high hopes, continued meetings and real progress on water issues are lacking. The underlying foundation of hydropolitics in the region has not changed: Turkey has no real incentive to change course, time is on its side, and water quantity and quality downstream continue to decline. For now, the parties seem unable or unwilling to deal with it.

The positions of the three primary parties on the water question seem irreconcilable, and an atmosphere of distrust has historically pervaded water relations between them. Nevertheless, there may be some opportunities to influence the parties to cooperate using prior experience from several transboundary water situations around the world. And the most promising opportunities may be in science and diplomacy, another topic that will be covered in chapter 7.

International Law

The first part of this chapter described regional hydropolitics in the Euphrate-Tigris basin and how the three principal riparian countries interact in the face of declining water quantity and quality. This chapter will focus on the next obvious question: How does international law influence the process? Despite many years of development, water law plays only a minor role in the basin. In summary, there is disagreement on all the fundamentals, including the definition of an “international river,” the meaning of “equitable and reasonable utilization,” and limitations on the obligation not to cause harm.

The role of law in international relations has been the subject of debate for more than 200 years. One of the branches of legal theory known as *positivism* holds that normative structures only achieve the status of law when they are issued by a sovereign and backed by sanctions.⁴⁹ Since

⁴⁸ Kibaroglu, *Turkey's Water Diplomacy*, 108.

⁴⁹ John Austin, *Austin: The Province of Jurisprudence Determined*, ed. Wilfred E. Rumble (Cambridge, UK: Cambridge University Press, 1995), 22, <https://doi.org/10.1017/CBO9780511521546>.

the duties imposed by international law lack a centralized mechanism of accountability, they cannot be called true law, according to this view. Another branch of international relations theory called *realism* recognizes that international law is indeed law, albeit with a very limited role and always circumscribed by prevailing power realities.⁵⁰ In contrast to these, other scholars have noted that international law has many functions that can confer legitimacy on state actors and their activities even in the absence of a centralized international authority.⁵¹

International law was at one time defined as the law that governs relations between states, but today the definition has been expanded to include the rights and obligations of individuals as well.⁵² International law functions effectively at many levels, and we often take its operation for granted. International communications, aviation, postal service, and trade are regulated by a web of international rules that are in the interests of all states to observe. International law covers most aspects of international commerce, although questions of whaling and environmental protection have become quite controversial. The issues become more difficult when matters of state sovereignty and the use of military force are at stake.

The primary sources of international law are *international conventions* (treaties), *international customs* (practice), and *general principles of law* recognized by civilized nations.⁵³ The treaty is perhaps the most readily accessible source, while other forms of law have been described as “soft” because of the difficulty of determining the norm or standard to apply. A state may take formal action to express its intent to be bound by a treaty, usually through a signature of a state representative.⁵⁴ A state that has signed but not ratified a treaty is obligated to refrain from acts that

⁵⁰ Hans J. Morgenthau, *Politics Among Nations: The Struggle for Power and Peace*, 3d ed. (New York: Alfred Knopf, 1965), 285.

⁵¹ David Armstrong, Theo Farrell, and Helene Lambert, *International Law and International Relations* (Cambridge, UK: Cambridge University Press, 2007), 22, <https://doi.org/10.1017/CBO9780511808753>.

⁵² According to one definition, “International law consists of the rules and principles of general application dealing with the conduct of states and of international organizations and their relations *inter se*, as well as with some of their relations with persons, whether natural or judicial.” Bryan A. Garner and Henry Campbell Black, *Black’s Law Dictionary*, 8th ed., ed. Bryan A. Garner (St. Paul, MN: Thomson West, 2004).

⁵³ See *Statute of the International Court of Justice*, art. 38 (17 July 1998).

⁵⁴ See the *Vienna Convention on the Law of Treaties*, art. 11 (22 May 1969).

would defeat the object and purpose of the treaty.⁵⁵ A state can formally express its consent to be bound by a treaty in one of the following ways: ratification (usually by the legislature), accession to an existing treaty, or succession (usually for a state that is newly independent or had a major change in status). In the United States, the executive branch typically signs a treaty, but it does not become law until ratified by the Senate.⁵⁶

Treaties apply only between and within the states that have ratified them. The law of treaties is complicated by a state's ability to make reservations, declarations, and objections with the intended effect of excluding or modifying certain parts of the treaty in their application to that state. This can make it difficult to determine the obligations of each state, particularly when each state is driven by different and unique national interests.

International Water Law

International water law with respect to rivers is of relatively recent origin.⁵⁷ Prior to World War I, the law was developed primarily to resolve disputes concerning freedom of navigation. Since that time, there have been several attempts to provide a framework for increasingly intensive water use, focusing on general guidelines that could be applied to the world's watersheds. The concept of a "drainage basin," for example, was accepted by the International Law Association in the 1966 Helsinki Rules on the Uses of the Waters of International Rivers (or Helsinki Rules), which also provide guidelines for the reasonable and equitable sharing of a common waterway. Article IV of the Helsinki Rules describes this principle in the following way:

Each basin State is entitled, within its territory, to a reasonable and equitable share in the beneficial uses of the waters of an international drainage basin.⁵⁸

⁵⁵ *Vienna Convention on the Law of Treaties*, art. 18.

⁵⁶ Article 2, section 2, clause 2, of the U.S. Constitution gives the president the power to make treaties subject to ratification in the Senate: "He shall have Power, by and with the Advice and Consent of the Senate, to make Treaties, provided two thirds of the Senators present concur."

⁵⁷ Francesco Sindico, "National Sovereignty Versus Transboundary Water Cooperation: Can You See International Law Reflected in the Water?," *AJIL Unbound* 115 (2021): 178–82, <https://doi.org/10.1017/aju.2021.24>.

⁵⁸ *The Helsinki Rules on the Uses of the Waters of International Rivers* (London: International Law Association, Helsinki, 1967), chap. 2.

Article V of the rules then lists 11 factors that must be considered in defining “reasonable and equitable.” There is no hierarchy to these components of reasonable utilization, and they are instead to be considered as a whole.⁵⁹ One important shift in legal thinking in the Helsinki Rules is that they address the right to beneficial use of water, rather than to water per se. The Helsinki Rules are used only rarely to help define water use. This is consistent with the assertion of Tony Allan that water rights are easy to assert, difficult to recognize, and nearly impossible to attain.⁶⁰ For example, the Mekong Committee used the definition of “reasonable and equitable use” from the Helsinki Rules in the formulation of its joint declaration in 1975, although no specific allocations were determined.⁶¹

When the United Nations (UN) reviewed the Helsinki Rules in 1970, some states (Brazil, Belgium, China, and France) objected to the prominence of the drainage basin approach, which might be interpreted as an infringement on a nation’s sovereignty.⁶² Others, notably Finland and the Netherlands, argued that a watershed was the most rational and scientific unit to be managed. Others contended that, given the complexity and uniqueness of each watershed, general codification should not even be attempted. States were of course determined to promote their own national interest, and each brought a unique history and experience in disputes about water. Some states were heavily reliant on water from outside their own borders, and others—such as China, Canada, and Turkey—were more concerned with sovereignty over water inside their respective countries. On 8 December 1970, the UN General Assembly directed its own legal advisory body, the International Law Commission (ILC), to prepare a draft “Codification of the Law on Water Courses for Purposes other than Navigation.”⁶³

⁵⁹ *The Helsinki Rules on the Uses of the Waters of International Rivers*.

⁶⁰ Allan, *The Middle East Water Question*, 216.

⁶¹ *Joint Declaration of Principles for Utilization of the Waters of the Lower Mekong Basin* (Vientiane, Laos: Committee for the Coordination of Investigations of the Lower Mekong Basin, 1975).

⁶² “Progressive Development and Codification of the Rules of International Law Relating to International Watercourses,” United Nations General Assembly Resolution 2669 (8 December 1970).

⁶³ “Progressive Development and Codification of the Rules of International Law Relating to International Watercourses,” 818.

The ILC, despite an additional call for codification at the 1977 UN water conference in Mar del Plata, Argentina, took 21 years to complete its draft articles. Several problems, both political and hydrological, slowed the process. For example, in response to a 1974 questionnaire submitted to member states, about one-half the respondents supported the concept of a drainage basin (e.g., Argentina, Finland, and the Netherlands), while the other one-half were strongly negative (e.g., Austria, Brazil, and Spain) or ambivalent. “Watercourse system” referred to a basin, which could be viewed as a threat to national sovereignty. Again, each state was motivated to protect its own special concerns and unique geographical setting. Downstream and upstream states are inherently skeptical of the actions of the other.⁶⁴

In 1994, more than two decades after receiving its charge, the ILC adopted a set of 32 draft articles. The articles were adopted by the UN General Assembly in 1997 as the *Convention on the Law of the Non-navigational Uses of International Watercourses*, commonly referred to today as the Watercourses Convention.⁶⁵ The convention provided that 35 states had to ratify before it would become effective; it came into force on 17 August 2014.

The Watercourses Convention includes language very similar to the Helsinki Rules, requiring riparian states along an international watercourse to generally communicate and cooperate.⁶⁶ Provisions are included for the exchange of data and information, notification of possible adverse effects, protection of ecosystems, and emergency situations. Allocations are dealt with through equally vague language. “Equitable and reasonable use” within each watercourse state, “with a view to attaining optimal and sustainable utilization thereof and benefits therefrom” (article 5), is balanced with an obligation not to cause “significant harm” (article 7).⁶⁷

⁶⁴ *Report of the United Nations Water Conference: Mar del Plata, 14–25 March 1977* (New York: United Nations, 1977).

⁶⁵ *Convention on the Law of the Non-navigational Uses of International Watercourses*, UN General Assembly Resolution 51/229 (21 May 1997), 5–6.

⁶⁶ See, for example, Stephen C. McCaffrey and Mpazi Sinjela, “The 1997 United Nations Convention on International Watercourses,” *American Journal of International Law* 92, no. 1 (1998): 97, <https://doi.org/10.2307/2998069>.

⁶⁷ *Convention on the Law of the Non-navigational Uses of International Watercourses*, 4–5n12 (the obligation to make reasonable use of the waters and to avoid causing significant harm to other watercourse states).

The latter provision is always of greatest concern to the upstream riparian, and it is easy to contemplate a situation where an upstream country would be ordered by an international court to release more water if article 7 had been violated.

Developing broad concepts that apply to all watersheds has been challenging from the start. Even the term *international drainage basin* has proven to be controversial in the Euphrates-Tigris basin, and Turkey has consistently maintained that the two rivers form a single basin.⁶⁸ This argument can lead to both practical and political benefits for Turkey. For instance, if Iraq should claim a water shortage in the flow of the Euphrates, Turkey can argue any deficit be made up from the excess flow of the Tigris inside Iraq. Also, Turkey can point to the fact that Iraq has already created a canal to do just that, strengthening its argument on the “one basin” theory.⁶⁹

Water Rights Criteria: Hydrography versus Chronology

Applying general legal guidelines to transboundary rivers is a daunting task. The correct term is *transboundary* rather than *international*, as the latter term applies to rivers that provide an international boundary. The rivers in the Euphrates-Tigris basin are considered transboundary, although the Tigris briefly includes an international boundary with Iran in Northeast Syria, and the rivers again form the international boundary with Iran at the confluence with the Persian Gulf.

Certain water law principles have been claimed regularly by riparian states in negotiations, often depending on their geographic location in the watershed. Claims for water rights are based either on hydrography (i.e., from where a river or aquifer originates and how much of that territory falls within a certain state) or on chronology (i.e., who has been using the water the longest). National positions are usually extreme, and the *doctrine of absolute sovereignty* is often initially claimed by an upstream riparian. This principle is often referred to as the Harmon Doctrine, named after U.S. attorney general Judson Harmon, who suggested this stance in 1895 regarding a dispute with Mexico about the Rio Grande. This theory holds

⁶⁸ Kibaroglu, *Building a Regime for the Waters of the Euphrates-Tigris River Basin*, 241.

⁶⁹ Kibaroglu, *Building a Regime for the Waters of the Euphrates-Tigris River Basin*, 241–42.

Map 6.1. Transboundary water in the Euphrates-Tigris basin



Source: map by Philippe Rekacewicz, GRID-Arendal, UN Environment Programme, adapted by MCUP.

that a state has absolute rights to water flowing through its territory.⁷⁰ The doctrine was eventually rejected by the United States, a downstream riparian of several rivers originating in Canada. It was never implemented in any water treaty, with the rare exception of administering some internal tributaries of international waters.

The downstream riparian often asserts the *doctrine of absolute riverain integrity*, which suggests that every riparian is entitled to the natural flow

⁷⁰ Stephen C. McCaffrey, "The Harmon Doctrine One Hundred Years Later: Buried, Not Praised," *Natural Resources Journal* 36, no. 4 (1996).

of a river system crossing its borders.⁷¹ This principle has reached acceptance in the international setting as infrequently as the Harmon Doctrine. In an arid or exotic (defined as a humid headwaters region with an arid downstream region) watershed, the downstream riparian frequently has older water infrastructure that must be defended. The principle that rights are acquired through older use is referred to as the *doctrine of prior appropriation*, that is, “first in time, first in right” (a.k.a. in the United States as the Colorado Doctrine).⁷²

These conflicting doctrines of hydrography and chronology clash along many international rivers, with national positions usually defined by relative riparian positions. Downstream riparians, such as Iraq and Egypt, receive less rainfall than their upstream neighbors and have historically depended on river water for the life of their nations. Consequently, modern rights-based disputes often take the form of upstream riparians, such as Ethiopia and Turkey, arguing in favor of the doctrine of absolute sovereignty, with downstream riparians taking the position of prior appropriation. For the Euphrates-Tigris riparians, no real precedent exists in international law today to undermine Turkey’s fundamental claims of sovereignty over its own water. The Treaty of Lausanne signed between the Allies and the new nation of Turkey on 24 July 1923 (see chapter 1) referred to the “safeguard” of certain acquired interests. This article has been interpreted by some authors as “an explicit appreciation of the rights of the downstream parties.”⁷³ But the tension between sovereignty and acquired rights will never be fully resolved.

One of the major difficulties in managing transboundary water is that much of it is moving underground and is therefore much more difficult to measure and regulate. The term *watercourse* in the Watercourses Convention can include both surface and groundwater and is based largely on the terms of the Helsinki Rules, but it includes only groundwater that is connected to the surface water. It does not incorporate the broader

⁷¹ Ahjond Garmestani and Craig Allen, *Social-Ecological Resilience and Law* (Chichester, UK: Columbia University Press, 2014), <https://doi.org/10.7312/garm16058>.

⁷² Colorado River Water Conservation District v. United States, 424 U.S. 800 (1976).

⁷³ Mostafa Dolatyar and Tim S. Gray, *Water Politics in the Middle East: A Context for Conflict or Cooperation?* (London: Palgrave Macmillan, 2000), 133, <https://doi.org/10.1057/9780230599871>.

definition of groundwater contained in the Seoul Rules, which includes transboundary aquifers that are not connected to surface waters of an international drainage basin.⁷⁴

Law and Politics

Existing law for transboundary waters has proven easy to argue but very difficult to apply. For example, riparian positions and consequent legal rights shift with changing political boundaries, many of which are still not recognized by the world community. Consider the various nonstate actors claiming control of Euphrates-Tigris surface water (see chapter 4).

The rules provide what is known in legal terms as a *balancing test* that is more appropriate for the courtroom than the politically charged atmosphere of international water disputes. Also, a balancing test requires some third party—such as an arbitrator, a watermaster, or a court—to resolve the issues. In water basins without such a regime, balancing tests are not particularly useful.

The uncertainty in international water law is compounded by the fact that cases are generally heard by the International Court of Justice (ICJ) only with the consent of the parties involved, and no practical enforcement mechanism is available.⁷⁵ Considering these limitations, it is hardly surprising that the ICJ has decided few cases regarding the law of transboundary rivers.⁷⁶ In one case heard by the ICJ, the results were mixed, and although the case may have clarified some of the general principles of equitable utilization, it failed to resolve the dispute between the riparian countries.⁷⁷ This reveals one of the fundamental problems in transboundary water law: complex standards to be decided by a judge using a balancing of interests are of limited value on the international stage.

⁷⁴ 1986 *the Seoul Rules on International Groundwaters* (London: International Law Association, 1986).

⁷⁵ See the Statute of the International Court of Justice, art. 36 (26 June 1945).

⁷⁶ Aaron T. Wolf, "Shared Waters: Conflict and Cooperation," *Annual Review of Environment and Resources* 32 (November 2007): 241–69, <https://doi.org/10.1146/annurev.energy.32.041006.101434>.

⁷⁷ For example, the 1997 ICJ case related to the Gabčíkovo-Nagymaros dam project on the Danube River. See "Gabčíkovo-Nagymaros Project (Hungary/Slovakia)," International Court of Justice, accessed 3 February 2023.

International law plays only a minor role in the Euphrates-Tigris basin, and although the Watercourses Convention is in force, Turkey refuses to become a party. Outside parties have no real impact on Turkey's decisions. Even though Turkey has long been a candidate for accession to the EU, the actual prospects are now slim, and the EU exercises very little influence in Turkish policy.⁷⁸

A recent report by the Stimson Center observed that “the decades-long effort to develop greater discourse between these states (Turkey, Syria and Iraq) have largely been rhetorical with considerable back and forth on ‘promises’ and other agreed upon protocols.”⁷⁹ All the parties in the basin have legal arguments, but they have more political value than practical effect. Turkey has consistently opposed efforts to “internationalize” the matter, relying on the same legal doctrines that the United States once used in disputes with Mexico concerning the Colorado River.⁸⁰ At the time of this writing, only 16 states had ratified the Watercourses Convention and that number includes both Syria and Iraq.

In such regions as North America, with significant water resources and good international relations, the record of cooperation between states is positive. For example, water issues between the United States and Canada, including quantity and quality, have long been managed by an international commission.⁸¹ In contrast, Middle Eastern river basins face pressures from growing populations, limited resources, and political turmoil. Unfortunately, international law has often reinforced separate and competitive theories among states that share the same watercourse. The conflicting doctrines that formed the basis of international water law give every state a point to argue but provide little help in achieving common ground.

⁷⁸ Ilke Toygür, “A New Way Forward for EU-Turkey Relations,” Carnegie Europe, 26 January 2022.

⁷⁹ Farwa Aamer, “Joint Working Group on International and EU Water Diplomacy—In Focus: The Euphrates-Tigris River Basin,” Stimson Center, 10 May 2021.

⁸⁰ Murat Hakki, “Cross-Border Water Conflicts in Mesopotamia: An Analysis according to International Law,” *Williamette Journal of International Law and Dispute Resolution* 13, no. 2 (2005).

⁸¹ The International Joint Commission (IJC) has been operating effectively for more than 100 years. The IJC is guided by the Boundary Waters Treaty, signed by Canada and the United States in 1909.

Sovereignty and Law

In her comprehensive book on Turkey's water diplomacy, Ayşegül Kibaroğlu provides a summary of the current Turkish position.⁸²

The doctrine of limited territorial sovereignty strikes a golden mean between the two preceding theories—by recognizing a state's sovereignty over the waters of a transboundary river under its jurisdiction, but limiting the exercise thereof in such a manner as to ensure other riparians a reasonable share of the waters. Under this doctrine, all states are equally sovereign, hence, the sovereignty of one state is limited by the sovereignty of the others. In other words, every state is free to use its territorial water, provided that in no way prejudices the rights and the uses of the other states. This doctrine is supported by the principles of reasonable and equitable use and the obligation to avoid significant harm.⁸³

Turkey's strong position, politically, geographically, and economically makes it unnecessary to argue and rely on legal principles in a court or before an international body. But it is certainly useful to portray Turkey's policy as reasonable and a "golden mean" that carefully considers the rights of the downstream neighbors.

Although he was not a lawyer, Tony Allan provided additional insight on the question of international law and its impact on water rights in the Middle East and North Africa (MENA) countries.⁸⁴ He notes that the legal principles are largely developed by "water outsiders" and the introduction of water policy reform (and water law) has been slow.⁸⁵ Because water is highly mobile, and monitoring it is difficult, any rules are difficult to enforce. Moreover, "alien legal principles, evolved in alien outsider institutions . . . have little appeal to MENA politicians, professionals and com-

⁸² Ayşegül Kibaroğlu, *Turkey's Water Diplomacy: Analysis of Its Foundations, Challenges and Prospects* (London: Anthem Press, 2021).

⁸³ Kibaroğlu, *Turkey's Water Diplomacy*, 51.

⁸⁴ Allan, *The Middle East Water Question*. See chap. 7 on international water law in the MENA countries.

⁸⁵ Allan, *The Middle East Water Question*. See chap. 5 on water pessimists and optimists and water insiders and outsiders.

munities when they will disrupt existing practice and are not founded on the cultural and religious conventions of the region.”⁸⁶

Equitable Utilization

Not surprisingly, upstream riparians have advocated that the emphasis between the two competing principles of hydrography and chronology be on equitable utilization, since that gives the needs of the present the same weight as those of the past. Likewise, downstream riparians have pushed for emphasis on no significant harm, effectively the equivalent of the doctrine of prior appropriation in protecting preexisting use. The World Bank, which must follow prevailing principles of international law in its funded projects, recognizes the importance of equitable use in theory but, for practical considerations, gives “no appreciable harm” precedent—it is considered easier to define—and will not finance a project without the approval of all affected riparians.⁸⁷

As legal principles for sharing scarce water resources evolve over time, they can eventually reach the status of customary international law. But in the realm of transboundary waters, the general lack of acceptance and the use of a balancing test makes the process more difficult.⁸⁸ In the absence of a treaty or basin-wide agreement, the arguments still emphasize the *rights* of each state and rest on the fundamental dispute between claims based on hydrography and those based on chronology. The parties’ positions are driven more by geography, economics, and politics than refined legal principles. Use of the terms *reasonable*, *equitable*, and *significant* guarantee that each riparian party will have a legal theory to support its position, even when that position may be extreme.

A fair reading of the Watercourse Convention supports the Turkish position that the downstream riparians are unable to put the waters to *equitable use*, at least in comparison to Turkey. Of course, the equation could change in the future in the event of a water shortage that causes significant

⁸⁶ Allan, *The Middle East Water Question*, 288.

⁸⁷ Salman M. A. Salman, *The World Bank Policy for Projects on International Waterways: An Historical and Legal Analysis* (Washington, DC: World Bank, 2009).

⁸⁸ Salman M. A. Salman, “Equitable and Reasonable Utilization and the Obligation Against Causing Significant Harm—Are They Reconcilable?,” *American Journal of International Law Unbound* 115 (2021): 183–88, <https://doi.org/10.1017/aju.2021.22>.

harm to the downstream users. The fact that Turkey has not signed the Watercourses Convention will make no significant difference if the convention reflects customary international law.⁸⁹ But the slow progress of ratification and implementation seems to indicate that the treaty has not yet reached that status. The failure to sign provides at least one major advantage to Turkey. It reduces the chance that a dispute will become “internationalized” and that some outside agency will have control over what Turkey considers to be its own natural resource.

International Water Law and Hydropolitics

One of Turkey’s principal objections to the Watercourse Convention was article 7’s provision not to “cause significant harm.” This is certain to be a concern to Turkey that this provision would be used as a weapon by Syria or Iraq in the event of declining water supply or a deterioration in water quality. Syria signed the convention, but it is much more difficult to determine the official Syrian position on the subject, in view of the tightly controlled and censored Syrian bureaucracy. Water information and policy are treated as a state secret, and the Syrians hold their cards close to their vests. This is true even though there is a legal argument to support Syria based on the principles of chronology and historic use.⁹⁰ Without the data to support a claim that Turkey is causing a decline in historic flows, the Syrian position would certainly be weakened. And the current chaos in Syria will continue to prevent meaningful interaction with Turkey on water issues.

In contrast to Syria, Turkey has a transparent strategy and conducts a public information campaign on the subject. The Turkish Ministry of Foreign Affairs website contains a summary of international water law and explains why Turkey’s position is reasonable under the current state of the law.⁹¹ Although these documents can be subject to criticism regarding

⁸⁹ “Peremptory Norms of General International Law (jus cogens),” in *Report of the International Law Commission: Seventy-first Session (29 April–7 June and 8 July–9 August 2019)* (New York: United Nations, 2018), chap. 5.

⁹⁰ See Joseph Dellapenna, “The Two Rivers and the Lands Between: Mesopotamia and the International Law of Transboundary Waters,” *Brigham Young University Journal of Public Law* 10, no. 2 (1996): 244.

⁹¹ See “Water: A Source of Conflict or Cooperation,” Turkey Ministry of Foreign Affairs, under the heading “International Law and Transboundary Rivers.”

their representation of the facts and the law, they do provide a valuable insight into Turkey's position on a matter of national security.

Some authors retain a more positive view of the role of international law in transboundary water conflict resolution. If international water law is considered an element of power relations, then it can be viewed as a source of structural or bargaining power.⁹² If this is true, then weaker actors should be able to back their claims against "basin hegemons," thus enhancing their bargaining power. However, the differences between Turkey on the one hand and Syria and Iraq on the other are so great that meaningful negotiation between them has never occurred. There is disagreement on all the fundamentals, including the definition of an "international river," the meaning of "equitable and reasonable utilization," and limitations on the obligation not to cause harm.⁹³

Water rights and principles of water law play a minor role in the Euphrates-Tigris basin, and Dr. Tony Allan advised that "lawyers would make a more effective contribution if they applied their regulatory endeavors to potentially operational economic transactions over water rather than attempting to breathe life into non-operational principles of water rights."⁹⁴

If the law provides no solutions, what about science and technology? The following chapter will describe recent developments in earth and water science that are relevant to the Euphrates-Tigris region. Science has the potential to make a major contribution to cooperation, but only with a concerted effort to bridge the gap between science and diplomacy. Together, science and diplomacy can make a major contribution in advancing the aims of cooperation and stability in the Euphrates-Tigris watershed.

⁹² Marwa Daoudy, "Hydro-Hegemony and International Water Law: Laying Claims to Water Rights," *Water Policy* 10, supplement no. 2 (2008): 89, <https://doi.org/10.2166/wp.2008.204>.

⁹³ Daoudy, "Hydro-Hegemony and International Water Law," 99.

⁹⁴ Allan, *The Middle East Water Question*, 38.

CHAPTER 7

Data, Science, and Diplomacy *Bridging Technology and Policy*

Despite the scale of the threats posed by a deteriorating water situation and poor water management in the Euphrates-Tigris basin, there has been little in terms of cooperation. Water ministers from Iraq, Turkey, and Syria communicate periodically, but measurable progress has been elusive. In 2010, the United States Institute of Peace (USIP) identified several obstacles, including a rarely discussed factor:

Lack of open technical data. A crucial roadblock is the lack of agreement on actual flow levels and water quality because of deficient measurement technologies, limited public hydrological data, and insufficient technical expertise to make environmental and agricultural impact assessments based on generally accepted scientific standards.¹

The USIP made a series of recommendations focusing on regional scientific cooperation. Using examples of this type of cooperation from the Nile and Mekong, the USIP argued for a new approach that would provide a strong basis for economic growth and political stability. This chapter will

¹ Joel Whitaker and Anand Varghese, *The Tigris-Euphrates River Basin: A Science Diplomacy Opportunity*, Peacebrief 20 (Washington, DC: United States Institute of Peace, 2010).

focus on technological developments that have the potential to transform the political and water security landscape in the Euphrates-Tigris region.

Since 2010, the connection between science, data, and diplomacy has grown increasingly important as international relations between countries become more complex and scientific knowledge expands globally. The 2020 global pandemic raised awareness of the importance of sharing scientific data on the international stage. The term *science and diplomacy* is now formally recognized as an area of study.² A good summary can be found in the works on science and diplomacy from the American Association for the Advancement of Science (AAAS).³

Transboundary issues and challenges involving the shared spaces between countries are among the high priority foreign policy issues for national governments. These issues not only present unique foreign policy challenges because of their proximate nature, but, given the strong domestic components, they have active and vocal domestic constituencies. These issues are often set in the context of the natural world, as is reflected in the adage “nature knows no boundaries,” whether it is aquatic or terrestrial ecosystems, outer space, or the shared air.⁴

This chapter will attempt to answer three questions related to data, science, and diplomacy: *What do we need? What do we have? How can we make practical use of the available information?*⁵ The first two questions relate to data and science, and the last question will focus on diplomacy in the final part of the chapter.

² A wide range of courses and degree programs in the field of science and diplomacy can be found on the AAAS Center for Science Diplomacy website.

³ “Transboundary Issues and Shared Spaces: An Education Resource,” *Science & Diplomacy*, accessed 6 December 2022.

⁴ “Transboundary Issues and Shared Spaces.”

⁵ Frederick Lorenz is grateful for the contribution of Dr. Aaron Salzberg, director of the Water Institute in the Department of Environmental Sciences and Engineering at the University of North Carolina at Chapel Hill. Dr. Salzberg was a guest speaker in the course Data, Science and Diplomacy at the University of Washington, Seattle, in 2020 and 2021.

Information Technology: Big Data, Cloud Computing, and Geographic Information Systems

In a world filled with water-related data, and more available every day, the first question is to determine what is necessary to support decision making in the water sector. What do we need? If we can answer that question, we can approach the second question, how do we determine what we have available and for what purpose?

The collection and storage of vast amounts of data poses several challenges. The term *big data* seems to defy understanding by those outside the field of computer science, including terms such as *data warehouse*, *data lake*, and *data swamp*.⁶ The need to store information in the cloud and remote from the ultimate user raises more questions: What is the role of the “curator” or manager of the information? How is it made available? This in turn impacts the usefulness of the data.

Big data analytics (BDA) is a concept focusing on managing large volumes of data through advanced analytics to drive information discovery. In a recent paper, the authors used BDA to improve groundwater management in the Southern African Development Community region in Africa.⁷ BDA can support water management by filling in data gaps and transforming these data into useful information. Additionally, machine learning and artificial intelligence have provided tools for data-driven modeling.

Cloud Computing and Remote Sensing

United Nations Sustainable Development Goals (SDGs) were adopted in 2015.⁸ Broad and optimistic goals were set in the environmental arena. A major obstacle to the achievement of these goals, however, has been water scarcity and rapid urbanization in the developing world. Earth observation (EO) has become an important tool to monitor the progress and implementation of specific SDG targets through its wide accessibility and global coverage. New algorithms and tools deployed in cloud computing

⁶ *Top Big Data Analytics Use Cases* (Austin, TX: Oracle Cloud Infrastructure, n.d.).

⁷ Zaheed Gaffoor et al., “Big Data Analytics to Support Groundwater Management,” *Water* 12, no. 10 (October 2020): 2796, <https://doi.org/10.3390/w12102796>.

⁸ “Goal 6. Ensure Availability and Sustainable Management of Water and Sanitation for All,” UNSDGS, accessed 6 December 2022.

platforms provide an opportunity to use EO for developing countries with limited technological capacity. In the Nile basin, the value and utility of cloud computing data has been demonstrated in the classification of various permeable and impermeable soil levels without the need for ground observation.⁹

Geospatial Artificial Intelligence, Automated Sensing, and Machine Learning

Geospatial artificial intelligence (GeoAI) is an emerging discipline that combines innovations in spatial data science, artificial intelligence (AI), machine learning (ML), and geospatial data.¹⁰ GeoAI is the study, development, and application of intelligent computer programs to automatic geospatial and nonspatial data processing. It models geospatial association and interaction, predicts spatial dynamics phenomena, provides spatial reasoning, and discovers patterns and trends.¹¹ GeoAI includes the methods, techniques, and tools of AI and ML to carry out geospatial modeling, such as spatial hydrological prediction and fluvial landform classifications.

GeoAI applications for water system modeling have steadily increased in recent years. GeoAI methods seem very relevant for complex systems and large geographical-scale modeling. But a significant disadvantage of GeoAI models is the low level of “explainability” and model generalization.¹² Although several levels of model integrations exist, a full physical-based GeoAI model is still under development. With further research, GeoAI models have a high potential for autonomous hydrological prediction and forecasting.

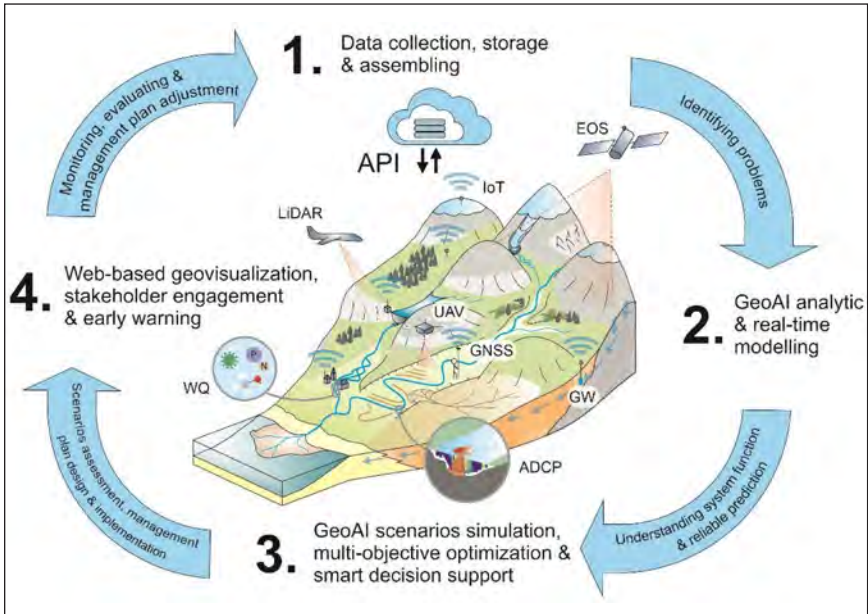
⁹ Wenzhao Li et al., “Earth Observation and Cloud Computing in Support of Two Sustainable Development Goals for the River Nile Watershed Countries,” *Remote Sensing* 12, no. 9 (2020): 1391, <https://doi.org/10.3390/rs12091391>.

¹⁰ Heidi Sucharew and Maurizio Macaluso, “Methods for Research Evidence Synthesis: The Scoping Review Approach,” *Journal of Hospital Medicine* 14, no. 7 (2019): 416–18, <https://doi.org/10.12788/jhm.3248>.

¹¹ Krzysztof Janowicz et al., “GeoAI: Spatially Explicit Artificial Intelligence Techniques for Geographic Knowledge Discovery and Beyond,” *International Journal of Geographical Information Science* 34, no. 4 (2020): 625–36, <https://doi.org/10.1080/13658816.2019.1684500>.

¹² Carlos Gonzales-Inca et al., “Geospatial Artificial Intelligence (GeoAI) in the Integrated Hydrological and Fluvial Systems Modeling: Review of Current Applications and Trends,” *Water* 14, no. 14 (2022): 2211, <https://doi.org/10.3390/w14142211>.

Figure 7.1. A GeoAI application model for integrated water resources management



(1) Internet of things supports real-time, high-frequency, hydrological monitoring. The data are stored in a cloud platform and accessed by an application programming interface. These data can be used for the real-time identification of problems in the system (e.g., a river basin); (2) GeoAI provides data analytic and online real-time modeling tools for hydrological system analysis and prediction; (3) GeoAI also supports multiobjective, multiscenario optimization modeling, which in turn is the basis of smart decision support systems; and (4) Geovisualization in web mapping and mobile apps can be used for data dissemination and stakeholder engagements and implementing early warning systems. The system can be closed with the evaluation and adjustment of the plan and the improvement of the hydrological monitoring system. WQ (automatic water quality monitoring), ADCP (acoustic doppler current profiler for water current velocity measurement and river bathymetry), GW (automatic groundwater monitoring in wells), UAV (unmanned aerial vehicle for very high-resolution land cover mapping and surface elevation models), EOS (Earth observation system for environmental condition monitoring), LiDAR (LiDAR survey of high-resolution topography data), and GNSS (use of global navigation satellite systems for ground truth data collection).

Source: Carlos Gonzales-Inca et al., “Geospatial Artificial Intelligence (GeoAI) in the Integrated Hydrological and Fluvial Systems Modeling: Review of Current Applications and Trends,” *Water* 14, no. 14 (2022): 2211, <https://doi.org/10.3390/w14142211>, adapted by MCUP.

The recent developments in AI and ML was driven mostly by “deep learning,” an improvement on prior “neural network” techniques. Computational neural networks act as a crude, simplified simulation of a human brain by linking together many layers of model neurons. Each neuron learns an activation function that causes it to either fire or not fire de-

pending on the behavior of the neurons in the previous layer. Present-day neural network deployments are enormous, commonly consisting of hundreds of millions of model neurons and requiring massive amounts of energy to run. A 2019 paper caused a stir by estimating that the latest neural models used by large tech companies for processing languages and images each have a carbon footprint comparable to the lifetime emissions of several average American cars, including their manufacture.¹³ Special-purpose ML models can be made much smaller, but still generally take more time and computing resources than other kinds of models.

Limitations of Artificial Intelligence and Machine Learning¹⁴

The “learning” part of machine learning occurs from training a model with sample data. For example, a neural model could “learn” to recognize a cat picture by training it with labeled (positive) pictures of cats and labeled (negative) pictures without cats. Similarly, for hydrology problems, an ML model can learn to estimate stream flow from images by training it with “ground truth” labeled images across a range of flow rates (or training to make predictions with other verified data like weather indicators or upstream measurements). A model’s accuracy increases as it is trained with more data, and modern applications can require vast amounts of labeled training data. Therefore, ML models are best suited for problems where training data is ample and readily available and can be prohibitively expensive in cases where producing training data is costly. Typically, a subset of the labeled data is held aside to test the model’s accuracy after it is trained.

Choosing the “fit” of an ML model is key to its success: over- and undergeneralizing models can lead to errors.¹⁵ For example, in Amrita Gupta et al.’s work monitoring streamflow from camera images, they achieved some success training models to estimate a stream’s flow from time-lapse

¹³ Emma Strubell, Ananya Ganesh, and Andrew McCallum, “Energy and Policy Considerations for Deep Learning in NLP,” *arXiv* (2019): <https://doi.org/10.48550/arXiv.1906.02243>.

¹⁴ Input for this section was provided in November 2022 by Matt Zeigler, a PhD student in the Information for Communications Technology and Development (ICTD) Lab at the University of Washington, Seattle. He played an important role in the author’s course Data, Science and Diplomacy at the University of Washington, Seattle, in 2020 and 2021.

¹⁵ Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach*, 4th ed. (Berkeley: University of California, 2022).

camera images. However, they found that they could not accurately re-apply the same model to different streams, but instead that it was necessary to generate a separate model for each stream and produce labeled training data for each.¹⁶ Assessing this fit between generalization and specificity is critical for assessing the credibility of results produced with machine learning, and assessing whether it is feasible to collect the necessarily data for an ML project.

Explainability or interpretability present major weaknesses for models that use some types of ML, especially deep learning: even after a model is trained to successfully recognize a cat in an image, it is very difficult to analyze the model and understand how it works. Is the model recognizing the cat by finding the shape of its ears, the colors, its pose, or recognizing the surrounding environment? ML explainability is an active area of computer science and the state-of-the-art may change quickly, but at the time of this writing it remains a major challenge.¹⁷ This gap can be especially problematic in international scenarios where a model's results are likely to be challenged. It is hard to show that results are credible when even the model's designers cannot explain how the model produced its results. This goes to the heart of the problem—scientific development does not necessarily yield information that benefits the end user.

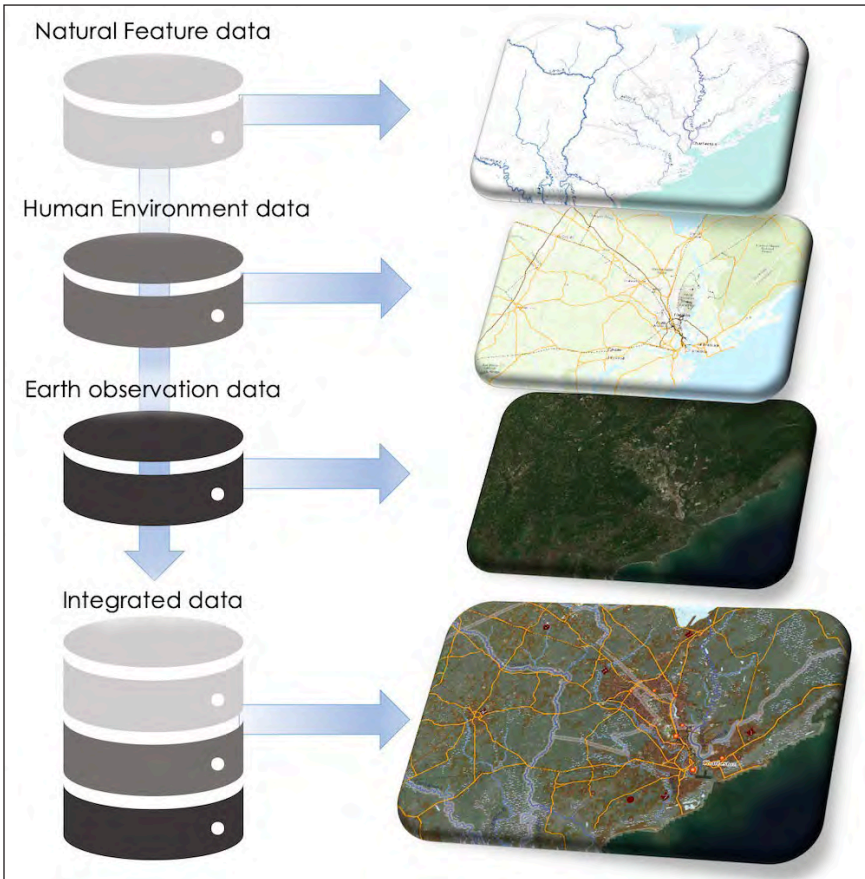
Geographic Information Systems and U.S. Geological Survey

Geographic information system (GIS) refers to the hardware and software used for storage, retrieval, mapping, and analysis of geographic data. The total GIS concept usually includes the operating personnel and the data that goes into the system. Spatial features are stored in a coordinated system that includes latitude/longitude or Universal Transverse Mercator (UTM) data, referencing a particular place on the Earth. GIS is commonly

¹⁶ Amrita Gupta et al., "Towards Continuous Streamflow Monitoring with Time-Lapse Cameras and Deep Learning," in *Conference on Computing and Sustainable Societies Proceedings* (New York: Association for Computing Machinery, 2022), <https://doi.org/10.1145/3530190.3534805>.

¹⁷ Ribana Roscher et al., "Explainable Machine Learning for Scientific Insights and Discoveries," *IEEE Access* 8 (2020): 42200–16, <https://doi.org/10.1109/ACCESS.2020.2976199>; and Nadia Burkart and Marco F. Huber, "A Survey on the Explainability of Supervised Machine Learning," *Journal of Artificial Intelligence Research* 70 (January 2021): 245–317, <https://doi.org/10.1613/jair.1.12228>.

Figure 7.2. Layers of GIS



Source: NASA, adapted by MCUP.

used for scientific investigations, resource management, and development planning.

In GIS, all spatial data is geographically referenced to a map projection in an Earth coordinate system. Spatial data can be realigned from one coordinate system into another, and data from different sources can be brought together into a common database and integrated using GIS software. With the right input data, a user can perform analyses, such as modeling the flow through connecting lines in a network and overlaying different environmental and geographic features.

GIS can be an important tool in watershed analysis; publicly available data such as U.S. Geological Survey (USGS) digital line graphs and digital elevation models, cartographic feature files, and digitized soil surveys can provide a foundation for the analysis.¹⁸ The participants can provide agricultural history, land classification, water flow, and other useful data. Current agricultural cover and urban areas can be mapped from satellite imagery. The final product of a watershed analysis is a resource assessment report divided into modules, including hydrology, surface erosion, stream channels, riparian function, and causal mechanisms. But a final report can be meaningless unless it is connected to a strategic plan that can be implemented by water resource management.

The USGS has been supporting engineers within the government of Iraq's Ministry of Water Resources (MOWR) and other ministries including the Electricity and Meteorological Authorities with remote sensing analysis capacity building for:

- Reservoir monitoring within and upstream of the Tigris-Euphrates basin using remotely sensed data to enable the Iraqis to assess water levels in the dams and reservoirs.
- Energy optimization for the various sources of energy (e.g., hydro-power, natural gas, and fuel oil).
- Dust storm monitoring and forecasting to monitor climate change and assess mitigation measures.
- Groundwater (GW) modeling to better manage Iraq GW resources and provide decision makers with tools to develop and assess approaches for sustainable water use.
- Monitoring snow accumulation and snow depletion upstream of the Tigris-Euphrates basin on a weekly basis.
- Calculation of regional evapotranspiration.
- Optimization of water use through economic modeling.¹⁹

USGS capacity-building efforts allow the Iraqis to better manage and operate government-run dams and reservoirs, negotiate more effectively

¹⁸ "EarthExplorer," USGS, 9 November 2022.

¹⁹ Details provided in an email from Dr. John W. Lane Jr., Senior Science Advisor, International Water, USGS, to Frederick Lorenz, 23 November 2022, hereafter Lane email.

their water allocations with upstream countries, calculate water consumption more accurately, and develop scenarios to address climate change and improve food security.²⁰

The USGS technical support is valuable, even if it does not result in any new bargaining power for Iraq or make any difference in the amount of water available from Turkey and Iran. The *Strategy for Water and Land Resources in Iraq* (SWLRI) report makes it clear that Iraq needs to prepare for the worst, assuming the predictable decline in water from upstream.²¹ The input from USGS is certainly valuable for internal management purposes and to mitigate the impact of climate change.

National Aeronautics and Space Administration Programs

The National Aeronautics and Space Administration (NASA), in collaboration with the U.S. Agency for International Development (USAID) and the World Bank, is developing remote-sensing and earth science data platforms in water-critical parts of the world for water availability, agriculture, and aquifer monitoring. They are designed to address a multitude of issues dealing with water resources, aquifer and stream flow data, agriculture planning, flood management and early warning, and overall water balance. NASA supports a free and open exchange of its earth science and satellite data throughout the world.²²

Surface Water and Ocean Topography and McFLI

The Surface Water and Ocean Topography (SWOT) satellite mission—jointly developed by NASA, France’s Centre National d’Etudes Spatiales, the Canadian Space Agency, and the UK Space Agency—launched in December 2022. It will provide the first global freshwater survey, including a novel approach that uses remote sensing data to estimate river fluctuations.²³

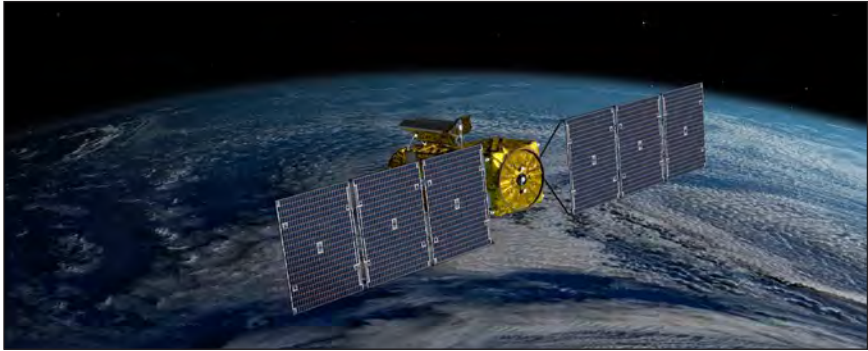
²⁰ Lane email.

²¹ *Strategy for Water and Land Resources of Iraq, 2015 to 2035* (SWLRI) (Baghdad: Ministry of Water Resources, Republic of Iraq, 2014), 3. Authors’ collection.

²² “NASA Open Data Portal,” NASA, accessed 6 December 2022.

²³ “Surface Water and Ocean Topography,” Jet Propulsion Laboratory, NASA, accessed 6 December 2022.

Figure 7.3. SWOT satellite



Source: NASA, adapted by MCUP.

The SWOT mission will generate data and measurements of river width, surface height, slope, and how they change over time. New techniques based on physical flow laws will then be applied, since it is nearly impossible to directly measure river discharge remotely. Satellites have an extremely difficult time seeing the bottom of a river through deep or murky water, but McFLI takes these measurements to work out what a river's discharge must have been to produce the observations. The term *McFLI*, or mass conserved flow law inversion, uses satellite observations of rivers to obtain discharge estimates. McFLI methods should play an important role in interpreting observations from the SWOT mission.²⁴ Over time, this will allow us to track changes in a river channel's cross-sectional area, channel shape, and water surface slope as water levels change.

SERVIR

The joint USAID-NASA Applied Sciences' SERVIR program is a regional monitoring and visualization system using earth science satellite measurements and other data to support environmental management, development needs, and natural disaster response in developing countries.²⁵ SERVIR products are used by government agencies, resource managers, researchers, students, news media, and the general public. SERVIR en-

²⁴ C. J. Gleason, P.A. Garambois, and M. T. Durand, "Tracking River Flows from Space," *Eos* (July 2017): <https://doi.org/10.1029/2017EO078085>.

²⁵ "SERVIR," NASA, accessed 6 December 2022.

ables scientists, educators, project managers, and policy implementers to better respond to a range of issues, including disaster management, agricultural development, biodiversity conservation, and climate change. It can also provide an estimation of changes to groundwater and terrestrial water storage changes using GRACE (Gravity Recovery and Climate Experiment) satellite data.²⁶

This technology should have great potential in the Euphrates-Tigris basin, but only when coordinated with the wide range of resources available. Eventually it could be integrated into a regional economic and technical development center, a concept that will be further developed later in this chapter.

Collaborative Modeling and Management: USACE-HEC

The U.S. Army Corps of Engineers (USACE) runs the Hydrologic Engineering Center (HEC) to support water resources management responsibilities “by bridging the gap between the academic community, practicing hydrologic engineers and planning professionals.”²⁷ The procedures can be made available to USACE and professionals worldwide through an open technology transfer program of technical assistance, publications, and training. In a recent article, HEC software was used to model snow melt in Turkey. In that study, it was shown that, with the HEC-HMS hydrological model, flow rate simulations can be performed with very good results at the outlet of the snow-dominated, mountainous Kırkgöze-Çipak Basin, which has a very complex topography.²⁸ The model parameters should have application throughout the wider Euphrates-Tigris basin.

River basin modeling has great promise for use in the Euphrates-Tigris basin. In Iraq, for example, the HEC-HMS model can be used to determine the impact of different Euphrates future flow levels based on various time alternatives (10, 15, or 20 years) for construction of the GAP project in Turkey (see chapter 3). This will be a critical part of the SWLRI, a

²⁶ “Gravity Recovery and Climate Experiment,” Jet Propulsion Laboratory, NASA, accessed 6 December 2022.

²⁷ “Hydrologic Engineering Center,” U.S. Army Corps of Engineers, accessed 6 December 2022.

²⁸ Selim Sengül and Muhammet Nuri Ispirli, “Predicting Snowmelt Runoff at the Source of the Mountainous Euphrates River Basin in Turkey for Water Supply and Flood Control Issues Using HEC-HMS Modeling,” *Water* 14, no. 3 (2022): 284, <https://doi.org/10.3390/w14030284>.

major multisector project completed for the Iraqi government in 2014 (see chapter 6) with revisions now underway.

The model is designed to allow stakeholders to carefully evaluate the long-term consequences of competing resource management strategies. The collaborative discovery process associated with this work is designed to assist in the development of strong, scientifically derived resource management plans, often with a greater degree of consensus among stakeholders than might otherwise have been achieved.

Technology to Support Iraq's MOWR and SWLRI

NASA and USGS monitor and make publicly available water levels for many critical reservoirs located across the Tigris-Euphrates watershed.²⁹ These data are used in Iraq and are critically important to calibrate the hydroeconomic model implemented in the 2014 SWLRI to simulate the transboundary contributions from the Tigris and Euphrates Rivers. The SWLRI report update (underway in 2022) will review the old model and update it. NASA/USGS data do not provide an immediate answer to the question of how much water we can expect the riparian countries can release to Iraq. To reply to that question, it takes additional modeling and extrapolations. However, NASA/USGS data provides an important input that will make the results of the model more reliable.³⁰

Despite the development of the SWLRI and input of modeling technology, Iraq has made little progress implementing its own water management plan.³¹ Numerous challenges continue to face the government, including corruption, lack of resources, and governmental gridlock. Reports of violence in August 2022 indicate a threat to the “very survival” of the Iraqi state.³² Without some return to stability in Iraq, even the best technology will be of limited value. But there may be opportunities for

²⁹ “Water Monitor Lakes and Reservoirs,” GSFC, NASA, accessed 6 December 2022.

³⁰ The information in this paragraph was provided to author Lorenz in November 2022 by a source familiar with the current Iraq SWLRI planning and modeling process.

³¹ A comparison of the ambitious goals in the 2014 SWLRI and actual accomplishments on the ground show a lack of progress. For example, the six-part plan for rehabilitation of the internal flood control system of Iraq had apparently not been accomplished eight years later, in 2022.

³² “‘Very State’ of Iraqi Survival at Risk, UN Mission Warns, as Guterres Calls for Calm and Restraint,” UN News, 29 August 2022.

advancement elsewhere in the basin that will eventually help Iraq. For example, improved management of water resources in Turkey could limit the predictable decline in water quantity and quality. And direct technical support to Iraq will assist the government in managing water resources and mitigating the impact of climate change.

The Need for Coordination: Outputs and End Users

This chapter indicates a range of scientific capabilities that could potentially lead to improved cooperation in the Euphrates-Tigris basin. The international technical and scientific capabilities described here are now available, but there are major obstacles in moving forward and contributing to cooperation in the Euphrates-Tigris basin.

In a 2018 workshop sponsored by NASA, representatives of U.S. federal technical agencies made the following key findings. The first part of the report evaluated the scientific research *providers* of the information:

Many existing science and technology capabilities are available to address operational information needs of decision makers regarding transboundary water management but are often disjointed and not directly connected to end-user communities. Currently, there are breaks in the chains linking data to the information and knowledge needed to fully understand the complex linkages between water stress and socio-economic stressors leading to conflict and security challenges in transboundary basins.³³

The second part of the *Finding* indicates the challenges for the *end users*:

The intelligence, defense, and foreign policy user communities and scientific research communities are not in sync with each other in regard to properly identifying requirements and therefore developing the right capabilities to support the end goal. There are a number of barriers that limit the adoption of existing Earth sci-

³³ Raha Hakimdavar et al., *NASA Workshop Report and Recommended Path Forward—Transboundary Water: Improving Methodologies and Developing Integrated Tools to Support Water Security*, NASA/TM-2018-219026 (Greenbelt, MD: Goddard Space Flight Center, NASA, 2018), 21.

ence modeling and observational capabilities to the fullest extent possible for informed decision-making related to transboundary water. One such barrier is that water security related research capabilities often do not meet operational requirements of users.³⁴

The findings indicate the inherent problem and division between science and policy. Those conducting the research are operating in their own realm, without a clear vision for the practical purpose of their scientific product. Those in the user community are unable to properly identify their own needs.

Who are the end users? For the U.S. foreign policy establishment, they would be the staff and diplomats responsible for water and security related policy planning. In the Euphrates-Tigris basin, they would be the water managers and regional political officials in the water ministries. As stated above, the problem lies in weak or nonexistent communication between the developers and curators of data. Despite progress in the provision of technical support to Iraq, more needs to be done to help achieve its goals in the realm of water security.

The Politics and Power of Data and Science: Two Examples

Two U.S.-based remote monitoring programs are selected here, now available for the Mekong and Nile basins. They use open-source sensing devices (including those from the European Union) and post the data online. But the results on the Mekong have been controversial, at best, with one or more parties refusing to accept the data. For the Nile, there may be a greater potential for lasting results.

The Mekong Basin and the Mekong Dam Monitor

The Mekong Dam Monitor (MDM) is an online platform that uses remote sensing, satellite imagery, and GIS analysis to provide near-real time reporting and data downloads across numerous previously unreported indicators in the Mekong basin.³⁵ The platform is freely available for public use on the Mekong Water Data Initiative website and all research inputs

³⁴ Hakimdavar et al., *NASA Workshop Report and Recommended Path Forward*, 21.

³⁵ Alan Basist et al., "Mekong Dam Monitor," Stimson Center, accessed 6 December 2022.

are public-access resources. But the politics in the Mekong basin are complex, with suspicion by all the riparian countries and regular refusal to accept verifiable data.

For China, criticism of its dam building is not welcome. The “objective” data in the MDM cannot be separated from the source of the information and the intersection with great power rivalry. The United States has been accused of “employing surveillance tactics on another sovereign state’s projects” and “gross interference in China’s internal affairs.”³⁶ This came just after the opening phase of the Mekong Dam Monitor, when President Xi warned on 1 July 2021 that “the Chinese people will absolutely not allow any foreign force to bully, oppress or enslave us.”³⁷

The collection and dissemination of data on transboundary rivers have always been political acts. Upstream countries are more likely to reject open-source data and to consider water information as a state secret. For the Mekong, China’s dominant geographic position provides little incentive to cooperate. On the Nile, it is not certain that Egypt and Ethiopia will be willing to accept the outputs produced by external sources. Ethiopia may be reluctant to agree to real-time data that shows the water flow details of the Grand Ethiopian Renaissance Dam.

Collection and distribution of water data presents the diplomats’ challenge, and innovative ways need to be found to deal with the emerging level of open-source data. The situation on the Mekong shows that it is not enough to simply publish and make transboundary water data “freely available” online. Diplomacy is always a matter of finding the right opportunities, and the dynamics in the Mekong basin are entering a new phase. Only time will tell if the MDM eventually contributes to conflict or cooperation in the Mekong Basin.

The Nile and NiBras

Challenges to manage and secure a sustainable water supply are becoming more acute in Egypt with the construction of new upstream trans-

³⁶ “Setting the Narrative Right on Mekong and Washington’s Dam Monitor,” *China Daily*, accessed 6 December 2022.

³⁷ Ken Moritsugu, “At Communist Party Centenary, Xi Says China Won’t Be Bullied,” *AP News*, 1 July 2021.

Figure 7.4. NiBRAS modeling tool for the Nile basin



Source: courtesy of NiBRAS, adapted by MCUP.

boundary water infrastructures in Ethiopia and Sudan. To understand the impact of such transboundary water projects on Egypt, a modeling tool was developed to simulate potential flow and reservoir scenarios in the Nile basin without requiring on-site hydrologic or transboundary dam data. The University of Washington-Seattle developed the Nile Basin Reservoir Advisory System (NiBRAS) in 2018, and the current version is available online.³⁸ The NiBRAS system was still under development in 2022, at that time the data available at the link was only current through 2020.

NiBRAS is a decision support system intended to promote societal applications of satellite missions in water management practices. The NiBRAS system was designed to provide users with three main outputs:

- Real-time monitoring of reservoir operation using a reservoir modeling approach.
- Forecasting of reservoir outflow and storage change using global numerical weather prediction (NWP) model-based forecasts of the weather.

³⁸ Hisham Elardiry, “Nile Basin Reservoir Advisory System,” NiBRAS Team, University of Washington, accessed 6 December 2022.

- Assessment of reservoir operation under various scenarios (e.g., land use/land cover [LULC], climate change, groundwater recharge, and transboundary dams).³⁹

The acceptance of water data on the Nile is controversial, where the problem relates to water measurements that might not be consistent with national interests. Ethiopia is now developing the Grand Ethiopian Renaissance Dam, but Egypt views the dam as a serious threat to sovereignty and water security. Egypt has resorted to veiled threats of military force to protect its rights.⁴⁰

Despite the availability of engineering studies and a wide range of scientific data, the parties have been unable to agree on terms (and the underlying data) that meet the needs of all parties. The NiBRAS project is designed to provide open-source objective data that can assist in building international cooperation. It is not certain that the parties will be willing to accept the outputs produced by the program, and Ethiopia may be reluctant to agree to the accuracy of real-time data that shows the water levels at the Grand Ethiopian Renaissance Dam.

The Stimson Center has long been critical of China, which may limit the value of the data produced by the Mekong Dam Monitor. For the Nile, NiBRAS is not well known in the region, and it has the potential to complement difficult diplomatic negotiations now underway. Because NiBRAS is based at a public university without obvious political ties, it may be considered neutral and less biased by the parties involved.

Reliability and Utility: All Models Are Wrong

The accumulation of technology and statistics is focused on the development of theoretical models aiming to predict the behavior of a certain process, for example, the amount of water available at a certain time and place. One authority reportedly said that “all models are wrong, but some

³⁹ “About NiBRAS,” University of Washington, accessed 6 February 2023.

⁴⁰ Al-Masry Al-Youm, “Egypt Warns Ethiopia Not to Start Filling GERD under Any Circumstances,” *Egypt Independent*, 2 March 2020.

can be useful.”⁴¹ This suggests that models will never represent the exact behavior on the ground. That said, even if a model cannot describe exactly the reality, it could be very helpful if it is close enough. For data and models that are designed to be used in the international context, reliability and explainability will be everything.

This further complicates the inherent problem and division between science and policy mentioned earlier in the chapter. People conducting research often operate in their own realm, without a clear vision for the practical purpose of their scientific product. Those in the user community may be unable or unwilling to properly identify their own needs. Data always needs a “curator” responsible for maintaining and managing the data.⁴² The Mekong Dam Monitor is curated by the Stimson Center. NASA curates vast amounts of satellite and remote sensing data. Even with a high level of technical proficiency, the reliability of the data will often be challenged by a potential end user. Therefore, the burden on the developer and curator is much more than producing accurate data. Curators must use common sense terminology and be prepared to explain that the data is reliable and useful.

Closing the Gap between Science and Diplomacy

The first part of this chapter tried to answer two questions related to data, science, and diplomacy: *What do we need?*; and *What do we have?* The remaining part of the chapter will try to answer one more question: *How can we make practical use of the available information in the Euphrates-Tigris basin?* In other words, how do we bridge the gap between science and diplomacy?

The term *diplomacy* has been defined as “the art and practice of conducting negotiations and maintaining relations between nations; skill in handling affairs without arousing hostility.”⁴³ In this book, we use the term more broadly to include the efforts, sometimes within a nation, to bridge the gaps between technology and the end users of the data. As mentioned earlier, these issues not only present unique foreign policy challenges be-

⁴¹ The quote has generally been attributed to British statistician George E. P. Box, “Science and Statistics,” *Journal of the American Statistical Association* 71, no. 356 (1976): 791–99, <https://doi.org/10.1080/01621459.1976.10480949>.

⁴² Keith D. Foote, “So You Want to Be a Data Curator?,” *Dataversity*, 19 August 2021.

⁴³ “Diplomacy,” National Museum of American Diplomacy, accessed 6 December 2022.

cause of their international nature, but, given the strong domestic components, they have active and vocal domestic constituencies.

The key to improving water security in Iraq is Turkey (see chapters 5 and 6 for more detail). Although Turkey has a sophisticated system to monitor and manage its own water infrastructure, it has been historically reluctant to share water data, in terms of both water quantity and quality. Turkey maintains the dominant geographic position, like China on the Mekong. But water science and remote sensing are quickly outpacing the ability of any nation to control the collection and dissemination of water data.

For the Euphrates-Tigris, the authors suggest that Turkey take the lead and establish a regional knowledge hub to include data collection and resource management. Climate change would be a major part of the study, and more needs to be done to build credibility and trust for the data. Emphasis needs to be placed on best practices for water management and the impact of climate change in the region. With the active participation of Turkey, more progress can be made in reducing the water deficit, not just for Turkey, but for the entire Euphrates-Tigris basin. More detail will be provided in the last part of this chapter.

Some U.S. History in Iraq

The United States advanced dozens of programs aimed at improving Iraq's control and management of its own water resources after the U.S. invasion in 2003. For example, in 2003, the U.S. Congress appropriated more than \$4 billion for water and public works in Iraq, an amount that was subsequently reduced to \$2.21 billion. For a variety of reasons, including inefficiency, corruption, and lack of security, little progress was made. The Government Accountability Office reported multiple examples of failed and often oversold programs to rebuild Iraq's infrastructure with American dollars and skills.⁴⁴ Several examples can be found in al Basra, a region heavily dependent on the Euphrates-Tigris with its own unique challenges.

⁴⁴ *Rebuilding Iraq: U.S. Water and Sanitation Efforts Need Improved Measures for Assessing Impact and Sustained Resources for Maintaining Facilities*, GAO-05-872 (Washington, DC: Government Accountability Office, 2005).

Figure 7.5. USAID-funded water treatment plant



Source: "Basrah's Road to Clean Water," USAID, adapted by MCUP.

In 2018, after decades of overuse, pollution, and reduced rainfall from climate change, al Basra's main water source became severely contaminated, sending 118,000 residents to the hospital due to water poisoning. More detail on water-borne disease in Iraq can be found in chapter 5. USAID has several projects underway in 2022, providing support to the Iraq government in various parts of the water sector, including al Basra.⁴⁵ But the USAID reports seem to overstate the results and avoid the hard questions about the limits of U.S. support. The 16 March 2022 USAID report on al Basra stated:

In response to the water crisis, USAID rehabilitated nine of Basra's major water treatment plants to ensure they meet both local and international standards. The renovated treatment plants are bringing safe, clean water to more than 625,000 residents.⁴⁶

⁴⁵ Clara McClinden, "10 Ways USAID Is Addressing Water Security in Iraq," *Global Waters*, 16 March 2022.

⁴⁶ "Basrah's Road to Clean Water," USAID, 16 March 2022.

Al Basra had a 2021 population of about 1.3 million, so the USAID report indicates about one-half the population were receiving clean water because of USAID efforts. But the situation in al Basra is more complex. The deterioration of public water infrastructure has its roots in decades of armed conflict and international sanctions. Tap water has been mostly undrinkable since the 1990s, forcing most households to rely on private water vendors. Water infrastructure upgrades were a priority for state rebuilding after 2003 but receded under the sectarian civil war. Governmental and donor plans for mega infrastructure water projects have stalled in the face of systemic corruption and racketeering.⁴⁷

In July 2018, massive protests erupted in al Basra as residents demanded improvements in public services.⁴⁸ Failings in water management were at the heart of local grievances: an outbreak of water-related illnesses was triggered by the increased use of polluted water from the Shatt al-Arab, al Basra's traditional source of water. The efficiency of water treatment facilities supplying al Basra city is reduced by irregular flows from canals to the water treatment plant.⁴⁹ These flows are impacted by upstream dam construction, climatic variability, and illegal water tapping. The operational capacity of water treatment plants is also limited by underinvestment in their maintenance, often reducing their working life to 10–15 years. There is a pressing need to diversify water sources for al Basra and improve the efficiency of treatment technologies and distribution networks. USAID efforts to rehabilitate certain water treatment plants in al Basra could be considered the proverbial drop in the bucket of available water.

U.S. Policy on Water Security

On 1 June 2022, Vice President Kamala D. Harris announced the launch of the White House Action Plan on Global Water Security. The plan outlines an “innovative approach to advancing water security at home and

⁴⁷ Azhar Al-Rubaie, Michael Mason, and Zainab Mehdi, *Failing Flows: Water Management in Southern Iraq*, LSE Middle East Centre Paper Series no. 52 (London: London School of Economics, 2021).

⁴⁸ Omar Al-Jaffal and Safaa Khalaf, *Basra Is Burning: The Protests in Basra Governorate, 2018–20*, LSE Middle East Centre Paper Series no. 56 (London: London School of Economics, 2021).

⁴⁹ Al-Jaffal and Khalaf, *Basra Is Burning*, 8.

abroad.” It further identifies the direct links between water and U.S. national security, and how the plan will “harness the resources of the U.S. Government—from leveraging science and technology to informing our diplomacy, defense, and development efforts—to advance global water security and foreign policy goals.”⁵⁰

The United States already has what it bills as a “whole-of-government Global Water Strategy” aimed at creating a more water-secure world. The strategy was mandated by the Senator Paul Simon Water for the World Act of 2014 to be developed and released every five years. The next update was due in late 2022 and was intended to reflect contributions from more than 17 government agencies and departments.⁵¹

Aaron Salzberg, the former lead diplomat for U.S. water initiatives, observed that “adopting a broader water security framework, the United States will be better positioned to address the real water challenges that impact people on the ground.”⁵² But he noted that the initiative is “repackaging” existing programs and does not propose structural changes or add new resources to what the United States is already doing.

Coordination of U.S. Efforts

Based on the authors’ observation, there is minimum coordination and evaluation of the many U.S. scientific capabilities described in this chapter, and each agency naturally promotes its own programs. The U.S. government websites cited previously in this chapter tend to overstate the capability and provide little in the way of documentation of results achieved. There is always competition for visibility and resources; this will be even more intense in a time of declining U.S. influence in the region.

Water-related programs funded by USAID have few measures or standards to evaluate and prioritize programs. Moreover, multiple organizations have provided technical aid to Iraq, with no overarching vision or strategic plan. Important work has been accomplished by NASA, USACE,

⁵⁰ White House, “Vice President Harris Announces Action Plan on Global Water Security and Highlights the Administration’s Work to Build Drought Resilience,” press release, 1 June 2022.

⁵¹ Senator Paul Simon Water for the World Act of 2014, H.R. 2901, 113th Cong. (8 December 2014). At the time of this writing, no updates or amendments to this act had been released.

⁵² Aaron Salzberg, quoted in Patsy Widakuswara, “US Elevates Water Security as Foreign Policy Priority,” *Voice of America News*, 21 June 2022.

and USGS in Iraq, as mentioned earlier, but that effort seems driven by the initiative and availability of certain individuals in those agencies. This is one of the reasons that U.S. efforts in Iraq since 2003 have yielded little in the way of positive results.

In a time of declining U.S. influence with Turkey, Syria, and Iraq, the most promising approach still seems to be in the field of science and technology. For a comparatively low investment, the United States can improve the coordination and delivery of the technology (and related training) described in this chapter to the people of the Euphrates-Tigris basin. This type of support can increase understanding and improve relations in ways that military involvement and diplomatic pressure cannot. The real challenge is to properly coordinate the activities and to bridge the gap between science and diplomacy in delivering the support.

Coordinating International Efforts

During the past 10 years, there have been periodic signs of recognition that freshwater scarcity can be a threat to international peace and stability.⁵³ U.S. policy documents have recognized the threat and pointed out that “prioritization and blame deflection” are major challenges. Water regulation in some countries “is buried in uninfluential ministries or agencies or is relegated as a secondary resource that is managed in a piecemeal manner from other government bodies.”⁵⁴ Yet, renewed interest in the topic does not necessarily yield results, and much more needs to be done. Additionally, each country providing funds for international development has its own interests in the region it chooses for development aid and promotes the use of its own companies and organizations to conduct the work. Thus, the fundamental problem remains: international organizations and various states aid Iraq with no overarching vision or strategic plan. Without better coordination, little hope for advancement can be expected.

The Hydropolitics Academy (HPA) is an independent, nonprofit think tank in Ankara, Turkey, dedicated to the analysis of water management

⁵³ *Water Conflict Chronology* (Oakland, CA: Pacific Institute, 2022).

⁵⁴ *The Future of Water: Water Insecurity Threatening Global Economic Growth, Political Stability* (Washington, DC: Strategic Futures Group, National Intelligence Council, 2021), 4.

policies, water diplomacy, and related issues.⁵⁵ In February 2022, the HPA completed a webinar and report on *Climate Change Effects in the Euphrates and Tigris River Basin Based on the EU Cascades Report* with the following conclusions:

- Little is being done on technological advancement on tools related to climate change. Few programs and projects could be handed over to political circles for action, especially on multistate cooperation and joint projects.
- Politicians and technical people are lacking an effective institutional framework for work progress that may lead to joint and country-level programs and projects needed to remedy the situation.
- What is missing is mutual trust and a common understanding of the positions of each of the stakeholders. But the most important missing ingredient is lack of political will by the decision makers.⁵⁶

In a 2021 article, Aysegül Kibaroglu and Ramazan Caner Sayan described the current situation and provided a concise history of cooperation and conflict over water in the region.⁵⁷ They note that more recent difficulties have centered around armed nonstate actors and damage to water infrastructure. Now that the threat from ISIS has decreased, they note some progress in international cooperation. In 2019, Turkey and Iraq announced the establishment of a Water Resources Center in Baghdad.⁵⁸ But since that time, there has been no reported progress, and political turmoil in Iraq will likely reduce the chances for sustainable international cooperation.

International relations concerning transboundary water can only achieve positive outcomes if the political will exists. The parties in the Euphrates-Tigris basin interact on water issues regularly, but on different levels—some public and some private. One important question is, how can the historic resistance of the basin countries to the exchange of data

⁵⁵ "Introduction of HPA," Hydropolitics Academy, accessed 6 February 2023.

⁵⁶ Dursun Yildiz and Fulya Aydin-Kandemir, eds., *Climate Change Impacts in the Euphrates and Tigris River Basin Based on the EU Cascades Report* (Ankara, Turkey: Hydropolitics Academy, 2022).

⁵⁷ "Water and 'Imperfect Peace' in the Euphrates-Tigris River Basin," *International Affairs* 97, no. 1 (January 2021): 139–55, <https://doi.org/10.1093/ia/iiaa161>.

⁵⁸ "Turkey, Iraq to Set Up Water Resources Center," *Hurriyet Daily News*, 1 August 2019.

be overcome? More importantly, why should Turkey participate in a new technical initiative in view of the traditional concern about “internationalizing” an issue that is firmly under Turkey’s control? What is the risk for Turkey? The development of a program of data collection, collaborative modeling, and management in the region could have unintended consequences. For example, the release of newly developed data might show that more water is available to “share” with downstream neighbors, leading to increased demands from Syria and Iraq.⁵⁹ It might also show that salinity levels as the Euphrates flows from Turkey to Syria and Iraq are already high and projected to be much higher as agriculture further develops in Turkey. Conversely, the data might show there is plenty of water in the basin if Syria and Iraq use it more efficiently.

This presents the diplomats’ challenge, and innovative ways need to be found to deal with the emerging level of open-source data. Diplomacy is always a matter of finding the right opportunities, and the dynamics in the Euphrates-Tigris basin are certainly entering a new phase. The next section examines a unique opportunity for collaboration in the Euphrates-Tigris basin that could expand this new phase even further: the creation of an international center for the riparian nations modeled after one serving the Hindu Kush–Himalayan nations.

ICIMOD: A Model for the Euphrates-Tigris Basin

Located in Kathmandu, Nepal, the International Centre for Integrated Mountain Development (ICIMOD) is a knowledge development and learning facility serving the eight member countries of the Hindu Kush–Himalaya region: Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan.⁶⁰ The developers of ICIMOD recognize that globalization and climate change have an increasing influence on the stability of fragile mountain ecosystems and the livelihoods of mountain people. They “support regional transboundary programs through partnership with regional partner institutions, facilitate the exchange of experience, and serve as a regional knowledge hub.” ICIMOD is based on economic development and sharing of knowledge, with no powers to reg-

⁵⁹ “Kurds Warn of Water Crisis in Northern Syria, Blame Turkey,” Ahval News, 19 March 2021.

⁶⁰ “Who We Are,” ICIMOD, accessed 6 February 2023.

ulate water quantity or quality.⁶¹ This model could be more effective and less threatening to Turkey than the Nile and Mekong regimes that have been previously described.

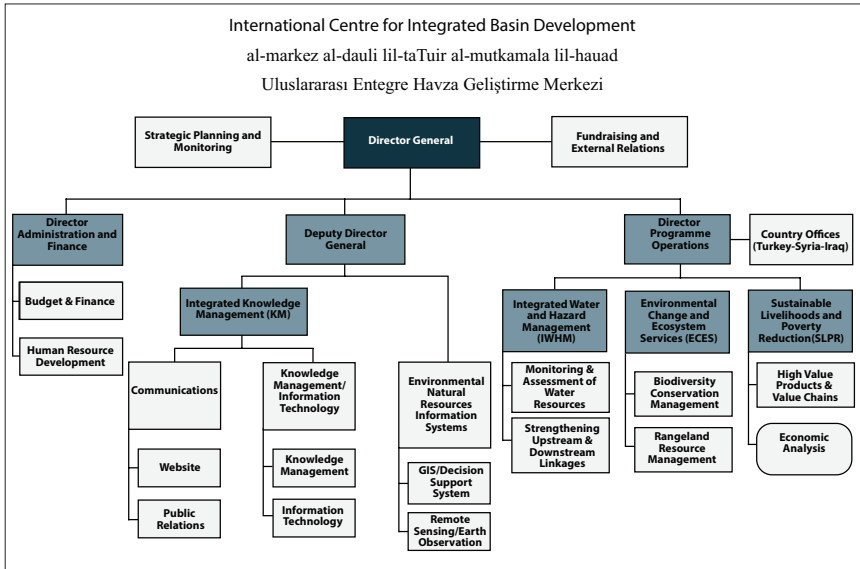
In the first edition, the authors proposed the creation of a development center for the riparian nations, and that concept should be even more relevant today. A suggested name: the International Centre for Integrated Basin Development (ICIBAD; figure 7.6). All three riparian countries would be asked to participate; Turkey would be the natural host and should be pleased to take a leadership role, displaying the highest level of expertise and experience. Ankara (or even Urfa in the heart of the GAP region) would be a secure place to operate. ICIBAD would also facilitate the training of “new classes of data diplomats,” mentioned previously in the online publication *Science & Diplomacy*.

A memorandum of understanding would carefully set out the responsibilities of the parties, and there could be multiple levels of data sharing, where Turkey would have the latitude to retain the most sensitive data. A regular series of training programs would benefit all the riparian nations and draw international experts. Ideally, there would be a fulltime staff, and facilities could be based in Turkey. As with ICIMOD, the center’s mission statement would be grounded in economic development and include the latest developments in dealing with climate change and the effects of globalization. At a time of increased political and military turmoil in the region, the economic model of the ICIBAD should prove to be the most effective approach. Coordinated action to mitigate the impact of climate change would be a theme to garner international support and attention.

More needs to be done to advance multistate cooperation in the Euphrates-Tigris basin. There is no effective institutional framework leading to joint and country-level programs. Water science and remote sensing are quickly outpacing the ability of any nation to control the collection and dissemination of water data. Without Turkey’s participation, new platforms are likely to be established by external actors to conduct sophisticated real-time monitoring of critical data. Turkey now has a unique opportunity to take the lead and establish a regional knowledge hub to

⁶¹ “ICIMOD/SERVIR-HKH Small Grants Programme,” GeoMountains, 23 February 2022.

Figure 7.6. Proposed International Centre for Integrated Basin Development (ICIBAD) organizational chart



Source: courtesy of the authors.

include data collection and resource management. This will be an effective way to deal with the impending water shortage and promote integrated resource development in the Euphrates-Tigris basin.

The Challenge for Scientists and Engineers

Scientists are regularly generating more data on worldwide water resources and developing more sophisticated software to manage it. An evolution in science has been described in a 2021 UNESCO report that should improve the sharing of knowledge, know-how, and techniques to respond to the challenges of the twenty-first century.⁶²

Several major factors have transformed and will continue to affect the relationships between science and society during the past 50 years. Significant changes have been taking place in science in terms of scale and the nature of inquiry. Boundaries between disciplines are breaking down,

⁶² *The United Nations World Water Development Report 2021: Valuing Water* (New York: United Nations, 2021).

as are interfaces between science, industry, and academia. Scientists and engineers face a special challenge because they rarely deal with politics and information outside their own field of knowledge.

The Challenge for Diplomats

The subject of “water diplomacy” has been receiving increasing attention in the last few years.⁶³ A comprehensive view from the Turkish perspective can be found as well, included previously in chapter 6.⁶⁴

In 2022, the *Routledge Water Diplomacy Handbook* was under development, designed to provide an “accessible reference for those seeking negotiated resolutions to water conflicts and dialogue opportunities at the transnational, subnational, and community scale.”⁶⁵ Editors include Dr. Aaron Salzberg, director of the Water Institute in the Department of Environmental Sciences and Engineering at the University of North Carolina at Chapel Hill. He was formerly the lead U.S. diplomat in critical international water negotiations. The framework for the draft handbook makes two important points:

Water Diplomacy finds its most immediate application when water is potentially a *source of conflict*.

Water Diplomacy is also a framework for addressing complex water problems at *multiple scales*: from transboundary water conflicts to distributional inequities within a state. . . .

This recognizes that Water Diplomacy needs to be operationalized differently at different scales. In the handbook, authors distinguish the transnational, subnational, and community scales, each with their own special needs.⁶⁶

⁶³ Shafiqul Islam and Kevin M. Smith, eds., *Interdisciplinary Collaboration for Water Diplomacy: A Principled and Pragmatic Approach* (New York: Routledge, an imprint of Taylor & Francis, 2020).

⁶⁴ Aysegül Kibaroglu, *Turkey's Water Diplomacy: Analysis of Its Foundations, Challenges and Prospects* (London: Anthem Press, 2021).

⁶⁵ For specific details about the handbook, see “Brief Overview,” *Water Diplomacy Handbook*, accessed 6 February 2023.

⁶⁶ Shaiqul Islam et al., eds., *Routledge Water Diplomacy Handbook* (New York: Routledge, an imprint of Taylor & Francis, forthcoming).

On 16 November 2022, Salzberg made a presentation at the Network 20\20 program, *The Geopolitics of Water Scarcity*.⁶⁷ He made several important points. The biggest challenges related to water scarcity are *not* related to water. The first is building access to water data and information. Next, we must help build the technical capacity and identify financing to provide the essential services, including health and sanitation. The most critical challenge is supporting local *governance*, addressing the lack of commitment, and helping to build the right institutions to deal with the problems.

The critical challenge for diplomats is to find innovative ways to deal with the emerging level of open-source water data. Diplomacy is always a matter of finding the right opportunities, and the dynamics in the Euphrates-Tigris basin are entering a new phase. How can diplomats eliminate barriers to the adoption of earth science modeling and observational capabilities? How can they identify the operational requirements of users and communicate that to the developers and curators of data? What action can be taken to improve cooperation and reduce the risk of conflict in the Euphrates-Tigris basin? The final chapter of this book will provide some possible courses of action.

⁶⁷ Aaron Salzberg, “Water Wars: The Geopolitics of Water Scarcity” (panel discussion, Virtual Briefing Series, Network 20/20, 16 November 2022).

CHAPTER 8

Security Planning and the Evolving Crisis

Both authors of this book have a background in U.S. national security, and they tend to analyze issues through the lens of U.S. national interests. We start with the fundamental assumption that water security in Iraq is directly related to U.S. national security, for reasons stated in the “Introduction to the Expanded Edition.” This final chapter begins with concepts used in the U.S. military planning process and then incorporates current policy directives from the State Department. We also include initiatives from intergovernmental and nongovernmental organizations (NGOs) that seek to promote improvements in the water sector. Although the authors write from a U.S. national perspective, the research and analysis is intended to reach a broad audience, particularly those who are interested in the health and welfare of the people in the region.

The doctrinal publications of the U.S. Marine Corps describe planning as the art and science of envisioning a desired future and laying out effective ways of bringing it about.¹ The Joint doctrines of the Department of Defense and the Service doctrines of the U.S. Army contain similar verbiage. In terms of the Marine Corps Planning Process (MCP), and its affiliated DOD and Service counterparts, readers can consider chapters 1–7

¹ *Planning*, Marine Corps Doctrinal Publication 5 (Washington, DC: Headquarters Marine Corps, 2018), 1-3.

as the data field for “Problem Framing.” In the planning process, “problem framing uses a design methodology supported by staff actions to enhance the understanding of the operational environment and the subsequent problem set.”² The authors’ research methodology has been to reexamine and assess changes in the political, security, hydrologic, and scientific situation in the Euphrates-Tigris basin. The desired outcome is to understand the increasing complexity of the basin as a problem set that will need to be managed in the future to improve regional stability and security.

This chapter is neither intended to be used as a plan, nor does it contain recommendations for actions designed to bring about a better future for Iraq in terms of water security. Instead, the authors present their assessments about the factors that they believe might improve security planning in Iraq. The format and language in this chapter reflect the principles that are common to the military planning processes used by NATO, American alliance partners, and the military Services. Use of the MCPP is an obvious starting point because of the publisher’s main audience. The authors begin with their thoughts about the level of security planning appropriate to the current situation. This is followed by problem framing and 12 assumptions that they believe would affect security planning in the basin. Because of the uncertain and chaotic geopolitical situation in the basin, the authors present two planning approaches: an interim approach that may be achievable in the short term; and a longer-term durable approach requiring stable and cooperative riparian polities. Rather than presenting recommendations or suggesting solutions, the authors explain how specific courses of action (COAs) might fit into the two approaches. The chapter concludes with three examples of what scenario development might look like.

Planning for the Developing Crisis

The research and the facts on the ground overwhelmingly indicate there is an ongoing crisis in the Euphrates-Tigris basin caused by rapidly decreasing quantities and quality of the available water. Since 1997, the authors have been professionally and academically engaged in assessing this

² *Marine Corps Planning Process*, Marine Corps Warfighting Publication 5-1 (Washington, DC: Headquarters Marine Corps, 2020), 1-3.

issue: *The Euphrates Triangle: Security Implications of the Southeast Anatolia Project* (1999), *The Thread of Life: A Survey of Hydropolitics and Security in the Tigris-Euphrates Basin* (2003 and 2004), followed by *Strategic Water: Iraq and Security Planning in the Euphrates-Tigris Basin* (2014). Furthermore, the authors published papers and articles as well as taught courses about water security and hydropolitics in the Euphrates-Tigris basin.³ They believe that the term *evolving crisis* is composed of two interrelated parts, an *ongoing crisis* and a *developing crisis*, which are both factually correct and supported by the evidence presented.

In 2022, we witnessed a convergence of crises—political, public health, economic, and military—in addition to climate change. The developing crisis in the water sector is just one part of the problem with no easy solutions. This leads to the question: What, if anything, can we do about it? The authors believe that conceptual planning is all that can be supported at the present time because the ends (what is to be accomplished), ways (how it is to be accomplished), and means (the resources that will be committed) are problematic. Conceptual planning establishes aims, objectives, and intentions and involves the development of broad concepts for action.⁴ In general, conceptual planning is a process of creative synthesis supported by analysis. It is not too early for security planners to begin conceptualizing a way ahead.

Any planning endeavor begins with conceptualizing the current and desired states of the operational environment. As General David H. Petraeus famously stated, “Tell me how this ends.”⁵ Unfortunately, Americans often start something without a defined end state. It is an American cultural meme that “doing something is better than doing nothing” and much of what America has done in the Euphrates-Tigris basin since 1990 was the result of the application of such an approach. In Iraq, during the 2003–9 American intervention, assessments of progress were measured against ill-defined objectives. For example, objectives such as “improve understandings of civilian control of the Ministry of Defense” were im-

³ Frederick Lorenz taught the course Water and Security in the Middle East at the University of Washington in Seattle for 16 years.

⁴ *Marine Corps Planning Process*, 3.

⁵ Katina Slavkova, “Tell Me How This Ends,” Government Affairs Institute, Georgetown University, accessed 6 February 2023.

posed and assessed monthly using a red-yellow-green matrix without any criteria defining what “improve understanding” actually meant.⁶ This went on for years with little positive change and a consequent waste of resources. Any expression of desired end states must be precisely phrased so that what is to be done may be tailored and measured in concrete terms.

The term *crisis* may seem alarmist, but it is used here with a caveat. Will there be a water war in the Euphrates-Tigris basin in the next 10–20 years, when the GAP (Southeastern Anatolia Project) in Turkey significantly impacts the natural flow of the rivers? Rather than a classic shooting war between countries, we are more likely to see rising tensions, exacerbated international relations, population displacement, human suffering, and localized violence.

With additional demands being made on the Tigris-Euphrates by uncooperative parties, water quantity and quality will be an important factor in regional instability, leading to a decline in economic and public health conditions. This decline, in turn, will make the region’s peoples more susceptible to fundamentalism and extremism, thereby undermining recent security gains, particularly in Iraq. In 2022, the National Intelligence Council confirmed this concern.⁷ However, as water shortages become more acute in the next 10 years, water in shared basins will increasingly be used as leverage and the use of water as a weapon to further terrorist objectives also will become more likely.

What might an approaching water crisis in the basin look like, and how would it affect the three nations most directly involved? What are the broader implications of such a crisis, and how would it affect international peace and security? As mentioned in the introduction, this is not a book of predictions, but a look at potential situations that should be of concern to those inside and outside the region. The authors have provided a rich field of open-source information in this book and have tried to make a start in framing the problem as seen by scholars, governments, institutions, and NGOs.

⁶ Edward Erickson’s personal notes from 2007 to 2008 while working in the Iraqi Ministry of Defense’s Ministerial Training Center as professor of political science.

⁷ *The Future of Water: Water Insecurity Threatening Global Economic Growth, Political Stability* (Washington, DC: Strategic Futures Group, National Intelligence Council, 2021).

In the preceding pages, the authors have highlighted the important and enduring work of many of the scholars working in this area. The work of Tony Allan has been groundbreaking, providing an economic and political framework to understand the nature of the problem.⁸ The leading Turkish scholar on the subject, Ayşegül Kibaroğlu, recognized that the three riparians continue to carry out uncoordinated water development projects coupled with inefficient water use and management practices.⁹ She concluded that progress was likely dependent on strong trade relations between Turkey and Iraq. The leading American scholar on the Euphrates-Tigris, John F. Kolars, suggested the development of a “river ethic” for the basin that would view the rivers as a vulnerable whole and recognize the mutual dependency of the parties.¹⁰ The research presented in these pages draws from authors who have made valuable contributions to the discussion, providing insight on how to make progress in possible negotiations between powerful parties (Turkey) and downstream riparians.

In *Managing and Transforming Water Conflicts*, a comprehensive and thoughtful study of worldwide water conflicts, Aaron T. Wolf and Jerome Delli Priscoli observed that the debate is frequently heavy on problems and light on solutions. To remedy this, Wolf and Delli Priscoli suggested a “retrospective balance of benefits and costs,” but this will be difficult in the Euphrates-Tigris basin. There has been very little progress in terms of projects and programs with respect to water, and “developments in the basin have been made unilaterally without the cooperation of other riparian countries.”¹¹ In the 2013 edition of this book, the authors highlighted three significant reports and studies that deserved special mention: the 2008 Trondalen study, the 2010 Geopolitics report, and the 2011

⁸ Tony Allan, *The Middle East Water Question: Hydropolitics and the Global Economy* (London: I. B. Tauris, 2002).

⁹ Ayşegül Kibaroğlu, *Building a Regime for the Waters of the Euphrates-Tigris River Basin* (The Hague, Netherlands: Kluwer Law International, 2002).

¹⁰ See John F. Kolars and William A. Mitchell, *The Euphrates River and the Southeast Anatolia Development Project* (Carbondale: Southern Illinois University Press, 1991).

¹¹ Jerome Delli Priscoli and Aaron T. Wolf, *Managing and Transforming Water Conflicts*, International Hydrology Series (Cambridge, UK: Cambridge University Press, 2009), <https://doi.org/10.1017/CBO9780511551536>.

Blue Peace report.¹² They are still valuable and provide building blocks for the current analysis.

Since the first edition of *Strategic Water*, scholars have continued to study these issues. Professor Kibaroglu has continued her work in defining ways to move forward in managing the basin's problems.¹³ Kibaroglu's work focuses on water diplomacy and, of note in problem framing, she asserts that

The role of non-state actors or informal institutions in trans-boundary water policymaking is still minimal even though there is ample room to involve them in water diplomacy in particular, with an objective to communicate more effectively across a wide spectrum of scientific disciplines, policymaking bodies and practitioners, and also to strive for integrated approaches to tackle the complex issues like transboundary water cooperation in conflict-laden regions, such as the downstream riparians of the ET river basin.¹⁴

Since the last edition, climate change has drawn increased attention. The most important recent study to emerge is the EU's November 2021 Cascades report, *Climate Change, Water and Future Cooperation and Development in the Euphrates-Tigris Basin*.¹⁵ The Cascades report "focuses on three different risks that are affected through climate-related water challenges: (1) livelihoods and food security, (2) political stability and violence, and (3) interstate conflict and cooperation."¹⁶ The findings of the study that are most relevant to security planning in the basin are:

¹² Jon Martin Trondalen, *Water and Peace for the People: Possible Solutions to Water Disputes in the Middle East* (Paris: UNESCO, 2008); *Managing the Tigris Euphrates Watershed: The Challenge Facing Iraq* (Dubai, UAE: Geopolicity, 2010); and *The Blue Peace: Rethinking Middle East Water, 2011* (Mumbai, India: Strategic Foresight Group, 2011), i.

¹³ Aysegül Kibaroglu, *Turkey's Water Diplomacy: Analysis of Its Foundations, Challenges and Prospects* (London: Anthem Press, 2021), 143–44, <https://doi.org/10.2307/j.ctvwh8bgf>.

¹⁴ Kibaroglu, *Turkey's Water Diplomacy*.

¹⁵ André Mueller et al., *Climate Change, Water and Future Cooperation and Development in the Euphrates-Tigris Basin* (Potsdam, Germany: Cascades, 2021).

¹⁶ Mueller et al., *Climate Change, Water and Future Cooperation and Development in the Euphrates-Tigris Basin*, 3. See the report's "Executive Summary," 3–6, for more detail.

1. Compared to direct human interventions, climate change has so far played only a minor role in changing the basin's hydrology and freshwater ecosystems.
2. Climate change will complicate and aggravate water-related challenges that are already significant in the region, especially in Iraq and Syria, while the incurred economic losses, in turn, will reduce the government's resources for an adequate adaptation response.
3. More severe water shortages and water quality problems aggravated by climate change will make it harder to sustain farming and livelihoods depending on ecosystems.
4. The impacts of climate change are different but also significant in urban areas and deteriorating water quality in the rivers will directly affect drinking water supply.
5. In rural areas, growing water scarcity is likely to increase competition over water and could lead to more local violence (e.g., between different communal groups).¹⁷

The principal message of the Cascades report is “climate change will intensify water insecurity in the future.”¹⁸ Its authors conclude that “the risks and opportunities that climate change poses, the institutions, capacity, and policy frameworks across the Euphrates-Tigris basin are, however, currently insufficient to cope with the looming challenges of climate change.”¹⁹ Since the early 1990s, the research about declining water quantity and quality in the Euphrates-Tigris basin and its predicted effects has been remarkably consistent. It is worse today than it was 30 years ago, and it will be even worse in the future.

The authors would highlight something the Cascades authors noted as significant: “Turkey’s adaptive capacity is considerably greater than those of the other riparian states.”²⁰ We would agree. Turkey is the up-

¹⁷ Mueller et al., *Climate Change, Water and Future Cooperation and Development in the Euphrates-Tigris Basin*, 3–4.

¹⁸ Mueller et al., *Climate Change, Water and Future Cooperation and Development in the Euphrates-Tigris Basin*, 4.

¹⁹ Mueller et al., *Climate Change, Water and Future Cooperation and Development in the Euphrates-Tigris Basin*, 4.

²⁰ Mueller et al., *Climate Change, Water and Future Cooperation and Development in the Euphrates-Tigris Basin*, 4.

stream riparian with the greatest resources, the most technical expertise, and the most functional governmental apparatus with which to act. Moreover, Turkish policies and public sensibilities mean they are naturally inclined to be proactive in solving its national security issues. In a planner's lexicon, Turkey might be regarded as the center of gravity of the Euphrates-Tigris basin. It is, therefore, perhaps not wrong to state that without Turkey nothing permanent can happen. It is also true that without a stable and functioning Iraqi government and a capacity to manage its own water resources, no progress will be made.

The Authors' Assumptions

An *assumption* is a specific supposition of the operational environment that is assumed to be true, in the absence of positive proof, essential for the continuation of planning. Assumptions are transactional and subject to change based on events and human action. In the planning process, assumptions are tested continuously for their validity. Invalid assumptions are discarded and, reciprocally, newly derived assumptions are added. In addressing the Euphrates-Tigris basin, the authors believe there are 12 assumptions that are currently valid in describing the operational environment.

1. History should inform any study of water issues in the Euphrates-Tigris basin. Water scarcity is compounded by serious environmental problems that have grown out of the ancient cycle of deforestation, desertification, soil erosion, salination, and the contamination of water supplies (see chapter 1). But today, we are in a much better position than the Sumerians to understand the nature of the problem and to find effective ways to deal with it.
2. The fragile geopolitical landscape in the Euphrates-Tigris basin is more complex and uncertain today than in 2012 and, moreover, it is deteriorating. The Iraqi government is dysfunctional, and Syria remains mired in a bitter civil war. The number of de facto riparian states has increased to include the nearly autonomous Kurdistan Regional Government (KRG) and the rebel Kurdish polity of Rojava (see chapters 2, 3, and 4). This condition of uncertainty makes

any kind of cooperation between governments, intergovernmental organizations, or NGOs, very problematic.

3. In the absence of a well-balanced and articulated U.S. regional foreign policy, long-term U.S. support to the Syrian Kurds and the KRG comes at the expense of the U.S. relationship with Turkey and harms a unified Iraq, which is now unable to centrally manage its own water resources (see chapters 3 and 4).
4. A strong central government is essential to effectively managing the water resources of any country and increasing Kurdish autonomy and development of the Tigris basin will have a negative impact on Iraq's overall policies and positions (see chapters 4 and 5).
5. Although the level of regional water scarcity in the next 10–15 years is difficult to measure precisely, Syria and Iraq are already experiencing crisis conditions as available freshwater declines. Based on available research, climate change will have a significant impact (discussed in more detail in chapter 5).
6. Even more important than water quantity, the issue of pollution and increasing salinity is of vital concern to Iraq. Recent studies have documented the dangerous levels for the first time, and this will further complicate water management in the region (see chapter 5).
7. Despite the continued emphasis in the region on new dams and infrastructure by all the riparian nations, more can be achieved by demand management and increased efficiency of existing facilities, particularly in Syria and Iraq. The *Strategy for Land and Water Resources in Iraq of 2014* (SWLRI) mentioned in chapter 5 provides a valuable roadmap.
8. Turkey will have little or no capability to “turn off the tap” and use water as a strategic weapon (chapter 6). But the perception in Syria and Iraq of Turkey's control over the waters of the Euphrates will continue to be a major factor in their relationship.
9. Hydropolitics is a multilayered and complex game: Iraq and Syria are at a serious disadvantage. Instability and inefficiency in water management will provide additional obstacles to both countries.

Without effective governance, Iraq will be unable to properly manage its own water resources.

10. Despite many years of development, international water law plays only a minor role in the Euphrates-Tigris basin (see chapter 6). With many divergent theories and no effective enforcement mechanism, the law will not provide meaningful redress to Iraq in times of increasing water scarcity.
11. Science and diplomacy can make a major contribution in advancing the aims of cooperation and stability in the Euphrates-Tigris basin, but only with careful prioritization of programs, adequate financing, better coordination, and the necessary political will (see chapter 7).
12. Although Turkey has few incentives to cooperate based on its geographic, political, economic, and military superiority, opportunities will still be attainable when national interests coincide. With the right support and coordination, advanced technology may provide a new and promising path (see chapter 7).

An Interim Approach to the Crisis

In planning, an approach is an expression of what is intended to be accomplished and how it would be accomplished. A reasonable interim approach to the problem of declining water quantity and quality in the Euphrates-Tigris basin could be to take on some of the problems with practical bilateral measures. These measures could be implemented on a bilateral basis between an external agency and a single riparian state. In this way, the hostile geopolitical environment within the basin could be marginalized. The bilateral interim measures would be a multitrack package designed to alleviate some of the current problems and would, in effect, buy time for the geopolitical situation to resolve itself. The bilateral interim measures could be packaged, for example, into three components such as building confidence, more effective management, and more effective training.

Building Confidence

Emerging during the Cold War, confidence-building measures (CBMs) are an important component of arms control methodology. They help

to cement ties and build mutual interdependence. CBMs have direct application to water disputes and are relevant to current conditions in the Euphrates-Tigris basin. In a 2003 article, James Kraska described six basic advantages of CBMs:

1. They tend to restrain nations in exchange for restraint from other nations.
2. They encourage rational behavior by building certainty and dispelling uncertainty.
3. They buy time to prevent surprise.
4. They provide “rules of the road” for crisis management.
5. They provide assurances and reassurances by reflecting the belief that increasing familiarity at all levels makes conflict less likely.
6. They diffuse coercion directed against member states.²¹

CBMs have no universally accepted definition; they provide a basket of concepts rather than a particular tool. The Henry L. Stimson Center in Washington, DC, which has long been engaged in studying the application of CBMs, describes them as “diverse national security tools, such as hot lines, people-to-people exchange, prior notification of exercises and cross-border economic projects that can help defuse tension, resolve misunderstanding, and promote cooperation to address security concerns.”²² The concept of CBMs began in Europe during the Cold War, and by using them, substantial progress was made in improving the polarized relationship between the United States and NATO on the one side, and the Soviet Union and the Communist bloc on the other.

In the case of India, Pakistan, and Bangladesh, the introduction and management of transboundary river agreements has helped to build confidence and reduce the risk of military confrontation between the parties. The Indus and Ganges basins in South Asia create a contentious area of political instability and recurring threats. With both India and Pakistan as

²¹ James Kraska, “Sustainable Development Is Security: The Role of Transboundary River Agreements as a Confidence Building Measure (CBM) in South Asia,” *Yale Journal of International Law* 28 (Summer 2003): 465.

²² Benjamin L. Self and Ranjeet K. Singh, “Introduction,” in *Investigating Confidence-Building Measures in the Asia-Pacific Region*, ed. Ranjeet K. Singh (Washington, DC: Henry L. Stimson Center, 1999), ix.

members of the “nuclear club,” perhaps nowhere else in the world presents a greater threat for neighboring states to come to the brink of nuclear war. But even during the crisis between Pakistan and India in 2002, following the 2001 attack on the Indian parliament, the annual meeting of the Permanent Indus Commission to discuss water issues between the two countries was not cancelled.

Experience in the Indus and Ganges basins shows that there can be a collective benefit for nations that share water resources, starting with nonbinding agreements that provide for the simple exchange of data and moving toward more formal regimes. Finally, agreements on water issues can positively impact the broader context of international relations and regional security. Turkey has favorably endorsed the concept of CBMs, and this could help develop initiatives that will lead to further cooperation in the Euphrates-Tigris basin.²³ Examples of such initiatives might include expanded technical cooperation, as discussed later in this chapter.

More Effective Management

Integrated Water Resources Management (IWRM) is a key concept that promotes the linking of land-use hydrological models with economics and ecology as a framework for integrated management. In developing countries, rapid changes are taking place in land use and water resource impacts without a clear plan or effective management techniques.

A series of international conferences and forums have played a key role in the development of the IWRM concept, starting with the UN’s conference on the human environment in Stockholm in 1972. The first UN water conference at Mar del Plata, Argentina, in 1977 was a key meeting that promoted the importance of water and water management to world governments. In 1992, the International Conference on Water and the Environment in Dublin, Ireland, was an opportunity for water experts from governmental and nongovernmental organizations (NGOs) to develop proposals to be presented at the UN Conference on Environment and Development in Rio de Janeiro, Brazil, later that year.

²³ H. Ozlu et al., *Turkey Water Report 2009* (Ankara, Turkey: General Directorate of State Hydraulic Works), 48.

There are three essential principles of IWRM: the basics of river basin management, full recovery of cost and appropriate pricing of water, and public participation in basin management decisions. River basin management implies a reallocation of power among administrative bodies and definitions of new and competent authorities for each basin.²⁴ During the past 10 years, many of Turkey's environmental reforms have been driven by a desire for European Union (EU) membership and have been guided and funded in large part by the EU. The EU's water quality and management standards have played a significant role in water resources development, but Turkish prospects for EU membership are clouded by numerous issues ranging from Cyprus to human rights and political reforms, as well as by questions of how "European" Turkey really is.

The real challenge to IWRM in the Euphrates-Tigris basin is the fractured nature of the political boundaries. The foundations for the current difficulties were laid during the colonial period when water management was a relatively low priority (see chapter 1). Today, Turkey clearly has the superior water management practices in the region, but only as it relates to its own resources. Even with the "positive outcome" mentioned previously in this chapter, an effective basin-wide management plan will be unlikely in the short or long term. Nevertheless, the IWRM principles can strengthen basin planning for all the parties, particularly Iraq as it moves to develop its revised strategic water resources plan.²⁵

In recent years, the plight of Middle East and North Africa (MENA) countries in dealing with water issues has received increased attention. It has been demonstrated in this book that Syria and Iraq will soon be unable to meet water demand. Indeed, they are already facing a full-blown crisis, and the situation is likely to get worse. Per capita water availability will fall by half by 2050, with serious consequences for the region's already stressed aquifers and natural hydrological systems. As the region's economies and population structures change during the next few decades, demands for

²⁴ See Carlos Gonzales-Anton and Carlos Arias, "The Incorporation of Integrated Management in European Water Policy," in *Integrated Water Resources Management*, ed., Miguel A. Marino and Slobodan P. Simonovic (Wallingford, UK: International Association of Hydrological Sciences, 2001), 69.

²⁵ *Strategy for Water and Land Resources of Iraq, 2015 to 2035* (SWLRI) (Baghdad: Ministry of Water Resources, Republic of Iraq, 2014).

water supply and irrigation services will change accordingly, as will the need to address industrial and urban pollution. Throughout the MENA world, much of the region's water flows across international borders, further complicating the resource management challenge. Finally, rainfall and evaporation patterns are predicted to shift because of climate change.

A More Durable Approach to the Crisis

Presuming a stable geopolitical and peaceful environment that is conducive to dialogue and cooperation evolves in the Euphrates-Tigris basin, there are several measures that might provide a longer-term, more durable approach to avoiding or militating the impending crisis. These might be considered the "tools" the interested parties would use to deal more effectively and more permanently with the problem. These measures require multilateral cooperation and agreement between governments, intragovernmental agencies and institutions, and NGOs (hence their differentiation from the bilateral interim measures above). The chaotic geopolitical situation currently does not accommodate or permit the implementation of these measures, but it is not too early to consider them fully.

Climate Change and Governance

Much has been mentioned in this book about the challenges facing Iraq in terms of water management and internal coordination. The Cascades report, mentioned previously, describes the link between climate change, political stability, and violence. As mentioned in chapter 5, there is no short-term method to mitigate the impact of climate change, but adaptive measures are potentially available. For Iraq, climate adaptation will not happen without capable national water governance. The SWLRI report indicates two pathways to improve the situation in Iraq. The first is not dependent on agreements with Turkey or Iran to provide more water, but that path (adaptation) will require drastic internal reform measures.²⁶

The SWLRI report recommended infrastructure improvement, an investment strategy, and the restoration of southern marshes as a way forward. Improving water governance within Iraq, including the regulation

²⁶ *Strategy for Water and Land Resources of Iraq, 2015 to 2035*, 5.

of water demand, will be essential if real progress is to be made. The biggest challenges related to water scarcity are *not* related to water. The first is building access to water data and information (see chapter 7 for more detail). Next, we must help build the technical capacity and identify financing to provide the essential services, including health and sanitation. The most critical challenge is supporting local *governance*, addressing the lack of commitment, and helping to build the right institutions in Iraq to deal with the problems.

Development of an Early Warning Mechanism

Water will certainly play an important role in future conflict, but is it possible to develop an early warning system to alert those concerned? Although the technology exists to monitor water levels, and even predict water flow through a basin model, the resources have not been effectively used to predict conflict. There are few incentives to coordinate the efforts of agencies that could benefit from the early prediction of conflict over water. Relief organizations—the UN, the U.S. State Department, NATO, and U.S. military planners—must plan for conflict and contingency operations, but each agency pursues its own interests and must compete for increasingly scarce funding.

U.S. military planning mechanisms are covered in more detail in chapter 3, and the authors note that there is no overarching strategy to deal with threats in the water sector. There has been some progress on the international level, the Netherlands-based Water, Peace and Security Partnership (WPS) is developing a functioning early warning mechanism based on the latest technology including remote sensing, machine learning, and big data.²⁷ The United Nations might also provide the necessary platform to develop a reliable and sustainable platform to analyze threats.²⁸ But more needs to be done to create an effective early warning system.

Data, Science, and Diplomacy

There is a serious deficiency in terms of reliable data on water supplies in the Euphrates-Tigris basin. Without reliable data that can be shared by the

²⁷ “Water, Peace, and Security Partnership,” accessed 14 December 2022.

²⁸ “Global Issues: Water,” United Nations, accessed 14 December 2022.

affected parties, prospects for real cooperation will remain out of reach. There is a growing consensus among water experts, the World Bank, and the UNDP that a real-time hydrometeorological data system is essential. If the Euphrates-Tigris nations could be persuaded to share streamflow, precipitation, groundwater level, and selected water quality measurements—basic hydrometrics—enormous collective benefits would accrue. But without some impetus from outside the region, the climate of mistrust in the region is likely to hamper such an effort in the near term. Chapter 7 of this book sets out the challenges and opportunities for science and diplomacy in greater detail. We suggest a model in chapter 7 (ICIBAD) to act as an international center, based in Turkey, to coordinate data sharing and improve international cooperation.

A simulation model for dams, diversions, and other storage and major conveyance systems in the Euphrates-Tigris basin will help analyze alternative decision scenarios in the timing of retention and distribution of water for various operational goals. Although water management information systems in Iraq are outdated and in disarray, a new system of technology is already available to simulate and manage all important reservoirs and delivery systems. In chapter 7, we noted the progress made by the U.S. Geologic Survey (USGS) outreach teams in Iraq. This type of assistance can provide water managers with a situational understanding of the state and transitory aspects of a complex system of reservoirs and water delivery facilities. It will allow the water managers to better plan water deliveries and appropriately anticipate shortage and overabundance situations within the system. In the long term, such a study will contribute to long-range planning for the basin and provide a reliable basis for cooperation between the parties.

Informal Cooperative Ventures: “Track Two” Approaches

Nongovernmental voluntary entities can play a role in developing an improved atmosphere for cooperation in the basin. These are “track two” approaches to diplomacy that are outside official government channels. In May 2012, a conference titled “Advancing Cooperation in the Euphrates-Tigris Region: Institutional Development and Multidisciplinary Perspectives” was organized in cooperation with the Euphrates-Tigris Ini-

tiative for Cooperation (ETIC). It was held at Okan University in Istanbul, Turkey, and more than 20 renowned researchers and scientists (most of whom were from the region) presented on technical and scientific issues, as well as legal frameworks, and discussed conflicting opinions and problems.²⁹

ETIC had some early success with joint training and capacity-building programs, as well as with research and projects with an aim to respond to the common needs and concerns of the people in the region. Today, ETIC exists only as an informal volunteer network of academics and water professionals from Turkey, Syria, and Iraq. A functioning website and a small paid staff would provide the groundwork for improvement and could support the establishment of a more formal intergovernmental network, such as the proposal for ICIBAD mentioned in chapter 7.

Effective International Coordination

Several international organizations promote coordination of water resource issues, including the International Water Association.³⁰ The UN Development Programme (UNDP) and the Stockholm International Water Institute (SIWI) partner to improve cooperation over shared waters.³¹ But each country providing funds and programs for international development has its own interests in the region and often promotes the use of its own private companies to conduct the work. Pillar 3 of the 2022 U.S. White House action plan seeks to “promote water cooperation through regional and multilateral fora,” but there are no formal mechanisms to carry out the task.³² Hence, the fundamental problem remains. International organizations and various states have many capabilities to aid Iraq and the other riparians in the basin with no overarching vision or strategic plan. Without better coordination, little hope for advancement can be expected.

²⁹ Max Planck Institute for Comparative Public Law and International Law, “Advancing Cooperation in the Euphrates Tigris Region: Institutional Development and Multidisciplinary Perspectives” (unpublished conference report, Istanbul, Turkey, 2–4 May 2012).

³⁰ “International Water Resources Association,” accessed 14 December 2022.

³¹ “Water Cooperation,” Stockholm International Water Institute, accessed 14 December 2022.

³² Antony J. Blinken, “U.S. Action Plan on Global Water Security,” press release, Department of State, 2 June 2022.

Articulating Courses of Action and the Way Ahead

The following represents what the authors believe to be the possible COAs given what we know today. We present them to illustrate how a specific COA might have a higher *likelihood* of success than another and where it might fit into the two approaches above. We define *short term* as less than 5 years and *long term* as 10–15 years or more. Some COAs may provide a higher impact if implemented than others and each must be evaluated to help identify a suggested priority in a time of decreasing budgets. “Success” is separately defined for each COA, with a brief cost-benefit analysis if it is adopted. The COAs are not presented in an order of priority, nor do we recommend one over another. With that said, the first three COAs represent actions that the United States could accomplish in a primarily bilateral interim approach. These would be relatively low-cost endeavors with high returns. COAs 4–6 represent actions that require a stable and cooperative geopolitical environment and are more suited to a durable long-term approach.

1. **Improved assistance to the Iraqi government in developing effective water governance and a long-term water management plan.** Success would be an energized and capable Iraqi MOWR that can coordinate and plan its actions both internally and internationally. We noted in chapter 3 that the U.S. Global Water Security includes none of the Euphrates-Tigris Basin countries as “High Priority.” The critical challenge is supporting local governance in Iraq, helping to build the right institutions to deal with the problems (see chapter 7). Action needs to be taken in the short term to have any long-term impact. *Potential impact is high and the likelihood of success moderate.* Because of the relatively low cost of improved technical assistance for this option, it should be a high priority.
2. **Improved coordination of U.S. efforts.** There are many federal agencies (20 in all) that have critical support capabilities, but more effort needs to be devoted to their coordination. Chapter 7 details the lack of coordination of technical support efforts. Success would be an improved U.S. federal capability that can successfully evaluate and prioritize programs. This should involve a whole-of-government approach with increased staffing and training within

the State Department and the United States Agency for International Development as well as technical assistance and support from the U.S. Army Corps of Engineers. *Potential impact is high, and the likelihood of success (better coordination) is high at a relatively low cost with little additional investment.*

3. **Science and Diplomacy.** We must consider the potential for a game-changing role of innovation. Success would be a breakthrough in developing a trilateral technical and development center for the Euphrates-Tigris region. There is great promise in the science and technology initiatives mentioned in chapter 7, and ICIBAD is provided as a model for the riparian nations to share information and technology. However, the technology needs to be carefully evaluated, prioritized, and delivered as part of a comprehensive diplomatic strategy. *Potential impact is high, and the likelihood of success is high if political will can be mustered and the efforts can be properly coordinated.* Cost would be moderate but well worth the effort.
4. **Track two approaches and informal confidence-building initiatives.** These efforts are having some impact but should not be considered a substitute for governmental action. Success would be an improved track two system that meets regularly and shares important information and expertise at the nongovernmental level. One example is Euphrates-Tigris Cooperation Initiative (ETIC) previously described in chapter 7.³³ *The impact would be moderate but could lead to more significant cooperation. There is a moderate likelihood of achieving some success, slightly higher in the long term.* This is a relatively low-cost approach that should be pursued.
5. **Development of an early warning mechanism to identify conflict and instability related to water.** Water will play an important role in future conflict, and it is now feasible to develop an open-source early warning system to alert those concerned. Success would be an NGO or other entity, such as the Netherlands-based WPS, developing a functioning early warning mechanism based on the latest technology including remote sensing, machine learning, and

³³ Kibaroglu, *Building a Regime for the Waters of the Euphrates-Tigris River Basin*, 124.

big data.³⁴ *Potential impact is moderate and the likelihood of success moderate.* Cost would be moderate, absorbed by the NGO, and this avenue should certainly be pursued.

- 6. Improved coordination of international efforts.** Success would be an improved international coordination mechanism for supporting the countries in the Euphrates-Tigris basin. There are many countries and international agencies working in the field, but U.S. diplomacy needs to be elevated to coordinate and focus more on the basin. Pillar 3 of the 2022 White House action plan seeks to “promote water cooperation through regional and multilateral fora,” but no new mechanisms or resources are provided.³⁵ *Potential impact is high, and the likelihood of success (better coordination) is moderate due to challenges from competing agencies and diverse national interests.* This initiative would be low cost, involving only diplomatic initiatives, and should be pursued.

Scenario Development and COAs

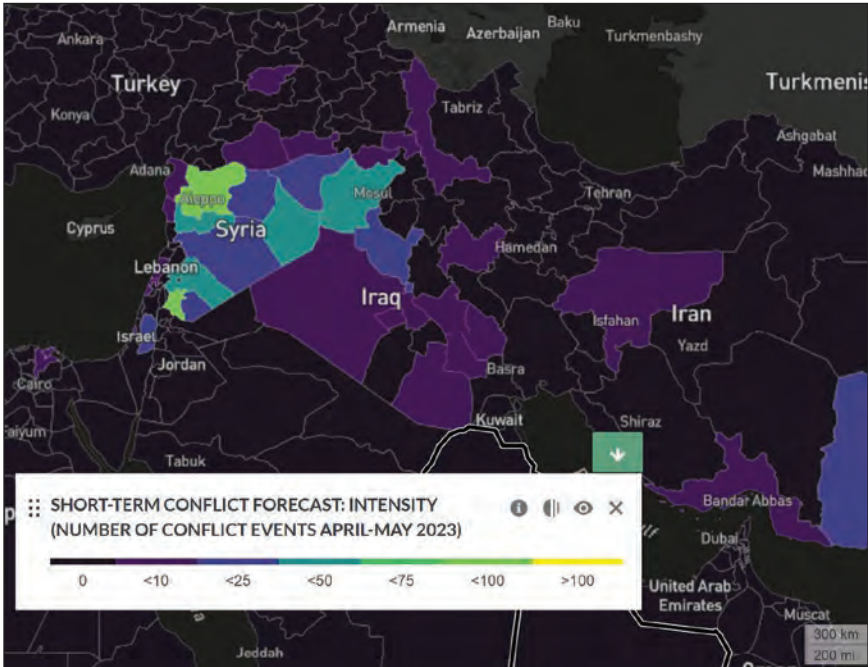
Should a security planner continue along the planning process, after COA development, the planner would conduct what is called “war gaming.” This step seeks to improve the COA by testing it against “an enemy and/or adversary, or other forms of friction in operations” in the operational environment. A useful tool in Euphrates-Tigris COA development is the WPS interactive conflict forecasting tool focused on Turkey, Syria, and Iraq (figure 8.1). COAs are tested against scenarios developed by planners, which might look like this:

Positive Scenario. A stable Iraq with a developing economy can successfully manage its own foreign affairs. In the water sector, Iraq has developed and properly implemented a long-range plan to manage its own water resources. Cooperation with Turkey and Syria on water issues has increased, leading to an active “sharing of benefits” in terms of technical expertise and trade in food and oil. The Kurdish Regional Government has resolved most of the

³⁴ Sonia Elks, “Tech Tool Aims to Predict Global Water Events Before They Happen,” *PreventionWeb*, 14 June 2019.

³⁵ Blinken, “U.S. Action Plan on Global Water Security.”

Figure 8.1. WPS interactive conflict forecasting tool focused on Turkey, Syria, and Iraq



Source: Water, Peace, and Security Partnership, adapted by MCUP.

issues related to Kirkuk and oil and has relegated control of water issues to the central Iraqi government. International efforts to aid security and the developing economy in the region have been successful. Although its available water has not increased, Iraq has learned to use water more efficiently and overcome the serious threat posed by high salinity levels.

Negative Scenario. Continued instability in Iraq makes the development of an effective foreign policy, and coordinated water management, impossible. The fall of the Bashar al-Assad regime in Syria with the rise of an independent Rojava leads to factional strife and continued unrest within the country. Cooperation with Turkey and Syria on water issues has declined, leading to a general breakdown in technical exchanges and trade in food and oil. International efforts to aid security and the developing economy

have not been successful. Iraq continues down the path of water inefficiency and fails to overcome the serious threat posed by high salinity levels. Extremist elements in Iraq and Syria take advantage of increasing public unrest, the central government collapses, and countries break down into a perpetual state of civil war with the potential of becoming failed states. Water is not the primary causal factor, but a significant contributing element.

Likely Scenario. An increasingly stable Iraq has a growing economy and improved relations with its neighbors. In the water sector, Iraq still has challenges in managing its own water resources. Cooperation with Turkey and Syria on water issues is stable but only on the technical level, despite increasing pressure from declining water quantity and quality. The KRG is operating autonomously and now controls and manages its own water issues. International efforts to aid security and the developing economy in the region have had some success but still face challenges. The water crisis in Iraq ultimately reaches a level that increases tensions and human suffering, leading to localized violence and preventing the Iraqi government and its people from realizing their full potential. In the authors' view, this is still an optimistic scenario.

The Future

Water and security issues in the Euphrates-Tigris basin have received fresh publicity as the world watches each new crisis unfold in the Middle East. Despite the current volatility and uncertainty in the region, the international community cannot wait to act on water and security matters in the basin. This should not detract from other priorities but will in fact serve to support broader initiatives, including regional cooperation and a stable government in Iraq. The 2003 invasion of Iraq had vast regional consequences that are still playing out 20 years later. The United States bears a special responsibility to Iraq and must not turn away as America shifts focus to its great power rivals.

Today, the reports of water deficits and human suffering are a clarion call for action, and the future demands creativity and opportunities for

solving these specters haunting the people of the Euphrates-Tigris basin. The failure to deal with these long-term issues will become apparent in 10–15 years when the water crisis reaches unmanageable levels. The U.S. Department of State makes secure and sustainable access to safe water an “essential element of national security planning.”³⁶ Iraq has the most to lose if the water situation in the Euphrates-Tigris basin further deteriorates.

Water should also be considered an opportunity.³⁷ Despite the difficult and dangerous regional security environment, there is still much that can be accomplished. The United States and the international community can support the initiatives mentioned above with little additional capital investment. The benefits of these initiatives will go far beyond the mere availability of water and responding to the crisis. It also supports U.S. strategic interests to maintain peace and stability in the region.

³⁶ Blinken, “U.S. Action Plan on Global Water Security.”

³⁷ *U.S. Government Global Water Strategy, 2022–2027* (Washington, DC: USAID, 2022), 3.

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INDEX

- Abbasid Dynasty, 21–23
Abu Dibis Lake, 36
AKP (Justice and Development) Party, 46–48, 50–52, 54, 60, 71
al Abadi, Haider, 39
al-Assad, President Bashar, 56, 60–63, 65–66, 70, 72–73, 94, 113, 122, 243
Allan, J. A. (Tony), 11–12, 127, 164, 182, 189, 192, 227
Allawi, Ayad, 39–40
Allenby, Gen Edmund H. H., 27
al-Kadhimi, Mustafa, 39, 41
al-Maliki, Prime Minister Nuri, 39, 41–42
al-Mansur, caliph, 21
al-Qaddafi, Muammar, 56, 78
al-Qaeda, 62
al-Sadr, Muqtada, (Sadr movement), 41–42
al-Thawrah Dam (Tabaqah Dam), 36
American Association for the Advancement of Science Center for Science Diplomacy, 194n2
Anglo-Persian Oil Company, 26
Arab Spring, 55, 78
Arabs,
 Faisal, 31, 33
 Ibn Saud, 31
Armenians (people), 28, 54–56
asymmetric power, 172–74
Atatürk Dam, 12, 37, 126, 149, 167–69, 177–78
Atatürk, Mustafa Kemal, 28, 30, 32, 47–48, 57, 131
Autonomous Administration of North and East Syria (AANES), 63
Babylon, 17, 20n13, 21
 Cyrus the Great, 21
 Hammurabi, 17–18
 Hanging Gardens, 21–22
 Nebuchadnezzar II, 21
 Nahrawan Canal, 21
 Nimrod Dam, 21
Baghdad, 21–23, 26–27, 29, 31, 43, 62, 72, 95, 97, 103–4, 108–11, 118–23, 126, 140, 178, 217
Balfour Declaration, 27
Barzani, President Massoud, 42, 94, 100, 107
Bush, President George H. W., 76–78
Bush, President George W., 77–78, 81
Cascades Report, *Climate Change, Water and Future Cooperation and Development in the Euphrates-Tigris Basin*, 97, 153, 217, 228–229, 236
Clinton, President William J. “Bill,” 77–78
Clinton, Secretary of State Hillary R., 78
climate change, 3–7, 13–14, 22, 75, 81–92, 96–97, 120–21, 124–60, 201–206, 210, 212–13, 217–219, 225, 228–29, 231, 236

- collaborative modeling and management, 204–5, 218
- Colorado River Compact, 125
- combatant commands, 85–86, 95
- confidence-building measures (CBMs), 232–34
- Convention of Friendship and Good Neighbourly Relations, 35–36, 68–69
- Convention on the Law of Non-navigational Uses of International Watercourses (UN Watercourses Convention), 170, 174, 183, 186, 188, 191
- Davutoğlu, Foreign Minister Ahmet, 54
- Delli Priscoli, Jerome, 227
- Democratic Union Party (PYD), 59, 63, 67, 70–72, 113–14, 116, 119
- Diyala River, 21, 36, 102, 105, 126
- doctrine of absolute riverain integrity, 185–86, 188, 190
- doctrine of absolute sovereignty (Harmon Doctrine), 184–86, 188–89
- doctrine of prior appropriation (Colorado Doctrine), 186, 188
- Doha Agreement, 65
- Eastern Question, the, 27
- Erdoğan, Prime Minister Recep Tayyip, 46–52, 54, 56–57, 67
- European Union (EU), 45, 52–54, 75, 97–98, 118, 153, 162, 167, 188, 207, 235
- Copenhagen criteria, 54, 82
- Euphrates-Tigris basin,
 - groundwater in, 103–5, 111–12, 114, 125, 127–28, 130, 142–43, 147–48, 155, 186–87, 197, 201, 204, 210, 238
 - Joint Technical Committee on Regional Waters, 168–70, 173
 - projections for freshwater availability, 3, 11, 88
 - water quality of, 5–6, 9, 70, 104, 125–26, 129, 142, 147–48, 151–52, 158, 168, 175–76, 191, 193, 197, 229, 235, 238
 - water quantity of, 5–6, 8, 13, 125–26, 142, 146–47, 162, 175–76, 179, 206, 212, 218–19, 226, 229, 231–32, 244
- Euphrates Tigris Initiative for Cooperation (ETIC), 238–39, 241
- Fertile Crescent, 16, 18
- France, 27–29, 33, 35, 56, 182, 202
- Fromkin, David, 25–26
- Ganges basin, 233–34
- GAP (Guneydogu Anadolu Projesi). See Southeastern Anatolia Project, 12, 37, 52, 71, 124–25, 131–36, 152, 158, 166–68, 175–77, 204, 219, 225–26
- Geographic information system (GIS), 199–201, 207
- Geopolicity report, 227–28
- geospatial artificial intelligence (GeoAI), 196–97
- Gleick, Peter H., 9
- global warming, 11, 75, 82–83, 97
- Great Zab (river), 102–4, 110
- Greece, 28, 32n44, 53, 57
- Habbaniyah Lake, 36
- Harmon Doctrine, 184–86
- Helsinki Rules on the Uses of the Waters of International Rivers (Helsinki Rules), 181–83, 186
- Hindiyah Barrage, 24, 112, 138
- Hussein, Saddam, 7, 27, 33–34, 44, 146
- Hussein-McMahon letters, 27
- hydropolitics, 8, 81, 161–92, 216–17, 225, 231
- Indus basin, 2, 21, 33, 234
- Integrated Water Resources Management (IWRM), 157–58, 197, 197, 234–35
- International Centre for Integrated Mountain Development (ICIMOD), 218–19
- International Centre for Integrated Basin Development (ICIBAD), 219–20, 238–39, 241

international custom, 180

international law, 9, 12, 37, 169, 179–81, 186, 188–92

International Law Commission (ILC), 182–83

International Monetary Fund (IMF), 65–66

international rivers, 179, 186, 192

international water law and hydrogeopolitics, 179, 181–84, 187–89, 191–92, 232

Iran (Islamic Republic of Iran), role/activities in the region, 3, 5–6, 16, 22, 33–34, 38–39, 41–44, 51, 53–56, 66–70, 72–74, 79–81, 92–94, 100–5, 110, 120, 124–26, 138–39, 153, 157–58, 161, 184, 202, 236

Iraq (Republic of Iraq),
 1975 incident with Syria, 161
 Abdullah, King, 31, 33, 46–47
 agricultural policy, 5, 8, 16, 73, 101, 120–21, 124, 126, 137, 138–39, 146–48, 153, 158
 Baath Party, 33–34, 42–43
 constitution, 39, 41–43, 107–9, 120
 dams, 12, 102–3, 110, 138–39, 146, 156, 214
 economy, 43–44, 148, 154, 160, 242–44
 foreign policy, 44, 106, 162–63, 165, 243
 groundwater, 103–4, 142–43, 201, 204
 Iraq First (policy), 45
 marshland diversion and reclamation, 144, 146
 national security policy, 44–45, 141, 144–45, 201, 205, 240
 politics, 39–46, 72–73, 125, 160–92
 proposed water master plan, 144–45
 relationship with the KRG, 42–43, 46, 57, 72, 94–95, 97, 101, 104, 106, 108–11, 118–22, 230–31, 244
 surface water resources and infrastructure, 112, 140–41
 water and security, 207, 212, 223–24
 water usage and management, 144–45

Islamic State of Iraq and Syria (ISIS), 3, 41, 62–63, 70, 79, 138

Israel, 33, 55–56, 66, 69, 79–80, 93, 163

Karakaya Dam, 37, 177

Karkamis Dam, 132, 149, 177

Keban Dam, 36, 149, 177

Khabur River (Bassel al-Assad) Dam, 115, 128, 137

Kıbaroğlu, Ayşegül, 189, 217, 227–28

Kirkuk, 29, 31, 103, 108, 118–19, 126, 243

Kitchener, Lord Horatio H., 26

Kolars, John F., 133, 136, 158, 177n44, 227

Koran, 19

Kraska, James, 233

Kurdish Democratic Party (KDP), 42, 70, 107

Kurdistan Regional Government (KRG), 38, 42–43, 46, 57, 71, 94, 97, 99, 105–7, 118–20, 230–31, 244
 dams, 104
 Kurdish Ministry of Natural Resources, 108–11
 Peshmerga, 95, 118
 policies, 72, 101, 120–22
 water resources, 101–2

Kurdistan. See Kurdish Regional Government
 Kurdistan Workers Party (PKK), 48–50, 55, 57–59, 70–71, 113, 174, 176

Kurds (Kurdish people), 3, 5, 25, 28, 30–32, 34, 38, 40–42, 56, 63, 67, 70–73, 77, 81, 93–94, 100–23, 137, 175, 231

League of Nations, 28, 31, 34

Lebanon, 27, 29, 66

Libya, 56, 78

linkage strategies, 174–75, 206

Little Zab (river), 36, 102, 104, 110

Marine Corps Planning Process (MCP), 223–24

Maude, LtGen Sir Frederick Stanley, 27

Mekong Committee, 182

Mekong River Basin, 193, 207–8, 212, 219

Mekong River Commission, 13

Middle East and North Africa (MENA), 127, 189–90, 235–36

Ministry of Water Resources (MOWR), Iraqi, 140–41, 144–45, 201, 205–6, 240

- Mitchell, William A., 133, 136, 158
- Mongols, 23
- Nile River basin, 16, 18, 21–22, 193, 196, 207–10, 219
- NiBRAS, 209–10
- nongovernmental organizations (NGO), 75, 86, 98–99, 117, 223, 226, 231, 234, 236, 241–42
- North Atlantic Treaty Organization (NATO), 9, 32, 45, 53, 58, 63, 75, 79, 98, 107, 224, 233, 237
- Nubar, Boghos, 30
- Obama, President Barack H., 41, 66–67, 78–80, 82–84, 87–90
- Ocalan, Abdullah, 174
- Organization for Security and Cooperation in Europe (OSCE), 53
- Ottoman Empire, 23, 25–28, 55, 131, 137
- Bayezid I, 23
- Midhat Pasha, 23
- Timur the Lame, 23
- Pacific Institute, 9–10
- Patriotic Union of Kurdistan (PUK), 42, 107–8
- People's Protection Units (YPG), 57, 59, 63, 67, 70–72, 93–94, 112–14, 119
- Petraeus, Gen David H., 225
- PKK. See Kurdistan Workers Party
- Reagan, President Ronald W., 33
- Rojava (See AANES), 55, 63, 70–71, 94, 101, 113–23, 230–31, 243
- salination (salinity), 19–20, 37, 146–47, 154, 175, 230
- Sanliurfa Tunnel, 177
- science and diplomacy, 193–222
- security planning, 3–14, 88, 95–96, 223–45
- Seljuk Turks, 22
- Shatt al-Arab River, 16, 26, 68–70, 126, 151, 214
- Southeastern Anatolia Project (GAP), 12, 37, 52, 71, 124–25, 131–36, 152, 158, 166–68, 175–77, 204, 219, 226
- master plan and potential, 132–33, 175–76
- Strategy for Land and Water Resources in Iraq of 2014* (SWLRI), 142, 144–45, 156–60, 202, 204–6, 231, 236
- Sumer, 9, 17, 19–20, 21n14, 146, 154, 169, 230
- Sykes-Picot Agreement (Mark Sykes and Francois Georges-Picot), 27–29, 34
- Syria (Syrian Arab Republic), 3, 5–6, 8, 12–14, 16, 20, 25, 27, 29, 31, 33–41, 45, 53, 55–57, 59–73, 78–79, 87, 92–95, 100–1, 111–25, 128, 133, 137, 147–48, 169–79, 184, 188, 191–93, 216, 218, 229–31, 235, 239, 242–44
- agricultural policy, 117
- economy, 65, 229
- foreign policy, 65–67
- inefficient use of water, 112–15
- national security policy, 67–68
- incident with Iraq, 161–62
- politics, 112–13, 176, 231–32
- positions on water resources, 111–13, 169–70
- Syrian Democratic Forces (SDF), 63, 67, 70, 94, 113–14, 116–17, 119–23
- Tabaqah Dam, 36
- Talabani, President Jalal, 42, 94, 100, 107–8
- Townshend, MajGen Charles V. F., 26–27
- Track Two approaches, 238–41
- transboundary water initiative, 13
- Treaty of Friendship and Good Neighbourly Relations, 36
- Treaty of Lausanne, 29–31, 35, 186
- Treaty of Sèvres, 28–30, 34–35, 100
- Treaty of Versailles, 25, 28, 30
- Trondalen, Jon Martin, 148, 153, 227–28
- Truman Doctrine, 32
- Turkey (Republic of Turkey), 3, 5–9, 12–13, 15–16, 25, 27, 30–38, 47–51, 55–56, 62, 67, 70, 77, 93–95, 100, 107, 110, 115, 117, 122–24, 131, 136, 157, 161, 164, 172–73, 182,

- 184, 186, 188, 193, 202, 204, 206, 216–19, 231–32, 242–44
- agricultural policy, 51–52, 158, 167
- Directorate of State Hydraulic Works (DSI), 36–37, 128, 178n47
- economic policy, 46–47, 51–52, 57–58, 130–31
- economy, 32–33, 45, 57–58, 132–33
- foreign policy, 38, 53–55, 176–79, 189–92
- national security policy, 38–39, 45, 58–60, 128–29, 147, 153, 174–75, 234
- position on pollution, 45, 125–26, 152, 166, 176, 235–39
- positions on water resources, 36–37, 71–72, 101–2, 111–12, 124–25, 127–28, 132–33, 137, 139, 148–50, 159, 165–70, 212, 226–30
- three-stage plan, 168, 170
- Umayyad dynasty, 21
- United Nations (UN), 53, 57n51, 58, 65, 75, 77–78, 96–97, 104, 117–18, 130, 156–57, 170, 182–83, 195, 234, 237
- UN Assistance Mission for Iraq (UNAMI), 96–97
- UN Country Team (UNCT), 96–97
- UN Development Programme (UNDP), 44, 239
- UN Educational, Scientific and Cultural Organization (UNESCO), 142–43
- UN High Commissioner for Refugees (UNHCR), 65
- UN Investigative Team to Promote Accountability for Crimes Committed by Da'esh/ISIL (UNITAD), 96–97
- United States government
- climate change, 89, 125, 155–57
 - coordination of efforts, 32n44, 70, 151, 207, 213, 215–17, 221, 240, 242
 - election of 2008, 82
 - foreign policy, 78, 107, 207, 214–15, 231
 - National Aeronautics and Space Administration (NASA), 127, 202–6, 211, 215
 - national security policy, 9, 67, 76–77, 81, 84, 90, 157, 223
 - Office of the Director of National Intelligence, 81, 89
 - policy toward Israel, 33, 54–56, 66, 69, 79–80, 93, 163
 - strategic interests, 14, 90, 92–93, 245
 - U.S. Agency for International Development (USAID), 86, 91, 95, 202–3, 213–15, 241
 - U.S. Department of Defense (DOD), 46, 67, 82–91, 95, 119, 157, 223
 - U.S. Army Corps of Engineers (USACE), 204–5
 - U.S. Central Command (USCENTCOM), 87–89, 95
 - U.S. European Command (USEUCOM), 95
 - U.S. Special Operations Command (US-SOCOM), 95
 - U.S. Transportation Command (US-TRANSCOM), 95
 - U.S. Department of State (DOS), 245
 - U.S. Geological Survey (USGS), 201–2, 205, 216, 238
 - U.S. Institute for Peace (USIP), 193
 - U.S. National Intelligence Council, 7, 89, 226
 - U.S. Marine Corps Planning Process (MCPP), 223
 - Union of Soviet Socialist Republics (USSR), 32n44, 33–34, 58, 63, 92, 233
- virtual water, 130, 163. See also Allan, J. A. (Tony)
- water
- agricultural return flow, 6–7, 20, 125, 147–48, 150, 166, 175
 - basin (water systems), 125, 130, 147, 187, 196
 - deficit, 5, 14, 75, 92, 99, 124–60, 163, 170, 212, 244–45
 - footprint, 11–12
 - freshwater availability, 3, 11, 88

groundwater, 19n11, 20, 103–4, 111–14, 125, 127–30, 142–43, 147, 155, 186–87, 195, 197, 201, 204, 210, 238

information as a state secret, 128–29, 153, 191, 208

optimists and pessimists, 12, 129–30

quality, 5–6, 9, 70, 104, 125–29, 142, 147–48, 151–52, 158, 168, 175–76, 191, 193, 197, 229, 235, 238, 244

quantity, 5–6, 8, 13, 70, 125–26, 142, 146, 162, 175–76, 179, 206, 212, 219, 226, 229, 231–32, 244

rights, 34, 69, 164–65, 172, 182, 184–85, 189, 192

salination (salinity), 19–20, 37, 146–47, 154, 175, 230

scarcity, 3, 5–6, 9–12, 14, 25, 37, 81–84, 88, 90, 92, 138, 144, 160, 163, 195, 216, 222, 229–32, 237

strategic weapon, 10, 161, 176–78, 191, 226, 231

stress, 46, 88, 159, 206

supply versus demand, 6–7, 9, 13–14, 37, 88, 124, 127, 129–30, 139, 141, 146, 155–59, 218, 235, 237

total dissolved solids (TDS), 147–50

waterlogging, 19–20, 175

wars, 9, 12–13, 81, 160, 226

Wolf, Aaron T., 227

World Bank, 13, 68, 136, 190, 202, 238

World Trade Organization (WTO), 53

World Wars

- World War I (First World War or WWI), 15, 24–26, 28, 31, 34, 181
- World War II (Second World War or WWII), 32–33, 36, 80, 92

Zagros Mountains, Iran, 16, 101–2, 104

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STRATEGIC WATER: *Iraq and Security Planning in the Euphrates-Tigris Basin*



The issue of fresh water scarcity has always been of vital concern to humans, and today it is increasingly characterized as a strategic factor in security planning. In the Euphrates-Tigris basin, water apportionment and management combined with climate change are increasingly emerging as threats to regional stability. The United States has a long-term strategic interest in the Euphrates-Tigris basin that, in turn, is directly linked to the national interests of the riparian states. The expanded second edition of *Strategic Water: Iraq and Security Planning in the Euphrates-Tigris Basin* updates analysis of the geopolitical situation and expands coverage of the aspirations of the basin

countries. Finally, the book presents new conclusions and a proposed framework for action in the next 10 to 20 years.

The authors' first edition was published in 2013 based on the observed situation in 2012. Since then, the geopolitical situation has become far more complicated and dangerous. At the beginning of the twenty-first century, Iran excluded, the geopolitical face of the Basin consisted of three politically stable nation-states. Since that time, Syria fell into a civil war, and the Islamic State (ISIS) rose, leading to the establishment of American-supported rebel groups in Syria needed to defeat ISIS. In turn, Syrian Kurds established an independent polity along the Turkish border, which has led to an increasingly uncooperative Turkey. Today, the Syrian and Iraqi governments are dangerously unstable and increasingly dysfunctional. The geopolitical face of the Basin states in 2023, Iran excluded, is composed of one stable nation-state, two unstable nation-states, and multiple factions that control shifting territory in the Basin.

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