

COUNCIL *on*  
FOREIGN  
RELATIONS

Center for Preventive Action



*Discussion Paper Series on Managing Global Disorder No. 14*  
*October 2023*

# Climate Change and Regional Instability in the Middle East

Marwa Daoudy

COUNCIL *on*  
FOREIGN  
RELATIONS

**Center for Preventive Action**

*Discussion Paper Series on Managing Global Disorder No. 14*  
*October 2023*

# Climate Change and Regional Instability in the Middle East

Marwa Daoudy

The Council on Foreign Relations (CFR) is an independent, nonpartisan membership organization, think tank, and publisher dedicated to being a resource for its members, government officials, business executives, journalists, educators and students, civic and religious leaders, and other interested citizens in order to help them better understand the world and the foreign policy choices facing the United States and other countries. Founded in 1921, CFR carries out its mission by maintaining a diverse membership, including special programs to promote interest and develop expertise in the next generation of foreign policy leaders; convening meetings at its headquarters in New York and in Washington, DC, and other cities where senior government officials, members of Congress, global leaders, and prominent thinkers come together with CFR members to discuss and debate major international issues; supporting a Studies Program that fosters independent research, enabling CFR scholars to produce articles, reports, and books and hold roundtables that analyze foreign policy issues and make concrete policy recommendations; publishing *Foreign Affairs*, the preeminent journal of international affairs and U.S. foreign policy; sponsoring Independent Task Forces that produce reports with both findings and policy prescriptions on the most important foreign policy topics; and providing up-to-date information and analysis about world events and American foreign policy on its website, CFR.org.

**The Council on Foreign Relations takes no institutional positions on policy issues and has no affiliation with the U.S. government. All views expressed in its publications and on its website are the sole responsibility of the author or authors.**

For further information about CFR or this paper, please write to the Council on Foreign Relations, 58 East 68th Street, New York, NY 10065, or call Communications at 212.434.9888. Visit CFR's website, CFR.org.

Copyright © 2023 by the Council on Foreign Relations®, Inc. All rights reserved.

This paper may not be reproduced in whole or in part, in any form beyond the reproduction permitted by Sections 107 and 108 of the U.S. Copyright Law Act (17 U.S.C. Sections 107 and 108) and excerpts by reviewers for the public press, without express written permission from the Council on Foreign Relations.

*This Discussion Paper was made possible by a grant from the Carnegie Corporation of New York. The statements made and views expressed are solely the responsibility of the author.*

# CONTENTS

- 1 Introduction
- 3 The Climate-Conflict Relationship
- 5 Effects of Climate Change on the Middle East
- 7 Compounded Threats and Challenges to Adaptation
- 12 Effects of Armed Conflicts on Human and Environmental Security
- 17 Implications and Recommendations
- 22 Conclusion
  
- 23 *Endnotes*
- 31 *Acknowledgments*
- 32 *About the Author*



# INTRODUCTION

In March 2023, the Intergovernmental Panel on Climate Change (IPCC) released its annual report, indicating that 3.3 to 3.6 billion people are highly vulnerable to the harm inflicted by climate change.<sup>1</sup> Communities in less-industrialized countries that have historically contributed comparatively less to climate change will feel its effects most acutely, and the Middle East in particular is a climate change hot spot.<sup>2</sup> The signs of distress are growing by the year, as chaotic events replace normal weather patterns.

Regional climate models project a significant increase in average temperatures in the Middle East, especially in the Sahara and the interior of the Arabian Peninsula.<sup>3</sup> Already, the Middle East and North Africa (MENA) region has seen 0.2°C (0.36°F) of warming between 1961 and 1990, and the rate of warming has intensified in recent years.<sup>4</sup> Heat wave indices have increased, particularly for North Africa, Turkey, and other Middle Eastern states on the Mediterranean Sea.<sup>5</sup> Additionally, droughts and climate-related disasters are expected to become more common and severe in the coming years.<sup>6</sup> Other concerns include declining yields of important crops, sea-level rise, increased frequency and intensity of sand and dust storms, accelerated desertification, reduced snowpack, and increased human displacement from low-lying coastal areas.<sup>7</sup> In 2020, flooding ravaged Egypt, Iran, Sudan, and Tunisia while wildfires spread in Lebanon, Syria, and Turkey. The summer of 2021 brought Iraq's worst drought in forty years and Syria's worst in seventy. A 2021 IPCC report reinforced earlier assessments that the Middle Eastern states bordering the Mediterranean Sea will experience an increase in droughts, aridity, and fires, with the regional average of warming reaching 2°C (3.6°F) or more by mid-century.<sup>8</sup>

Along with the effects of the changing climate, the Middle East has suffered from protracted conflict and instability in the past several decades.\* The region is home to over sixteen million refugees and internally displaced persons (IDPs), has contended with the presence of armed nonstate actors such as the Islamic State of Iraq and Syria (ISIS), and is actively enduring protracted conflict in Syria, Yemen, Sudan, and elsewhere. Throughout those conflicts, governments and nonstate actors have repeatedly weaponized the region's already-scarce resources, especially water. Currently, the United Nations estimates that over seventy million individuals need humanitarian assistance throughout the region.<sup>9</sup>

In modern conflicts in the Middle East and elsewhere, the changing climate does not directly cause unrest or conflict but rather intersects with other vulnerabilities, all exacerbated by poor governance decisions. In that regard, the changing climate's threats to land and resources do not alone lead to greater levels of instability. Rather, the relationships between instability, resource management, and climate change throughout the Middle East are influenced by structures of power, individual governments' policies, and interstate negotiation (or, often, the lack thereof). Therefore, instability can result when those threats are met with governments that are either unable to mitigate their effects or that deliberately exacerbate them. As governance, corruption, economic, social, and environmental risks compound, human security is endangered, and the likelihood of instability, conflict, and violence rises. Areas at particular and sustained risk of such compounding vulnerabilities are Iraq, Syria, Turkey, and Yemen, as well as Gaza and the West Bank and parts of North Africa.

The response to climate- and conflict-related challenges from both Middle Eastern governments and their international partners will be crucial for stability and security. With recent UN Framework Convention on Climate Change (UNFCCC) Conferences of the Parties being hosted in the region (in Egypt in 2022 and in the United Arab Emirates in 2023), a geographical focus on the Middle East is necessary. Due to the region's geopolitical significance, the regional and international implications of resource competition, and existing humanitarian commitments, policymakers in the United States and elsewhere should recognize the multifaceted nature of the relationship between the changing climate and instability in the Middle East. Implementing and supporting policies that bolster the ability to address, mitigate, and adapt to climate change will foster opportunities for greater stability throughout the region.

---

\*Please note: this report was completed before the outbreak of the Israel-Hamas war on October 7, 2023.

# *THE CLIMATE-CONFLICT RELATIONSHIP*

For several decades, scholars and policymakers in the United States and Europe have debated whether and how climate change is linked to violent conflict.<sup>10</sup> In particular, threats to ecological and human security are perceived to arise from drought and famine in vulnerable areas of the world.<sup>11</sup> The link seems intuitive, which allows politicians to make the case for climate action based on a direct climate-conflict nexus.<sup>12</sup> The Middle East is at the center of debates about climate change and conflict due to its vulnerability to climate change and the long history of colonial and postcolonial scholarship that invokes environmental determinism to explain “underdevelopment.”<sup>13</sup> Further, conventional climate security narratives typically posit that increased climate change will encourage migration from vulnerable regions to developed regions, increasing conflict and insecurity everywhere.<sup>14</sup> The Middle East faces significant vulnerabilities relating to climate change, environmental degradation, and protracted conflict. Despite the often-used climate security narrative, the pathways between those realities are indirect; the region’s troubles are connected through a complex set of intervening variables that have exacerbated the Middle East’s exposure to the dangers of the changing climate.

One issue with this climate-conflict narrative is that it encourages a view of autonomous governments in less-developed countries as passive victims of nature, rather than agentic, political actors. All too often, the role of policy choices in exacerbating climate change and fostering conflict is overlooked. Too exclusive a focus on climate change as a possible source of violence can obfuscate other important, empirical drivers of conflict. Those drivers include inhumane policies regarding food, water, and land access; property rights regimes; repressive, authoritarian governance; and deliberate destruction of the



environment by governments and nonstate actors. Indeed, leaders could invoke the perceived climate-conflict relationship to justify repression of human mobility at the domestic and international levels, feeding the narrative that “environmental migrants” are triggering social and political unrest—a narrative that overlooks the role and responsibilities of authoritarian regimes and governments that have failed to foster human development.<sup>15</sup>

In the last few years, academics, policy analysts, and practitioners have tried to eschew a simplistic view of the climate-conflict relationship.<sup>16</sup> Doing so allows them to examine the ways climate change itself interacts with human security as well as the further risks posed when resources and infrastructure become targets of conflict. For example, the repercussions of dam projects, water scarcity in agricultural and livestock production, displacement and migration patterns, and the mismanagement or weaponization of water all exemplify the inextricable interaction of environmental degradation, climate change, and instability. Of primary significance are the Arabian Peninsula and the Levant, where climate change and political instability acutely challenge human security.

# *EFFECTS OF CLIMATE CHANGE ON THE MIDDLE EAST*

Over the last fifty years, the Middle East has warmed at rates significantly higher than other regions, with an estimated 0.45°C (0.81°F) increase in warming per decade.<sup>17</sup> That rate is nearly two times faster than in Europe, for example. Particularly affected by the rapid rise in temperatures will be parts of Iraq, Jordan, Lebanon, Syria, Turkey, and the Arabian Peninsula.<sup>18</sup> Extreme summer heat waves occurred across the Levant and Middle East in 2020 and 2021; Iraq and other countries in the Persian Gulf saw temperatures surpassing 50°C (over 120°F). Along with and associated with that warming, the region has experienced more frequent droughts, heat waves, and other catastrophic weather events. For example, flooding forced human displacement in Egypt, Iran, and Tunisia in 2020, while wildfires spread in Lebanon, Syria, and Turkey. The International Monetary Fund (IMF) estimates that climate disasters in the region have caused an annual average of \$2 billion in direct material damages and have affected over seven million residents each year.<sup>19</sup>

Although rainfall projections are difficult to ascertain and vary greatly by country, studies paint a harrowing picture overall. In Jordan, for example, remote-sensing data indicates that rainfall will decrease by 30 percent and the likelihood of drought in the country will triple by 2100.<sup>20</sup> As droughts become more prevalent, reliance on groundwater will continue to be a major concern, as countries throughout the region already struggle with depleted aquifers and groundwater scarcity.

A 2023 IPCC report indicates that areas of high importance for biodiversity conservation are at extreme risk as temperatures increase across the Middle East.<sup>21</sup> Further, the IMF has reported that changing temperatures and precipitation patterns correlate with a decrease in per capita income, particularly due to the damage to the agricultural

sector.<sup>22</sup> Climate modeling of the region confirms that trends such as decreasing crop yields, rising sea levels, intensifying sand and dust storms, accelerating desertification, diminishing snowpack, and increasing displacement from low-lying coastal areas are continuing, projecting that the tangible consequences of the changing climate will be increasingly evident without significant mitigation and sustainability efforts. The danger to the social, political, and economic fabric of the region cannot be overstated.

# COMPOUNDED THREATS AND CHALLENGES TO ADAPTATION

In addition to deliberate environmental destruction and resource manipulation during armed conflict, countries throughout the Middle East face other obstacles in their climate adaptation and mitigation efforts.

## *GOVERNANCE AND MISMANAGEMENT OF CLIMATE CHANGE'S EFFECTS*

Although countries throughout the region are facing myriad challenges due to the changing climate, several have taken steps to adapt to and mitigate risks. However, other Middle Eastern countries rank in the lower half of the world's states in the Notre Dame Global Adaptation Initiative index, indicating their high climate vulnerability and low readiness for climate change.<sup>23</sup> The rankings indicate that the countries in a better position regarding adaptation and resilience are those with greater financial resources, such as Saudi Arabia and Qatar. Countries outside of the oil-rich Gulf face more significant governance and mitigation challenges, which limit their adaptive capacities, threaten human security, and pose a greater risk of instability.

Syria is a critical case when examining issues of adaptation and poor governance. In Syria, agriculture has traditionally accounted for 25 to 30 percent of gross domestic product (GDP), providing the bulk of employment opportunities among rural communities in the country's breadbasket regions.<sup>24</sup> Large-scale internal migration originated from the regions hit by water and food insecurity during the 2006–10 drought. A closer examination of food insecurity alongside economic and political structures reveals the factors that made the state and communities extremely vulnerable to climate change during periods of

drought.<sup>25</sup> Following the severe drought of 2006 to 2010, and before the war started in 2011, approximately 370,000 to 460,000 individuals from northeastern and eastern Syria were forced to leave their homes to seek better livelihoods in other parts of the country.<sup>26</sup> In slums in Damascus and Deraa, those displaced populations (referred to as *al-nazihin*, or “the displaced”) faced utter neglect from the government. However, displaced populations did not lead the protests in south-eastern Syria where the uprising began.<sup>27</sup> Stability was affected by a combination of factors, including the state’s role in the deterioration of human security nationwide. Water and food insecurity were two of the structural issues that preceded the 2011 uprisings and undermined state legitimacy. Exacerbated by climate change, many vulnerabilities in rural communities were worsened by state policies of neglect and marginalization. The uprising directly reflected grievances about rights, inclusion, and employment.<sup>28</sup>

Just south of the Middle East, the case of Darfur in Sudan offers a warning, displaying some of the worst potential human security outcomes of multilayered vulnerabilities and poor governance decisions. Darfur is prone to drought and famine, and before conflict broke out in 2003, it was home to a 67 percent rural population.<sup>29</sup> In the lead-up to war, drought and desertification presumably spurred migration. Specifically, nomadic pastoralists moved south, where they clashed with sedentary agriculturalists over sparse resources.<sup>30</sup> Some scholars have argued that environmental change led to migration and demographic changes, which resulted in violent conflict.<sup>31</sup> However, climatic changes are significant factors when understood in concert with political and social vulnerabilities. Alterations to traditional land-use rights were especially important to the breakout of conflict in Darfur. For instance, the government in Khartoum unilaterally declared its ownership of all unregistered land and used access to land as a recruitment tool for the pro-Arab Janjaweed militia fighting in Darfur, playing on the colonial-era animosity between Sudanese Arabs and minorities.<sup>32</sup> The Janjaweed conducted scorched-earth campaigns to push civilian agriculturalists off their land, spurring urbanization in Darfur.<sup>33</sup>

## TRANSBOUNDARY RESOURCE MANAGEMENT

As temperatures continue to rise and droughts intensify, resource management throughout the region has exemplified the complex relationship between the changing climate and instability. Iraq, Syria, and Turkey, for example, have consistently faced difficulty in cooperatively

managing cross-boundary water resources, specifically the Tigris and Euphrates Rivers.<sup>34</sup> Both rivers originate in the mountains of south-eastern Turkey. They flow into Syria and Iraq and join the sea at the head of the Persian Gulf. As downstream countries, both Syria and Iraq are dependent on and vulnerable to water projects that Turkey builds on the rivers.<sup>35</sup> Disputes over the management of those rivers have been commonplace over the last century, and they will intensify as water and energy scarcity deepen.

In 1977, the Turkish government announced the commencement of the Güneydoğu Anadolu Projesi, or the Southeastern Anatolia Project (GAP), which began as a development project that specifically capitalized on land and water resources in southeastern Anatolia.<sup>36</sup> The GAP's central features include twenty-two dams and nineteen associated hydraulic power plants built along the Tigris and Euphrates.<sup>37</sup> The region's increasing temperatures could alter the basic hydrological cycle, including precipitation patterns and the rivers' water flow.<sup>38</sup> As the hydrological cycle changes with the warming climate and Turkish dams significantly reduce the volume of water flowing south, Turkey's GAP project will place downstream communities in an increasingly precarious situation. Communities in the Euphrates and Tigris basins will likely face protracted droughts and periods of water scarcity, leading to loss of livelihoods. Although the United Nations designed a 1997 convention regarding the joint stewardship of international watercourses, Turkey voted against it and continues to object to similar efforts.<sup>39</sup>

As Turkey has restricted downstream water access, it has exacerbated water management challenges in Iraq, specifically in and around the southern city of Basra. Since the 1980s, the Iraqi government has failed to regulate and manage water that flows into the rivers and canals of Basra.<sup>40</sup> The country has also faced significant challenges to water infrastructure maintenance due to the U.S. invasion between 2003 and 2011 and later campaigns against ISIS. The GAP project has amplified those challenges, causing a decrease in downstream flows from the Tigris and Euphrates. In addition, Iraq has experienced a decrease in rainfall and changing weather patterns, likely a direct result of climate change.<sup>41</sup> The combination of those factors has led to the deterioration of water access and infrastructure in Basra, a city already long plagued by corruption, mismanagement, and associated instability. In 2018, for example, nearly 118,000 people were hospitalized in the area due to water-related illnesses.<sup>42</sup> Since 2018, Basra has experienced a series of protests, often characterized by violence and destruction, demanding

better access to clean water and electricity as the city was reaching temperatures of over 50°C (122°F).<sup>43</sup>

In February 2023, two major earthquakes occurred on the Syria-Turkey border. The affected areas were home to millions of already vulnerable Syrian IDPs and refugees.<sup>44</sup> The second earthquake destroyed a Syrian dam, leading to severe flooding in the country's north.<sup>45</sup> Governance problems hindered attempts to mitigate the flooding, deliver aid to those on the Syrian side of the border, and repair the dam, while the immediate effects of the floods led to further displacement within Syria. Upstream dams in Turkey were also damaged in the earthquakes, and the measures taken to prevent further structural damage included some water releases into rivers flowing southward. If water releases or damage to infrastructure in Turkey were to cause major flooding downstream in Syria and Iraq, Damascus or Baghdad would have no established legal agreement or mediation mechanism through which to pursue transparency and an equitable resolution.<sup>46</sup> When natural disasters such as the 2023 earthquakes occur, political instability and weak governance put the most vulnerable communities at further risk. Additionally, in regions without water, energy, and other resource management conventions, disasters magnify interstate inequities and human security harms.

Although the changing climate could threaten the security and prosperity the Tigris and Euphrates have historically provided to the region, that threat is materialized and exacerbated through the actions of the Iraqi, Syrian, and Turkish governments, especially through their poor stewardship of the water within and beyond their borders. Therefore, measures to handle to cross-boundary resource management problems should incorporate strategies that address climate change *and* international norms regarding resource sharing.

## *AGRICULTURE, URBANIZATION, AND MIGRATION*

Temperature-warming trends adversely affect both food security and food production in the Middle East. Climate change is particularly concerning in rural areas with vulnerable populations dependent upon rain-fed agriculture. Population growth in the MENA region occurs at an annual rate of 2.1 percent, meaning that the region will have a total population of over 690 million by the year 2050.<sup>47</sup> As the population continues to grow, the region also contains the least arable land per person compared to other parts of the world.<sup>48</sup> Nonetheless, many of its rural residents depend on the agricultural sector as their main source of

livelihood. The intensification of dry weather, droughts, and sand and dust storms as well as increasing temperatures have placed communities reliant on agriculture at significant risk.<sup>49</sup>

When individuals choose or are forced to flee homes as their immediate geographies become untenable, their movement typically begins as rural-to-urban migration.<sup>50</sup> Changes in the agricultural sector throughout the region, combined with armed conflicts, droughts, and sand and dust storms, have caused hundreds of thousands of rural residents to flee into cities seeking economic opportunity and increased security.<sup>51</sup> As extreme weather events and shortages of basic staple crops threaten their survival, people in countries throughout the region will also increasingly flee beyond their borders. In that regard, as rising temperatures and increasing droughts diminish agricultural opportunities, thereby intensifying inequality, a combination of social, economic, and political factors lead people to migrate, making it difficult to isolate environmental issues from other drivers.

## *ECONOMIC INEQUALITY*

The Middle East is also experiencing intense economic inequality, particularly between oil-rich and non-oil-rich states, and that inequality will likely exacerbate climate change's injuries to resource-poor countries. Oil-exporting Gulf countries with diversified, nonagricultural economies, such as Qatar, Saudi Arabia, and the United Arab Emirates (UAE), have the financial and technological resources they will need to lower their own carbon emissions, protect their populations from the effects of climate change, and adapt to a future in which the demand for fossil fuels will be far lower than it is today. Far from losing out in the green economy of the future, those countries are poised to reap significant gains: aggregate demand for oil is likely to increase before it falls. Wealthy states are also well positioned to become major suppliers of solar energy, an increasingly important resource. In contrast, non-oil-rich countries throughout the region will struggle to adapt to the changing climate, as they lack the financial resources to adequately address mitigation challenges.



# *EFFECTS OF ARMED CONFLICTS ON HUMAN AND ENVIRONMENTAL SECURITY*

Parsing how the weaponization of critical natural resources would affect human security in the region requires understanding how climate factors interact with socioeconomic vulnerabilities, and how both are magnified when water and energy systems are either decimated or exploited in conflict. Exploiting resource scarcity and destroying water infrastructure are consistent tactics of state and nonstate actors throughout the Middle East.<sup>52</sup> Armed conflicts significantly hinder governments' and communities' adaptation to the changing climate, particularly as the region warms and water resources vanish, diminishing adaptive capacity. In the coming years, political conflict over shared water resources will likely remain a source of instability in the Middle East, threatening the human and environmental security of the region and its populations.

Controlling access to water is used to establish legitimacy and domination over a population in times of peace and as an offensive and defensive tool during war. Cooperative resource agreements between state and nonstate actors can also contribute to water weaponization, as was the case with wartime arrangements between ISIS and the Syrian government. Those agreements deprived civilians of resources in order to advance common destructive objectives.<sup>53</sup> The cumulative effect of those incidents over time creates human insecurity, exacerbates climate vulnerability, and limits communities' ability to adapt to climatic changes. The most touted example of conflict directly harming environmental and human security in the Middle East occurred during the 1990 Gulf War, when Iraqi military attacks on Kuwaiti oil fields caused significant air, soil, and aquifer pollution. The cases of Yemen, Iraq and Syria, and the West Bank and Gaza further illustrate how state and nonstate actors throughout the Middle East target infrastructure

and exploit resource scarcity, worsening climate vulnerabilities and increasing instability.

## YEMEN

The Middle East has one of the biggest water shortages on earth, and Yemen in particular faces acute aridity and resource management issues, especially as pertains to water.<sup>54</sup> Annual precipitation in most regions of Yemen amounts to less than fifty millimeters annually, making the country one of the most water-scarce in the world.<sup>55</sup> Yemen already faced a precarious water situation prior to 2014 because the government encouraged considerable groundwater extraction from the country's limited aquifers.<sup>56</sup> The overexploitation of groundwater, predominantly to support the agricultural sector, contributed to socioeconomic challenges, particularly in the Saada Basin in northwest Yemen.<sup>57</sup> Since the outbreak of the most recent war in 2014, instability in the country has hindered the government's management and stewardship of limited resources and has allowed those resources to become targets of the conflict.<sup>58</sup>

Throughout the war, Saudi and Emirati forces have carried out aerial bombing campaigns that have destroyed Yemen's water and sanitation infrastructures. Those attacks have exacerbated the water scarcity that Yemenis were already facing prior to the war, leaving over nineteen million without access to clean water.<sup>59</sup> Moreover, the combination of water pollution and damage to infrastructure has severely damaged food security, with populations suffering from malnutrition, severe hunger, and pockets of famine throughout the country. Those with already insecure access to food have been made even less secure by the Saudi-led blockade of two major ports, al-Hudaydah and Salif, where 80 percent of food imports enter the country. By cutting off local populations' access to clean water and sanitation, external actors have placed Yemenis at high risk for communicable illnesses such as cholera. Governorates under blockade (such as al-Hudaydah) experienced some of the highest cholera-related death rates in the world between 2016 and 2021.<sup>60</sup> All parties to the conflict, including nonstate actors, have used the food supply as a shortsighted weapon. The Houthis, the Shiite sect fighting the country's Saudi-backed central government, expropriated food aid provided by the World Food Program for extortion rackets to fund their wartime operations. The COVID-19 pandemic has further intensified the crisis by disrupting vital supply chains and limiting the purchasing power of local populations.

The devastating effects of the interventions by Saudi Arabia and the UAE in the war in Yemen have persistently limited Yemeni authorities' ability to manage environmental risks, both on Yemen's mainland and on its proximate islands. Located off the southern coast of Yemen in the Arabian Sea, the Socotra archipelago has become a focal point of regional and international interest due to its strategic proximity to one of the world's busiest shipping lanes. The UAE used the conflict as an opportunity to occupy and control Socotra in 2020. The ultimate goal is to make the archipelago an Emirati territory as part of a larger effort to increase the UAE's influence over the region's vital waterways.<sup>61</sup> The population of the archipelago numbered less than sixty thousand before the conflict in Yemen began, allowing for the preservation of the environment and biodiversity. The UAE claims that it is only using Socotra as a military training site, but reports have increased that it is constructing military installations and tourist and residential attractions—some in areas considered protected nature reserves under the stewardship of the United Nations Educational, Scientific, and Cultural Organization (UNESCO).<sup>62</sup> The increasing development of Socotra is placing the local ecosystem under intensified stress, though it was already at risk due to climate change prior to occupation.<sup>63</sup> Following the announcement of the Abraham Accords between the UAE and Israel in 2020, there were also accounts of Israeli tourism to the islands, which were actively protested by Yemeni authorities.<sup>64</sup>

## *IRAQ AND SYRIA*

In Syria, the government and nonstate actors alike have deliberately damaged water resources and vital infrastructure as a wartime strategy. Air strikes on water and wastewater treatment infrastructures by the Syrian and Russian air forces have contaminated groundwater, with more than 90 percent of the current population lacking access to safe water sources, contributing to the spreading of waterborne diseases.<sup>65</sup> At one point during the peak of the civil war, approximately 35 percent of Syria's water treatment plants had been rendered nonfunctional.<sup>66</sup> In 2013 and 2014, battles between regime forces and ISIS also destroyed water plants and sewage pipelines.<sup>67</sup> Moreover, ISIS's 2013 capture of Syria's main dam on the Euphrates, the Tabqa Dam, represented a significant victory for the group. Upon the dam's capture, ISIS threatened to cut off electricity to Damascus and released eleven million cubic meters of water, flooding the surrounding farmland. Those actions forced local populations into submission and the central government into a no-strike

agreement.<sup>68</sup> As ISIS ascended to its peak (before being expelled by U.S.-backed forces in 2017), it would regularly flood certain areas while restricting water flow to others, manipulating water access across Syria and Iraq to punish populations.<sup>69</sup> The targeting of other types of infrastructure has also put civilians at risk: when the Syrian government, in conjunction with Russia, damaged oil refineries in northeastern Syria, the leaks contaminated surrounding groundwater—a risk factor for gastrointestinal illness, damage to the nervous and reproductive systems, and chronic diseases such as cancer.

At its height, ISIS recruited tens of thousands of fighters both from within and outside of the territory it controlled in Iraq and Syria.<sup>70</sup> Some reports indicate that the effects of climate change, particularly drought, could have played a role in ISIS's recruitment efforts.<sup>71</sup> Populations experiencing more drought and more difficulty accessing water were relatively successful recruiting grounds for ISIS.<sup>72</sup> For example, recruitment in Tikrit, Iraq, which was particularly water-starved, was much more successful than in better-resourced areas nearby.<sup>73</sup> Further, ISIS spread rumors that majority-Shia regions were delaying crop payments to the group and cutting off water resources to Sunni farmers, using perceived threats to livelihood and water access as a way to stir up sectarian resentment in its favor.<sup>74</sup> As in other cases, climatic changes, combined with other economic and social vulnerabilities, were leveraged effectively by ISIS to create greater instability throughout the region.

Turkey also exploited water scarcity during the Syrian conflict. To squelch the rise of Kurdish autonomy in northeastern Syria, which threatened to further radicalize Turkey's own Kurdish population, Turkish troops shut off water access to 460,000 people in the Syrian province of al-Hasakah and in three different refugee camps at a time when COVID-19 was running rampant.<sup>75</sup> Water shutoffs by Turkey, combined with low rainfall, led the Khabur River to dry up; the river became a landfill and an open sewage site, spreading disease to neighboring villages. Although ISIS's presence has been significantly curtailed since 2017, Syria remains vulnerable to the efforts of nonstate actors and the Turkish government to control water resources as it navigates reconstruction.

## *THE WEST BANK AND GAZA*

Due to the allocations of transboundary water resources agreed upon in existing treaties, Israel currently controls approximately 80 percent

of water reserves in the West Bank, which are derived from the Mountain Aquifer.<sup>76</sup> Those resources support Israeli settlements that are considered illegal under international law. Israelis living in the settlements often pollute shared streams in ways that further limit Palestinians' access to clean water.<sup>77</sup> The number of Jewish settlers in the West Bank is estimated to be over 413,000 in addition to some 200,000 in East Jerusalem.<sup>78</sup> According to the World Health Organization, the minimum amount of water each person requires daily is 100 liters. On average, Israelis use 350 liters, while Palestinians use only 70 liters.<sup>79</sup> Palestinians living under Israeli occupation in the West Bank are prohibited from constructing water infrastructure without obtaining a permit from the Israeli army, further restricting their access to water.<sup>80</sup> Given the profound insecurity experienced by Palestinians throughout the West Bank, many residents construct their own unsanctioned infrastructure or storage facilities, though those are regularly destroyed by Israeli forces.<sup>81</sup> In 2020, 84 of the 849 structures destroyed in the West Bank by Israeli forces were water and sanitation structures.<sup>82</sup>

After Kuwait, the Gaza Strip is the next-most water-poor region in the world, with only 10 percent of the population in Gaza having direct access to clean, safe drinking water.<sup>83</sup> The UN Development Program (UNDP) has reported that Gaza's water infrastructure has deteriorated significantly.<sup>84</sup> The Gaza Coastal Aquifer is the only source of water for about two million Palestinian citizens living in the Gaza Strip, and its quality and quantity of water are both rapidly declining.<sup>85</sup> Due to Gaza's isolation, its aquifer is overextracted, particularly in times of conflict when other water infrastructure is damaged. As Gaza experiences sustained bombing campaigns from Israeli forces, the already water-starved area is made even less secure. For example, in May 2021, Israeli air strikes significantly damaged a desalination plant in Gaza that provided clean water to over 250,000 people.<sup>86</sup> Moreover, the Israeli land, sea, and air blockade imposed on Gaza since June 2007 prevents necessary upgrades to water and wastewater infrastructure. More than a quarter of all reported disease in Gaza is caused by poor water quality and access. Additionally, 108,000 cubic meters of untreated sewage flow from Gaza into the Mediterranean Sea every day, causing serious health risks.<sup>87</sup> In Gaza, Israeli forces consistently weaponize access to water, creating situations of protracted human and environmental insecurity.

# *IMPLICATIONS AND RECOMMENDATIONS*

Local governments and regional and international institutions have largely failed to address climate vulnerability and adaptation gaps in the Middle East, despite more nascent efforts. Although countries throughout the region are generally vulnerable to climate change and lack the resources to cope with mounting damage to water and food resources, those threats do not have to lead to greater instability in the Middle East.

The Joe Biden administration's National Security Strategy frames climate change as an existential security threat, and specifically names the Middle East as an area of concern—particularly in regard to water scarcity.<sup>88</sup> However, when it comes to top countries of concern for climate-related security threats, the National Intelligence Council only acknowledges Iraq.<sup>89</sup> Clearly, the United States needs to focus more on the transboundary threats and concerning trends facing the entire Middle East, especially where the weaponization of environmental resources is exacerbating the stress already imposed by the changing climate. Syria, Yemen, and the West Bank and Gaza are experiencing those severe, multilayered threats, as in Iraq.

The United States and its international partners should respond to the compounding challenges affecting the Middle East by promoting human security, which in turn will foster greater stability. To that end, the United States has a significant number of strategies at its disposal, such as prioritizing climate-forward data sharing and development assistance, leveraging relationships with allies to protect the most vulnerable, mitigating the effects of instability, and utilizing international organizations to foster resource-protection norms.

**The United States and international organizations should incorporate climate-centered development in post-conflict reconstruction and rebuilding efforts.**

International actors and organizations involved in post-conflict reconstruction efforts should pursue programs and policies that tackle environmental security from multiple angles. In the immediate aftermath of violence, particularly in the Middle East where conflicts tend to be recurring and protracted, prioritizing climate adaptation can prove difficult. However, a failure to do so can undermine future prospects for overall stability. A strategy requires a three-pronged approach: addressing structural inequalities, providing immediate environmental relief for vulnerable populations, and critically evaluating the environmental stresses of reconstruction itself. The United States and international organizations should assist post-conflict states (as well as states such as Yemen that are making the transition from active conflict to reconstruction) to develop national adaptation plans as part of their peace-building processes.

Another important post-conflict step is the collection of new climate change data, as violent conflict often prevents crucial datasets from being collected. Reconciliation processes should also include accountability to and support for populations that have lost access to resources and infrastructure and those whose livelihoods have been destroyed by the environmental harms of conflict. The United Nations has recognized the need to incorporate climate change into peace-building practices. For example, the UN Assistance Mission in Somalia recently became the first to deploy a team to assess climate security issues and report them to the UN Security Council.<sup>90</sup> The United States should support comprehensive peace-building efforts in the region that actively incorporate climate adaptation strategies.

**U.S. government agencies and multilateral organizations should provide for sustained adaptation planning assistance.**

Congress can leverage the annual appropriations process to ensure greater financial support for adaptation and resilience programming assistance throughout the region. Increasing support for organizations and financing mechanisms such as UNFCCC's Green Climate Fund will allow countries throughout the Middle East to adapt to the warming world and prepare for its challenges, allowing them to avoid unmitigated emergencies that can increase instability. One example of a promising effort in that area is the UNDP's ongoing assistance to Iraq, Jordan, Lebanon, Morocco, Somalia, Sudan, and Tunisia. The UNDP is

helping governments track and meet their nationally determined contributions to global climate change funding as determined under the Paris Agreement and in cooperation with the UNFCCC.<sup>91</sup> Given the necessary international support, those countries in the MENA region have proven that they are dedicated to meeting their targets and are working to improve their capacities for monitoring and evaluation.<sup>92</sup> It is imperative that the United States support adaptation financing both through its own ongoing contributions and through multilateral programming to encourage other countries' contributions.

To ensure assistance reaches the most vulnerable, U.S. funding should also support grassroots efforts, which are more attuned to local dynamics and needs. For example, the Office of the UN High Commissioner for Refugees, in conjunction with local and international nongovernmental organizations (NGOs) such as the IKEA Foundation, made the Azraq refugee camp in Jordan the first in the world to be powered by renewable energy by connecting ten thousand shelters to the grid. The joint effort also offered employment and training opportunities for the refugees in Azraq.<sup>93</sup> In Yemen, the same organizations provided for the construction of durable shelters made of local materials such as *khazaf* (woven palm leaves) that can withstand heavy rains, strong winds, high humidity, and scorching heat.

**The United States and other international actors should collaborate with Arab partner countries in the Gulf to implement regional energy transition and encourage intraregional climate financing.**

The United States and international organizations should partner with the Arab Gulf countries to help them implement an energy transition plan for the region. Doing so will benefit them economically, as oil is a notoriously volatile commodity, particularly during periods of structural transition. The fact that carbon prices could eventually be raised to account for the negative externalities of carbon dioxide emissions provides another strong incentive for oil-producing states to take climate change seriously and plan for energy transition. In November 2022, the United States and the UAE announced the Partnership to Accelerate Transition to Clean Energy (PACE), which committed over \$100 billion in joint financing to invest in clean energy transition.<sup>94</sup> The partnership plans to make joint investments in clean energy options in emerging economies, work to create greener supply chains, and foster the development of new clean technologies.<sup>95</sup> The United States should continue to create partnerships like PACE throughout the Gulf. Those



partnerships should encourage investment within the Middle East's most vulnerable economies and emphasize a collective move toward a greener future. The United States should also engage with the Gulf states to foster climate financing initiatives and investment opportunities for the region as a whole. That type of financing would aid non-oil-rich states in meeting their emission and mitigation targets.

**The United States should leverage its relationships with Israel, Saudi Arabia, and other states to challenge resource weaponization in times of conflict.**

The United States should also utilize its relationships with U.S. allies to prioritize the human security of the most vulnerable populations. Left unchecked, states such as Israel and Saudi Arabia will continue to engage in greenwashing by pursuing initiatives that pay lip service to concerns about climate change but do little to protect or empower climate-vulnerable populations. During its military campaigns, Israel routinely targets the Palestinians' water supply, especially in Gaza, by damaging wastewater treatment plants and contaminating groundwater. Israel also touts green energy projects in the Golan Heights, an area it illegally annexed from Syria in 1981. Saudi Arabia often pioneers its climate resilience and mitigation programming domestically while simultaneously bombing critical civilian infrastructure in Yemen. Similar practices are carried out by the UAE even as it prepares to host the twenty-eighth Conference of the Parties (COP28) in November 2023 on the themes of climate change, peace, and security. By signaling to its allies that human and environmental security are inseparable from national security, Washington could enhance its leadership and foster effective peace-building in the Middle East.

**International organizations should promote transboundary resource management mediation processes that include all states in the region.**

Transboundary resource management and cooperation will continue to be a major challenge in the region and will be exacerbated by the changing climate. The United Nations adopted the Convention on the Protection and Use of Transboundary Watercourses and International Lakes in 1996, but that was originally an agreement negotiated only for the pan-European region.<sup>96</sup> In 2016, the convention was geographically expanded, and all UN member states were invited to sign on to the framework. Most recently, in March 2023, Iraq acceded to the convention as an implementing member.<sup>97</sup> Such agreements provide

a framework for collaborative and equitable transboundary resource management, which also require member countries to include sustainability markers when reporting their resource use. The United States should play an active role in encouraging a regional agreement for the Middle East and leverage its relationship with countries such as Turkey that have previously declined to participate. Efforts in the early 2000s for Iraq, Syria, and Turkey to reach a transboundary water-sharing agreement broke down. However, with climate change increasing water scarcity in both Syria and Iraq, negotiations are vital to minimize threats to human security and instability.

**International organizations, with the support of the United States, should foster norms that protect natural resources and infrastructure during conflict.**

The United States, the European Union, and international organizations should use the tools at their disposal, such as international agreements, to foster norms that protect natural resources and infrastructure even in the midst of conflict. In May 2022, the International Law Commission concluded the development of a new framework for the Protection of the Environment in Relation to Armed Conflicts.<sup>98</sup> The twenty-seven principles proposed in the document are designed to protect natural resources during violent conflict. They also address the protection of resources before conflict begins and in the post-conflict phase.<sup>99</sup> Although the UN General Assembly voted to approve those principles in December 2022, the important work of implementation is only beginning. The United Nations is often hard-pressed to enforce such frameworks, particularly when powerful states do not assist in these processes. The United States should lead by example by incorporating the principles into its own domestic legal framework in order to convince its allies and others to do the same. Washington has a limited appetite for confronting its allies regarding human rights violations. However, applying pressure on partners in the Middle East, including Israel, Saudi Arabia, and the UAE, to implement the standards set forth in the new convention could help protect civilians around the globe and, by consequence, limit the United States' reputational costs in the international and regional arenas.

# CONCLUSION

As the changing climate continues to harm the world's most vulnerable, the Middle East will remain one of the most acutely affected regions. Its limited resources, soaring temperatures, and ongoing conflicts will continue to disrupt the lives and livelihoods of its residents. As protracted conflict persists, threats to and destruction of environmental resources and water infrastructure will exacerbate the harms of climate change without protection and mitigation efforts. Governance challenges, transboundary resource management, and other economic vulnerabilities do present major risks in the face of climate change, but they also present significant opportunities for mitigation, adaptation, and ultimately, greater human security.

The threats posed by climate change could interact with other political, economic, and social variables to increase instability in the region, but both local and foreign governments as well as intergovernmental organizations can implement policies to reverse those trends. Governments throughout the region should prioritize efforts to do so, which will require both regional and international support. The United States and its allies can use their resources and their power to foster greater resilience and mitigation capacity throughout the region, which will ultimately promote stability in the Middle East and beyond.

# ENDNOTES

1. Hoesung Lee et al., eds., *Climate Change 2023: Synthesis Report* (Geneva: IPCC, 2023), 51, <http://ipcc.ch/report/ar6/syr>. Climate vulnerability can be understood as the propensity to be adversely affected by climate effects. It considers susceptibility to harm as well as a lack of adaptation and coping abilities. See Christopher B. Field et al., eds., “Summary for Policymakers,” in *Climate Change 2014: Impacts, Adaptation, and Vulnerability* (Geneva: IPCC, 2014), 3, 5, [http://www.ipcc.ch/site/assets/uploads/2018/02/ar5\\_wgII\\_spm\\_en.pdf](http://www.ipcc.ch/site/assets/uploads/2018/02/ar5_wgII_spm_en.pdf).
2. Lee et al., *Climate Change 2023: Synthesis Report*, 51; Hans-Otto Pörtner, Andrés Alegria, eds., “Annex I: Global to Regional Atlas,” in *Climate Change 2022: Impacts, Adaptation and Vulnerability*, ed. Hans-Otto Pörtner (Geneva: IPCC, 2023), 2817, [http://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC\\_AR6\\_WGII\\_Annex-I.pdf](http://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_Annex-I.pdf).
3. UN Economic and Social Commission for Western Asia (ESCWA), *Annual Report 2013: 40 Years With the Arab World* (Beirut: ESCWA, 2014), [http://archive.unescwa.org/sites/www.unescwa.org/files/publications/files/e\\_escwa\\_oes\\_14\\_1\\_e.pdf](http://archive.unescwa.org/sites/www.unescwa.org/files/publications/files/e_escwa_oes_14_1_e.pdf).
4. Katharina Waha et al., “Climate Change Impacts in the Middle East and Northern Africa (MENA) Region and Their Implications for Vulnerable Population Groups,” *Regional Environmental Change* 17, no. 6 (2017): 1624.
5. F.G. Kuglitsch et al., “Heat Wave Changes in the Eastern Mediterranean Since 1960,” *Geophysical Research Letters* 37, no. 4 (2010).
6. ESCWA, *Annual Report 2013*; Ove Hoegh-Guldberg et al., “Impacts of 1.5°C Global Warming on Natural and Human Systems,” in *Global Warming of 1.5°C: An IPCC Special Report* [...], ed. V. Masson-Delmotte (Geneva: IPCC, 2019), 178, 196, 200, [http://www.ipcc.ch/site/assets/uploads/sites/2/2019/02/SR15\\_Chapter3\\_Low\\_Res.pdf](http://www.ipcc.ch/site/assets/uploads/sites/2/2019/02/SR15_Chapter3_Low_Res.pdf).
7. Jason P. Evans, “21st Century Climate Change in the Middle East,” *Climatic Change* 92 (2009), 418; Jeannie Sowers, Avner Vengosh, and Erika Weinthal, “Climate Change, Water Resources, and the Politics of Adaptation in the Middle East and North Africa,” *Climatic Change* 104, no. 3–4 (2011): 599–627; Mostafa K. Tolba and Najib W. Saab, “Arab Environment: Climate Change; Impact of Climate Change on Arab Countries,” (Beirut Arab Forum for Environment and Development, 2009); Fathi Zereini and Heinz Hötzl, *Climatic Changes and Water Resources in the Middle East and North Africa* (Berlin: Springer, 2008).

8. Richard P. Allen et al., “Summary for Policymakers,” in *Climate Change 2021: The Physical Science Basis*, ed. V. Masson-Delmotte et al. (Geneva: IPCC, 2021), [http://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC\\_AR6\\_WGI\\_SPM.pdf](http://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf).
9. “Humanitarian Response,” UNICEF Middle East and North Africa, accessed April 21, 2023, <http://unicef.org/mena/humanitarian-response>.
10. Halvard Buhaug, “Climate Not to Blame for African Civil Wars,” *Proceedings of the National Academy of Sciences (PNAS)* 107, no. 38 (2010): 16477–82; Nils Petter Gleditsch, “Whither the Weather? Climate Change and Conflict,” *Journal of Peace Research* 49, no. 1 (2012): 3–9; Solomon M. Hsiang, Marshall Burke, and Edward Miguel, “Quantifying the Influence of Climate on Human Conflict,” *Science* 341, no. 6151 (2013): 1212.
11. Simon Dalby, “Anthropocene Formations: Environmental Security, Geopolitics and Disaster,” *Theory, Culture & Society* 34, no. 2–3 (2017): 240.
12. White House, “Fact Sheet: President Biden Announces New Initiatives at COP27 to Strengthen U.S. Leadership in Tackling Climate Change,” November 11, 2022, <http://whitehouse.gov/briefing-room/statements-releases/2022/11/11/fact-sheet-president-biden-announces-new-initiatives-at-cop27-to-strengthen-u-s-leadership-in-tackling-climate-change>; U.S. Mission to the United Nations, “Remarks by John Kerry, U.S. Special Presidential Envoy for Climate, at a UN Security Council High-Level Open Debate on Climate, Peace, and Security,” June 13, 2023, <http://usun.usmission.gov/remarks-by-john-kerry-u-s-special-presidential-envoy-for-climate-at-a-un-security-council-high-level-open-debate-on-climate-peace-and-security>.
13. Edmund Burke and Diana K. Davis, *Environmental Imaginaries of the Middle East and North Africa* (Athens: Ohio University Press, 2011); Harry Verhoeven, ed., *Environmental Politics in the Middle East* (New York: Oxford University Press, 2018).
14. Kelly M. Greenhill, *Weapons of Mass Migration: Forced Displacement, Coercion, and Foreign Policy* (Ithaca, NY: Cornell University Press, 2010); Susan Forbes Martin and John Tirman, eds., *Women, Migration, and Conflict: Breaking a Deadly Cycle* (Dordrecht, Netherlands: Springer, 2009); Edward Newman and Joanne van Selm, *Refugees and Forced Displacement: International Security, Human Vulnerability, and the State* (Tokyo: United Nations University Press, 2003).
15. Marwa Daoudy, Jeannie L. Sowers, and Erika Weinthal, “What Is Climate Security? Framing Risks Around Water, Food, and Migration in the Middle East and North Africa,” *Wiley Interdisciplinary Reviews: Water* 9 no. 3, (2022), 3–5.
16. Marwa Daoudy, *The Origins of the Syrian Conflict: Climate Change and Human Security* (Cambridge: Cambridge University Press, 2020), 5.
17. Giorgos Zittis et al., “Climate Change and Weather Extremes in the Eastern Mediterranean and Middle East,” *Reviews of Geophysics* 60, no. 3 (2022): 10.
18. Zittis et al., “Climate Change and Weather Extremes.”
19. Christoph Duenwald et al., “Feeling the Heat: Adapting to Climate Change in the Middle East and Central Asia,” International Monetary Fund, March 30, 2022, <http://imf.org/en/Publications/Departmental-Papers-Policy-Papers/Issues/2022/03/25/Feeling-the-Heat-Adapting-to-Climate-Change-in-the-Middle-East-and-Central-Asia-464856>.

20. Josie Garthwaite, "The Effects of Climate Change on Water Shortages," *Stanford Earth Matters*, March 22, 2019, <http://news.stanford.edu/2019/03/22/effects-climate-change-water-shortages>.
21. Pörtner and Alegria, "Annex I," 14.
22. Duenwald, *Feeling the Heat*, 17.
23. Notre Dame Global Adaptation Initiative, "ND-GAIN Country Index Country Rankings," University of Notre Dame, accessed April 18, 2023, <http://gain.nd.edu/our-work/country-index/rankings>.
24. Daoudy, *Origins of the Syrian Conflict*, 186–87.
25. Daoudy, *Origins of the Syrian Conflict*, 186–87.
26. Daoudy, *Origins of the Syrian Conflict*, 71.
27. Christiane J. Fröhlich, "Climate Migrants as Protestors? Dispelling Misconceptions About Global Environmental Change in Pre-revolutionary Syria," *Contemporary Levant* 1, no. 1 (2016): 38–50.
28. Francesca De Châtel, "The Role of Drought and Climate Change in the Syrian Uprising: Untangling the Triggers of the Revolution," *Middle Eastern Studies* 50, no. 4 (2014): 521–35.
29. Oxfam, "Crisis in Sudan," October 9, 2014, 5, <http://oxfamamerica.org/explore/research-publications/crisis-in-sudan>; "Population, Total—Sudan" World Bank, 2019, <http://data.worldbank.org/indicator/SP.POP.TOTL?locations=SD>.
30. Chase Sovo, "Conflict and Famine: How They're Connected," World Food Program USA, November 30, 2017, <http://wfpusa.org/articles/conflict-and-famine>.
31. Alexander De Juan, "Long-Term Environmental Change and Geographical Patterns of Violence in Darfur, 2003–2005," *Political Geography* 45 (2015): 23.
32. Musa Abdul-Jalil and Jon D. Unruh, "Land Rights Under Stress in Darfur: A Volatile Dynamic of the Conflict," *War & Society* 32, no. 2 (2013): 169, 157.
33. Abdul-Jalil and Unruh, "Land Rights Under Stress," 169, 157.
34. Sameh W. Al-Muqdadati et al., "Dispute Over Water Resource Management—Iraq and Turkey," *Journal of Environmental Protection* 7, no. 8 (2016): 1097.
35. Lina Eklund and Darcy Thompson, "Differences in Resource Management Affects Drought Vulnerability Across the Borders Between Iraq, Syria, and Turkey," *Ecology and Society* 22, no. 4 (2017): 9.
36. Arda Bilgen, "Turkey's Southeastern Anatolia Project (GAP): A Qualitative Review of the Literature," *British Journal of Middle Eastern Studies* 47, no. 4 (2020): 653; Marwa Daoudy, "Asymmetric Power: Negotiating Water in the Euphrates and Tigris," *International Negotiation* 14, no. 2 (2009): 367.
37. Republic of Turkey, *What Is the GAP? Project Area Map*, Ministry of Industry and Technology, October 2022.
38. Republic of Turkey, *What Is the GAP?*

39. Republic of Turkey, *What Is the GAP?*; Patricia Wouters, "The Legal Response to International Water Scarcity and Water Conflicts: The UN Watercourses Convention and Beyond," *Allocating and Managing Water for a Sustainable Future: Lessons From Around the World*, conference proceedings, June 11–14, 2002, University of Colorado Law School, 25, <http://scholar.law.colorado.edu/allocating-and-managing-water-for-sustainable-future/2>.
40. Human Rights Watch, "Basra Is Thirsty: Iraq's Failure to Manage the Water Crisis," July 22, 2019, 12, [http://hrw.org/sites/default/files/report\\_pdf/iraq0719\\_web.pdf](http://hrw.org/sites/default/files/report_pdf/iraq0719_web.pdf).
41. Human Rights Watch, "Basra Is Thirsty."
42. Human Rights Watch, "Basra Is Thirsty."
43. Azhar Al-Rubaie, "Basra Protests Erupt as Power Cuts Hit Scorching Iraq," *Al Jazeera*, July 8, 2021, <http://aljazeera.com/news/2021/7/8/basra-protests-spread-a-power-cuts-hit-iraq-amid-scorching-heat>; Michael Mason, "Infrastructure Under Pressure: Water Management and State-Making in Southern Iraq," *Geoforum* 132 (2022): 52–61.
44. Annie Slemrod, "Türkiye-Syria Earthquake Strikes a Region Where Millions Already in Crisis," *New Humanitarian*, February 6, 2023, <http://thenewhumanitarian.org/news/2023/02/06/Turkiye-Syria-earthquake>.
45. Center for Disaster Philanthropy, "2023 Turkey-Syria Earthquake," updated September 22, 2023, <http://disasterphilanthropy.org/disasters/2023-turkey-syria-earthquake>.
46. Jemima Oakey, "Turkey's Earthquakes Raise Questions Over Dam Safety and Its Transboundary Implications," *Azure*, March 29, 2023, <http://azure-strategy.com/turkeys-earthquakes-raise-questions-over-dam-safety>.
47. Raziieh Namdar, Ezatollah Karami, and Marzieh Keshavarz, "Climate Change and Vulnerability: The Case of MENA Countries," *International Journal of Geo-Information* 10, no. 11 (2021): 794.
48. Namdar, Karami, and Keshavarz, "Climate Change and Vulnerability."
49. Henry Jonathan, Hesham Magd, and Aatadal Al Salhi, "Climate Smart Agriculture and Mitigation Techniques for Sustainable Resilient Farming in Middle East Region," *Global Business and Management Research* 14, no. 2s (2022): 12.
50. Satchit Balsari, Caleb Dresser, and Jennifer Leaning, "Climate Change, Migration, and Civil Strife," *Current Environmental Health Reports* 7, no. 4 (2020): 405.
51. Ahmed Jaad and Khaled Abdelghany, "The Story of Five MENA Cities: Urban Growth Prediction Modeling Using Remote Sensing and Video Analytics," *Cities: International Journal of Urban Policy and Planning* 118 (2021): 2266.
52. Peter Gleick, "Water as a Weapon and Casualty of Armed Conflict: A Review of Recent Water-Related Violence in Iraq, Syria, and Yemen," *WIREs Water* 6, no. 4 (2019).
53. Marwa Daoudy, "Water Weaponization in the Syrian Conflict: Strategies of Domination and Cooperation," *International Affairs* 96, no. 5 (2020): 1353.
54. Matthew I. Weiss, "A Perfect Storm: The Causes and Consequences of Severe Water Scarcity, Institutional Breakdown and Conflict in Yemen," *Water International* 40, no. 2 (2015): 252.

55. Philipp O. Amour, "Contribution of Water Scarcity and Sustainability Failures to Disintegration and Conflict in the Arab Region: The Case of Syria and Yemen" in *The Regional Order in the Gulf Region and the Middle East: Regional Rivalries and Security Alliances* (Cham: Springer International Publishing AG, 2020), 391.
56. Weiss, "Perfect Storm," 252.
57. Amour, "Contribution of Water Scarcity and Sustainability Failures," 395.
58. Amour, "Contribution of Water Scarcity and Sustainability Failures," 391.
59. Margaret Suter, "An Update on Yemen's Water Crisis and the Weaponization of Water," Atlantic Council, November 29, 2018, <http://www.atlanticcouncil.org/blogs/menasource/an-update-on-yemen-s-water-crisis-and-the-weaponization-of-water>.
60. UN Office for the Coordination of Humanitarian Affairs, "Cholera Situation in Yemen, April 2021," accessed April 2023: <http://reliefweb.int/report/yemen/cholera-situation-yemen-april-2021>.
61. Karim Shami, "Tyranny on the Waters: The UAE-Israeli Occupation of Yemen's Socotra Island," *Cradle*, March 24, 2023, <http://thecradle.co/article-view/22904/tyranny-on-the-waters-the-uae-israeli-occupation-of-yemens-socotra-island>.
62. Paola Tamma, "Has the UAE Colonised Yemen's Socotra Island Paradise?," *New Arab*, May 17, 2017, <http://newarab.com/analysis/has-uae-colonised-yemens-socotra-island-paradise>.
63. Tamma, "Has the UAE Colonised Yemen's Socotra Island Paradise?"; World Heritage Outlook, "Socotra Archipelago," International Union for the Conservation of Nature, December 2, 2020, <http://worldheritageoutlook.iucn.org/explore-sites/wdpaid/903138>.
64. Bruce Riedel, "Saudi Arabia and the UAE Consolidating Strategic Positions in Yemen's East and Islands," Brookings Institution, May 28, 2021, <http://brookings.edu/blog/order-from-chaos/2021/05/28/saudi-arabia-and-the-uae-consolidating-strategic-positions-in-yemens-east-and-islands>.
65. Daoudy, "Water Weaponization in the Syrian Conflict," 1353.
66. Joseph Daher, "Water Scarcity, Mismanagement and Pollution in Syria," Middle East Directions Program, European University Institute, June 27, 2022, 12, <http://cadmus.eui.eu/bitstream/handle/1814/74678/QM-09-22-308-EN-N.pdf>.
67. Daoudy, "Water Weaponization in the Syrian Conflict," 1353.
68. Daoudy, "Water Weaponization," 1362; Marwa Daoudy, "Scorched Earth: Climate and Conflict in the Middle East," *Foreign Affairs*, March–April 2022, <http://www.foreignaffairs.com/articles/middle-east/2022-02-22/scorched-earth>.
69. Tobias von Lossow, "The Rebirth of Water as a Weapon: IS in Syria and Iraq," *International Spectator* 51, no. 3 (2016): 82–83.
70. Wilson Center, "Timeline: The Rise, Spread, and Fall of the Islamic State," October 28, 2019, <http://wilsoncenter.org/article/timeline-the-rise-spread-and-fall-the-islamic-state>.
71. Paola Andrea Spadaro, "Climate Change, Environmental Terrorism, Eco-Terrorism and Emerging Threats," *Journal of Strategic Security* 13, no. 4 (2020): 69.



72. Spadaro, "Climate Change, Environmental Terrorism, Eco-Terrorism and Emerging Threats," 69.
73. Spadaro, "Climate Change, Environmental Terrorism, Eco-Terrorism and Emerging Threats," 69.
74. Spadaro, "Climate Change, Environmental Terrorism, Eco-Terrorism and Emerging Threats," 69.
75. Daniela Sala, Bartholomäus von Laffert, and Shaveen Mohammad, "'Killing Us Slowly': Dams and Drought Choke Syria's Water Supply—in Pictures," *Guardian*, November 10, 2021, <http://theguardian.com/global-development/gallery/2021/nov/10/dams-and-drought-choke-syrias-water-supply-in-pictures>.
76. Elena Lazarou, "Water in the Israeli-Palestinian Conflict," European Parliamentary Research Service, January 2016, 1, [http://europarl.europa.eu/RegData/etudes/BRIE/2016/573916/EPRS\\_BRI%282016%29573916\\_EN.pdf](http://europarl.europa.eu/RegData/etudes/BRIE/2016/573916/EPRS_BRI%282016%29573916_EN.pdf).
77. Lazarou, "Water in the Israeli-Palestinian Conflict," 78.
78. B'Tselem (Israeli Information Center for Human Rights in the Occupied Territories), "Settlements," updated January 16, 2019, <http://btselem.org/settlements>.
79. UN OCHA, "How Dispossession Happens: The Takeover of Palestinian Water Springs by Israeli Settlers," March 19, 2012, 14, <http://ochaopt.org/content/how-dispossession-happens-takeover-palestinian-water-springs-israeli-settlers-march-2012>.
80. Michelle Rudolph and Rachel Kurian, "Hydro-Hegemony, Water Governance, and Water Security: Palestinians Under Israeli Occupation in the Jordan Valley, West Bank," *Water Alternatives* 15, no. 1 (2022): 73–74.
81. Rudolph and Kurian, "Hydro-Hegemony, Water Governance, and Water Security," 73–7.
82. UN High Commissioner for Human Rights, "The Allocation of Water Resources in the Occupied Palestinian Territory, Including East Jerusalem," Human Rights Council, September 23, 2021, [http://www.un.org/unispal/wp-content/uploads/2021/10/A.HRC\\_.48.43\\_230921.pdf](http://www.un.org/unispal/wp-content/uploads/2021/10/A.HRC_.48.43_230921.pdf).
83. UN OCHA, "Humanitarian Situation Report No. 2, April–June 2020," <http://humanitarianresponse.info/en/operations/occupied-palestinian-territory/document/humanitarian-situation-report-no-2-april-june>.
84. Adnan Al-Hindi, Amira Aker, and Wael K. Al-Delaimy, "The Destruction of Gaza's Infrastructure Is Exacerbating Environmental Health Impacts," *Environmental Epidemiology* 6, no. 1 (2022): 1.
85. Mohammed Seyam et al., "Investigation of the Influence of Excess Pumping on Ground-water Salinity in the Gaza Coastal Aquifer (Palestine) Using Three Predicted Future Scenarios," *Water* 12, no. 8 (2020): 2218.
86. Al-Hindi et al., "Destruction of Gaza's Infrastructure," 1.
87. Shira Efron et al., "The Public Health Impacts of Gaza's Water Crisis: Analysis and Policy Options" (Santa Monica, CA: RAND Corporation, 2018), [http://rand.org/pubs/research\\_reports/RR2515.html](http://rand.org/pubs/research_reports/RR2515.html).

88. White House, “Biden-Harris Administration’s National Security Strategy,” October 2022, <http://whitehouse.gov/wp-content/uploads/2022/10/Biden-Harris-Administrations-National-Security-Strategy-10.2022.pdf>.
89. National Intelligence Council, “Climate Change and International Responses Increasing Challenges to U.S. National Security Through 2040,” 2021, [http://dni.gov/files/ODNI/documents/assessments/NIE\\_Climate\\_Change\\_and\\_National\\_Security.pdf](http://dni.gov/files/ODNI/documents/assessments/NIE_Climate_Change_and_National_Security.pdf).
90. UN Department of Political and Peacebuilding Affairs, “Addressing the Impact of Climate Change on Peace and Security,” accessed April 18, 2023, <http://dppa.un.org/en/addressing-impact-of-climate-change-peace-and-security>.
91. UN Development Program, “Regional Snapshot: Arab States,” July 25, 2022, <http://climatepromise.undp.org/research-and-reports/undps-climate-promise-explainer>.
92. UNDP, “Regional Snapshot,” 6.
93. United Nations High Commissioner for Refugees, “Azrtateaq, the World’s First Refugee Camp Powered by Renewable Energy,” May 17, 2017, <http://www.unhcr.org/us/news/stories/azraq-worlds-first-refugee-camp-powered-renewable-energy>.
94. White House, “Fact Sheet: U.S.-UAE Partnership to Accelerate Transition to Clean Energy (PACE),” November 1, 2022, <http://whitehouse.gov/briefing-room/statements-releases/2022/11/01/fact-sheet-u-s-uae-partnership-to-accelerate-transition-to-clean-energy-pace>.
95. White House, “Fact Sheet: U.S.-UAE Partnership.”
96. UN Economic Commission for Europe, “The Water Convention and the Protocol on Water and Health,” accessed October 11, 2023, <http://unece.org/environment-policy/water>.
97. UNECE, “Water Convention.”
98. Karen Hulme and Elizabeth B. Hessami, “New Legal Protections for the Environment in Relation to Armed Conflict,” International Union for Conservation of Nature and Natural Resources, July 16, 2022, <http://iucn.org/story/202207/new-legal-protections-environment-relation-armed-conflict>.
99. Hulme and Hessami, “New Legal Protections.”

# *ACKNOWLEDGMENTS*

I would like to convey my sincere thanks to Paul Stares at the Council on Foreign Relations for extending the invitation to write a report on this important topic and to Natalie Caloca for her unfailing support. I also wish to extend my deep appreciation for the outstanding research support provided throughout the writing process by my graduate student and research assistant at Georgetown University, Molly Pasquarella.

## ABOUT THE AUTHOR

**Marwa Daoudy** is an associate professor of international relations at Georgetown University's School of Foreign Service. She is a nonresident scholar with the Malcolm H. Kerr Carnegie Middle East Center, where she leads the Climate Change, Conflict, and Governance Project. Prior to her time at Georgetown, Daoudy was a lecturer at Oxford University in the politics and international relations department, a fellow of Oxford's Middle East Center at St. Anthony's College, and a visiting scholar at Princeton University's School of Public and International Affairs. Daoudy is the author of two award-winning books, one on the politics of water between Iraq, Syria, and Turkey (Ernest Lémonon Award, 2005) and the other (her latest book) titled *The Origins of the Syrian Conflict: Climate Change and Human Security*, which was awarded the 2020 Harold and Margaret Sprout Award for the best book in environmental studies. In 2023, she was awarded a Wilson Center Fellowship to work on her new book, which reflects on the meaning and implications of climate vulnerability and security for populations in the Middle East and North Africa.

*Cover photo: A fisherman walks across a dry patch of land in the marshes of southern Iraq, which have suffered dire consequences from back-to-back droughts and rising salinity levels.*  
(Anmar Khalil/AP Photo)

Council on Foreign Relations  
*cfr.org*

58 East 68th Street  
New York, NY 10065  
tel 212.434.9400

1777 F Street, NW  
Washington, DC 20006  
tel 202.509.8400