THE RIGHT TO WATER AND CLIMATE CHANGE 2025 THE ARAB WATCH REPORT ON ECONOMIC AND SOCIAL RIGHTS

MISSING PUBLICS? THE POLITICS AND STATE OF CLIMATE ADAPTATION IN THE ARAB WORLD

Dina Zayed

Independent advisor and consultant

annd
Arab NGO Network for Development
شبكة المنظمات العربية غير الحكومية للتنمية

This report is published as part of the Arab NGO Network for Development's Arab Watch Report on Economic and Social Rights (AWR) series. The AWR is a periodic publication by the Network and each edition focuses on a specific right and on the national, regional and international policies and factors that lead to its violation. The AWR is developed through a participatory process which brings together relevant stakeholders, including civil society, experts in the field, academics, and representatives from the government in each of the countries represented in the report, as a means of increasing ownership among them and ensuring its localization and relevance to the context.

The seventh edition of the Arab Watch Report focuses on the right to water. It was developed to provide a comprehensive and critical analysis of the status of this right across the region, particularly in the context of climate change and its growing impacts. The information and analyses presented aim to serve as a platform for advocacy toward the realization of this fundamental right for all.

The views expressed in this publication are solely those of the author and do not necessarily reflect the positions of the Arab NGO Network for Development (ANND), Brot für die Welt, or Norwegian People's Aid.

The report is published by the **Arab NGO Network for Development** (ANND). It can be obtained from ANND or can be downloaded from the following website

http://www.annd.org

SUPPORTED BY

Brot für die Welt | Norwegian People's Aid

THE RIGHT TO WATER AND CLIMATE CHANGE 2025 THE ARAB WATCH REPORT ON ECONOMIC AND SOCIAL RIGHTS

MISSING PUBLICS? THE POLITICS AND STATE OF CLIMATE ADAPTATION IN THE ARAB WORLD

Dina Zayed
Independent advisor and consultant

Dr. Dina Zayed is an independent advisor and consultant with expertise in climate adaptation politics and finance, international development, global climate policy, and social and climat justice. An interdisciplinary social scientist, firmly rooted in understanding power relations and politics, Dr. Zayed is an Associate Fellow at the Carboun Institute. A participatory action researcher and practitioner, Dr. Zayed brings a career track record of bridging research, communications, grantmaking, partnerships, advocacy and programming and has worked across sectors focusing on social change and public participation, especially for climate resilience and equity in the Middle East and Africa. She is a former Programme Director with the Climate Emergency Collaboration Group (CECG), a philanthropic pooled fund, where she led CECG's work on climate impacts and resilience, as well as the organization's equity and inclusion strategy and grant making. She has previously worked and collaborated with a wide array of philanthropic, research, non-profit, and civil society groups, including the Institute of Development Studies (IDS), ODI Global, UNWomen, the International Development Research Centre, 350.org, the Global Alliance for Improved Nutrition, the CGIAR Research Program on Agriculture for Nutrition and Health, and the International Finance Corporation. Earlier in her career, she was a Reuters Correspondent, serving in the Egypt, Sudan and South Sudan Bureau and covering the historic political upheaval across the Arab region. From 2014, she subsequently wrote on sustainability issues and climate change for the Thomson Reuters Foundation. Dina holds a PhD from the Institute of Development Studies at the University of Sussex, an MSc in Environmental Change and Management from the University of Oxford, and a BA in Political Science from the American University in Cairo.

CONTENTS

01

INTRODUCTION

Rapid economic and demographic growth has transformed the Arab world in less than half a century. Accompanying this change is a sobering host of environmental issues that have crippled a predominantly arid region. Water scarcity, desertification, and land degradation are among the most pronounced challenges, with water shortages hamstringing nineteen of the twenty-two countries comprising the region. Climate change is already putting additional stress on the economies of the Middle East and North Africa (MENA), and, in a matter of a few decades, the lived impacts of accelerating global warming have become tangible. More than 40 percent of the Arab world's citizens have already been exposed to climate disasters and drought. Notable examples include Syria, where unprecedented drought conditions have decimated the livelihoods of 20 percent of the rural population, and Somalia, where close to 900,000 people were displaced between November 2016 and August 2017 (UNDP 2018). This is a region that is warming twice as fast as the global average and that, as a matter of existential policy, must reconcile with the implications of climate change for a population expected to double by 2070 (Borghesi and Ticci 2019).

The Intergovernmental Panel on Climate Change (IPCC) noted as early as 1992 that Western Arabia and the Maghreb were two of the five world regions "most vulnerable to the effects of climate change" and facing the "greatest risk in terms of serious threats to sustaining the population." Yet public awareness and policy responses across the region have been slower to emerge than elsewhere. A landmark 2009 Arab Forum for Environment and Development report argued that "virtually no work is being carried out to prepare Arab countries for climate change challenges. Specifically, no concerted data-gathering and research efforts could be traced regarding the impacts of climate change on health, infrastructure, biodiversity, tourism, water, and food production." This paper takes stock of the state of climate adaptation planning and policy in the region, relying on an integrative literature review to examine how far knowledge production on the Arab world's climate crisis has progressed since this appraisal.

On the frontlines of climate change, the Arab world is often depicted as soon to be "uninhabitable." We are frequently warned of a "daunting crisis" and "unquantifiable danger" (e.g., Joffé 2016; Kharraza et al. 2012; Gubash 2018). Underlying these discourses of calamity is a series of somber projections. Current 'business-as-usual' climate scenarios would expose half of the region's population to ultra-extreme, recurring heatwaves. In the second half of this century, temperatures of up to 56°C and higher may persist for several weeks at a time (Francis and Fonseca 2024). Under these same business-as-usual sce-

narios, average temperature increases in the MENA region are expected to reach up to 4°C (Gaub and Lienard 2021). But it is not just a hotter future – and indeed, present – that afflicts the region. Exposure to extreme and chronic water stress, high degrees of urbanization and rapid population growth, and unprecedented flash floods make for a complex and interconnected climate vulnerability matrix. Ongoing desertification threatens nearly a fifth of the region's total land area (Abahussain et al. 2002; AHDR 2009). The region has also observed noticeable declines in biodiversity, and shifting climate extremes are contributing to vector-borne illnesses that burden public health systems.

As has been highlighted extensively in this report, MENA is the world's most water-stressed region, with more than 60 percent of the population having unreliable and inconsistent access to potable water (Hindiyeh et al. 2023). Five of the world's 10 most drought-prone countries are found in the region (Maboudi and D'Amico 2025). In many parts of the region, dwindling water supplies are already the norm (Sowers, Vengosh, and Weinthal 2011). Some estimates also suggest that climate-related water scarcity will cost the region between 6 and 14 percent of national gross domestic product (GDP) by 2050 (Olawuyi 2022). The Arab region also receives rainfall far below the global average, with citizens having only one-eighth of the renewable water resources available to the average person worldwide. Given that only 5 percent of the region's land is arable, and that 40 percent of this land area requires irrigation, the Arab region's agriculture sector is highly exposed to a changing climate. As the largest employer in many Arab countries and a significant contributor to national economies, the risks facing the agricultural sector cannot be overstated. Precipitation changes and extreme weather events are expected to decrease agricultural output by at least 20 percent before the end of the century (Waha et al. 2017). Rising temperatures, extreme heatwaves, changing precipitation patterns, declining arable land, and reduced crop yields form a unified threat to food security in a region that already imports more than half of its bread. Today, the region imports more food per capita than any other region in the world.

But far from imposing homogeneous risks, the prospects for a climate-resilient future in the Arab world are defined by intrinsic inequality. The Arab world's population is expected to reach 646 million by 2050, and its urban population, which more than quadrupled from 1970 to 2010, is set to double again (UNDP 2018; Borghesi and Ticci 2019). None of this growth is evenly distributed. Urbanization rates in the region exceed the global average and outpace overall population growth rates. With regional conflicts intensifying and instability deepening, MENA also hosts the largest percentage of the world's refugees and internally displaced persons, who often concentrate in cities. Against this backdrop, flash flooding in cities across the region has virtually doubled in less than a decade, driven by more intense rainfall events and increasingly unregulated construction in low-lying areas and wadis (seasonal river valleys). In 14 of the region's countries, this scale of urbanization has exerted tremendous pressure on drainage and transport infrastructure (Namdar et al. 2021). Yet the impacts of these disasters on urban populations are falling disproportionately on the poorest and most marginalized communities. This, after all, is a region where the richest 10 percent hold 44 times more wealth than the poorest 40 percent (Marani 2024). Within national economies, figures such as the United Arab Emirates' GDP per capita of $44,315, compared with Yemen's $701,

are far from anomalous (Henderson 2023). Between and within nations, there are multiple experiences of climate change.

What we are left with, therefore, is an image of the stark intersecting vulnerabilities that characterize climate change risks in the Arab world. But how much social scientific understanding do we have of climate adaptation in the Arab world, especially given our empirical comprehension of the socio-political inequalities shaping the lived experiences of the region's inhabitants? How is climate change adaptation conditioned and shaped by political realities? This paper offers a review that synthesizes how climate change has been framed in the region. It finds that efforts to build adaptive capacity in the Arab world are significantly lagging, as is the research.

In a landmark global scoping review, Vincent and Cundill (2021) assessed the evolution of empirical climate adaptation research in the Global South. Among their most notable findings, and of particular relevance to this analysis, is a clear and overwhelming gap in research from the Middle East and North Africa. As the following sections will explore, there is a dearth of literature examining adaptation as a process in general. More problematic is the notable absence of work that assesses climate change as both a political and politicized space, in which vulnerability is constituted and reproduced by political and social systems. There are very few consistent and reliable records on climate patterns as they are lived and experienced by local communities. Much of the existing research base has also been shaped, funded, or led by major international development institutions, often using positivist scientific framings and relying on techno-managerial assumptions about how ecological and environmental issues can be managed (Zayed 2021). In the limited number of studies that bring political questions to the fore, the framing is routinely shaped around externalized risks and hazards. As will be highlighted in this review, the existence of "publics" interacting with and responding to climate change appears to be entirely overlooked in much of our nascent understanding of climate change in the region. A simple keyword search for terms such as "politics," "public," or even "people" is eerily absent from much of the literature reviewed for this analysis. Even when political processes and public mobilization are alluded to in agential terms, there is a significant lack of analysis of the intersecting nature of vulnerability in the region, and of how climate adaptation is shaped by governance realities and helps shape them in turn.

This paper will first unpack the region's climate vulnerability as it is laid out in the literature, taking a specific interest in the role climate change plays in shaping extreme weather events and sea-level-rise hazards, amplifying water insecurity, and increasing the frequency and severity of droughts. It will then offer a snapshot of the adaptation policy and legal landscape in the region before reviewing the research approaches shaping conversations on climate adaptation in the Arab world.

02

CYCLES OF VULNERABILITY, CHRONICLES OF SCARCITY?

The region is often characterized as energy-rich, yet the first part of the world to "run out of water" (Allan 2001). This paradoxical profile has shaped the research agenda and the body of evidence emerging from MENA. There is now little doubt that the Arab region is particularly vulnerable to the impacts of climate change. With current backtracking on global ambitions to tackle the climate crisis, this appears to be the start of a worsening trend. But as the following section will explore, this vulnerability is not borne equally, and a changing climate is certainly not experienced in uniform ways across the region. This section will unpack some dimensions of the Arab world's climate vulnerability, focusing on extreme heat; water scarcity and drought; and, finally, flooding and other forms of disaster exposure.

Arab countries hold more than 43 percent of the world's total proven oil reserves. With an average output of some 21.8 million barrels per day in 2024, the Arab world produces nearly a third of the world's oil supply, making the region the single most important supplier of crude oil (IEA 2024). In addition, spare capacity is concentrated in three Gulf Cooperation Council (GCC) states – Saudi Arabia, Kuwait, and the United Arab Emirates – with Saudi Arabia holding the bulk of the world's available spare capacity. As a byproduct of this fossil-fuel-shaped geopolitical order, the growth of CO emissions in the Middle East and North Africa was the third largest in the world between 1990 and 2004, and more than three times faster than the global average (Elasha 2010). The Arab world is more reliant on oil as a fuel source than any other region in the world and has subsequently been at the center of energy-transition contentions.

Yet the region is far from homogeneous, and the tremendous gap between oil-producing nations and those without oil must be emphasized. The Arab region contributes around 5 percent of global emissions. Yet it is home to one of the highest rates of fossil fuel subsidies in the world – at about 8.6 to 13.3 percent of GDP – driving high levels of energy consumption (Abudu, Wesseh, and Lin 2022; El-Katiri and Fattouh 2017). The region also has some of the highest per capita emissions, as well as the world's highest emissions intensity relative to GDP. Energy use per capita, particularly in hydrocarbon-exporting Arab countries, exceeds the world average by 600 percent. Six Gulf countries account for less than 11 percent of the region's population but emit 52 percent of the Arab world's carbon emissions (Ibid.). This emissions profile, however, looks very different in other parts of the Arab world. For instance, Egypt is responsible for just 0.68 percent of global

emissions, Algeria for 0.46 percent, Tunisia for 0.08 percent, and Morocco for 0.2 percent (El Nour 2023). Yet the menu of regional choices and trade-offs involved in reducing energy consumption and adapting to climate change is increasingly intertwined, and the impacts of a changing climate are already being felt.

People in the region are disproportionately suffering from extreme heat. Recent trends show that, in most areas, temperatures have already been increasing by about 0.2°C to 0.3°C per decade, with extreme heat events far outnumbering extreme cold events (Verner 2012). There is nearly unanimous evidence confirming temperature increases over the past four decades. A 2014 World Bank Turn Down the Heat study examines the impacts of warming under both 2°C and 4°C scenarios. In a 2°C hotter world, the annual number of days with high temperatures and thermal discomfort is expected to increase in some of the region's capital cities: from 4 to 62 days in Amman, 8 to 90 days in Baghdad, and 1 to 71 days in Damascus. The greatest increases are expected in Beirut and Riyadh, where the number of hot days is projected to reach 126 and 132 days per year, respectively. In a 4°C hotter world, the average number of hot days is projected to exceed 115 days per year in all these cities.[1] Under the 4°C scenario, unprecedented heat extremes could affect 70-80 percent of the land area in the Middle East and North Africa (World Bank 2014). These shifts are expected to be amplified by reductions in soil moisture resulting from decreased precipitation (Lorenz et al. 2010; Orlowsky and Seneviratne 2012). Focusing specifically on the Fertile Crescent, Kitoh et al. (2008) further propose that, by the end of the century, the area may lose its current form and disappear entirely. Temperature extremes under a 2°C average global warming scenario are projected for about 30 percent of summer months across the region (Waha et al. 2017). In some parts of MENA, summer temperatures may be up to 8°C warmer by the end of the century (cited in Ezzeldin, Adshead, and Smith 2023). Extreme temperatures also have implications for worsening air quality.

Closely mirroring these trends are impacts on water management and insecurity in the region. Reflecting the focus of this Arab Watch Report, a significant share of the literature produced in the last decade offers important analysis and synthesis of climate change projections for water resources in the region. The Intergovernmental Panel on Climate Change (IPCC) predicts that annual rainfall is likely to decrease in much of Mediterranean Africa and the Northern Sahara, with decreases more likely nearer the Mediterranean coast (IPCC 2007). Forootan et al. (2016) trace water storage patterns, confirming a documented trend of declining terrestrial water storage across the Middle East (Voss et al. 2013; Awange et al. 2014). In a global assessment of water consumption patterns and scarcity, Kummu et al. (2016) demonstrate that water consumption per capita has declined sharply in the Middle East since the 1960s, alongside an exponential growth in the number of people living under conditions of water shortage or high water stress. Johannsen et al. (2016) add to a growing and cohesive body of evidence documenting a decline in water reservoirs and resources across the entire region. Chenoweth et al. (2011) document likely precipitation declines of about 10 percent by both the middle and the end of the century. Climate models also project less predictability and a drop in water runoff of 20 to 30 percent in most MENA

[1] The World Bank analysis draws on the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) Working Group reports released in 2013 and 2014, as well as peer-reviewed literature published after the AR5 cutoff dates.

countries by 2050 (Milly et al. 2005). As established elsewhere in this report, the Arab region faces unprecedented water scarcity. By 2030, water availability per capita is expected to fall below the absolute water poverty line.

Throughout this literature, we see expert recommendations for more efficient water use, changes in cropping patterns, and the adoption of water-saving techniques, as well as the integration of participatory governance tools. McDonnell et al. (2014) discuss regional capacity-building and bridging the science-policy gap by allowing researchers access to data to support better water management practices.

Between these two trends of declining water availability and higher temperatures, there is a swelling risk of drought. Drought frequency has increased over the last 20 years in countries such as Morocco, Tunisia, Algeria, and Syria. In Morocco, the rate shifted from an average of one drought year in every five-year period before 1990 to one drought year in every two-year period (Mougou and Mansour 2005). Of the 22 drought years in the 20th century, 10 occurred during the last three decades, including three successive dry years in 1999, 2000, and 2001. North African countries (notably Morocco, Algeria, and Tunisia), as well as others in the Arab world, are consistently projected to become global drought hotspots by the end of the 21st century (Haas 2002; Orlowsky and Seneviratne 2012). Hoerling et al. (2012), looking at the frequency of winter droughts in the Mediterranean, find that 10 of the 12 driest winters since 1902 occurred in the past 20 years. Prudhomme et al. (2013) report an increase of more than 50 percent in the number of drought days around the Mediterranean by the end of the 21st century (2070-2099), relative to the 1976-2005 period. For the same region, Orlowsky and Seneviratne (2012) project an average of more than six months of drought per year. While regional drought projections suffer from major model uncertainties – not least because of topographic variation and the high degree of dependency on baseline periods – a projection of extreme drought conditions around the Mediterranean, North Africa, and the Middle East is consistent across a variety of studies. Indeed, many of these manifestations have already been experienced (IPCC 2012; Evans 2009). Increasing drought conditions also affect other systems, including the accumulation of desert dust, which in turn has public health consequences. Even under current conditions, dust storm events are associated with increased risks of hospital admission for respiratory and cardiovascular events, as well as risks of diseases linked to exposure to airborne human pathogens (Akpinar-Elci et al. 2021).

Droughts, of course, affect rain-fed agricultural production as well as water supply for domestic, industrial, and agricultural purposes. Agriculture accounts for about 85 percent of water withdrawals across the region. As previously mentioned, surging populations and harsh environmental conditions have meant that the region effectively imports more food than it grows, buying abroad half or more of the calories its citizens consume. This has eased agricultural pressure on dwindling water resources but has also left the region vulnerable to global price fluctuations in staple crops. An example of such vulnerability was so starkly manifested after the 2007-2008 global food crisis, when a 30 percent hike in prices reportedly resulted in a 12 percent increase in poverty rates in Egypt (Michel and Yacoubian 2013). Yet food self-sufficiency at country and sub-regional levels varies widely: Qatar imports virtually all of its food needs (98 percent), compared with Morocco's 14

percent (Wellesley 2019). This dependence on food imports further exacerbates risk across the region, as deteriorating rural livelihoods are seen to contribute to internal and external migration. In turn, internal migration adds further pressure to already poorly serviced urban infrastructure.

It is within this web of relationships that there is also evidence suggesting a link to increased flash flooding across the region, and to heightened sensitivity to climate-induced disasters. The number of people affected by flash floods has doubled over the last ten years because of more intense rainfall, alongside inadequate infrastructure, such as blocked drainage systems or concrete surfaces that do not absorb water (Verner 2012). With a significant share of the region's population and economic activity concentrated in urban coastal areas, 7 percent of MENA's population lives less than five meters above sea level, and up to 100 million people could be exposed to coastal flooding by 2030 (Borghesi and Ticci 2021; Waha et al. 2017). A staggering 75 percent of buildings and infrastructure in the region are considered at risk from sea-level rise, storm surges, and temperature increases (Göll 2017). The International Monetary Fund (IMF) estimated that an average of $2 billion a year in direct material damages is attributable to these disasters, affecting over seven million of the region's citizens each year (cited in Daoudy 2023). Cumulatively, climate disasters have already affected more than 50 million people in the Arab region. Financial calculations of the cost of these events are likely an underestimation, as reporting covers only 17 percent of disasters and rarely captures the suffering that follows the loss of lives and livelihoods (Verner 2012).

In conclusion, there have been advances in empirically documenting the impacts of climate change on the Arab world and in refining scientific models for greater accuracy and predictability. The resulting picture shows a region that is deeply vulnerable and already feeling the brunt of a warming planet. Ambitious adaptation policy and programming in this context cannot be an afterthought. For a country like Egypt, the IPCC's Sixth Assessment Report already reports an accumulated loss of 11-12 percent of GDP per capita due to climate change between 1990 and 2010 (Eladawy 2025). Even with radical emissions cuts, and if the Paris Agreement were to successfully meet its 1.5°C target, child mortality in Egypt is expected to rise by approximately 2.3 percent by 2050 (Robinson and Dasgupta 2022). These examples indicate the urgency that should be shaping the climate conversation in the region. Yet what seems clear from this review is that there are still considerable gaps in our understanding of how climate impacts feed back into one another and, more crucially, how they may be inspiring adaptive policy responses – a question this paper turns to next.

03

TACKLING CLIMATE CHANGE ADAPTATION

To prevent rollbacks in human development in the Arab world and to secure development gains, climate change needs to be prioritized across the region. All countries in the region, except Yemen and Libya, have submitted their first and second Nationally Determined Contributions (NDCs), which are critical to the Paris Agreement and effectively serve as national climate plans. The NDCs appear to reflect deeper regional awareness of the urgency of climate change (Oxfam 2025). However, beyond reporting to the United Nations Framework Convention on Climate Change (UNFCCC), most countries in the region have yet to design comprehensive and well-integrated national plans. The following overview focuses mainly on the existence of national adaptation plans across the region. It is also worth noting, nonetheless, that several countries have developed ambitious renewable energy targets and net-zero plans.

Yet despite significant advances in renewable energy, many countries in the region have not substantially replaced fossil fuel production with renewable sources. Instead, they have increased overall energy consumption (Abudu, Wesseh, and Lin 2022). Several Gulf economies, for instance, have adopted ambitious climate targets, including Saudi Arabia's pledge to reach net zero by 2060. However, as Henderson (2023) and others have argued, some of these economies are expanding renewable energy infrastructure while maintaining a political economy of dominance within the region. They are also expending tremendous resources in North Africa, for example, on agricultural and other infrastructure programs that do little to fundamentally transform communities' adaptive capacities and that often shift the locus of emissions. For critics, Gulf investment in agrarian commodities and natural resources in other parts of the Arab world is largely driven by a need for fiscal sustainability, rather than a commitment to the changes required for truly transformative adaptation pathways (Henderson 2023).

Far from homogeneous, the region's capacity to weather a changing climate is conditioned by a range of political economy choices, and adaptation possibilities are deeply divergent. It would be misleading to assume that the region's citizens face equal fates. To confront nutrient deficits and agricultural needs, for example, Gulf states have heavily invested in grain storage infrastructure, often far outstripping the capacities of poorer Arab economies. To illustrate this point, Saudi Arabia's storage capacity, serving a population of 35 million, is around 3.4 million tons. Egypt, by contrast, has a similar 3.4 million tons of storage capacity but a population exceeding 100 million (Henderson 2023). The same can be said about the region's capacity to manage water scarcity, with 65 percent of the world's desalination plants found in the

Gulf. The ability of countries such as Kuwait or Qatar to navigate extreme water scarcity is fundamentally distinct from that of Iraq or Jordan (Abdel Hamid 2009). In this context, the routine description of an "oil-rich" and "water-poor" Arab world erases significant variation between and within countries. As Jeannie Sowers (2014) puts it, this framing overlooks critical questions of who gets access to energy and water, and how. As Sowers (2014) argues, what does it mean for Qatar, reported to be the second most water-stressed country in the world, to simultaneously have the third highest GDP per capita in the world? Alternatively, how can we comprehend the trade-offs involved in reducing emissions when higher energy consumption may be required as an adaptation solution to extreme heat? Up to 70 percent of the Gulf's peak electricity consumption is used for air conditioning. As the number of cooling units increases across the region due to rising temperatures and population growth, this is unlikely to remain an exception (Al-Sarihi 2025).

Notwithstanding, what appears clear across the board is that the evolution of policy responses does not match the level of vulnerability felt across the Arab world. As one illustration, legislation and public-interest responses have generally lagged behind the global average. In Maboudi and D'Amico's (2025) review, which covers the period from 1992 to 2021, they found that only 132 climate-related laws, regulations, and policies were adopted across the region's 22 countries. Each country passed an average of six national climate change laws – that is, around half the global average (Maboudi and D'Amico 2025). Within this picture, there are, of course, numerous nuances. Morocco leads the region, having enacted 11 distinct climate laws, in contrast to Kuwait's single climate policy over the same period. More revealingly, less than a third of these laws or policies are adaptation-specific, with most focusing on mitigation (Ibid.). As another metric, the effectiveness of the Paris Agreement in the region has received little attention, as has broader assessment of the efficacy of policy interventions, though emerging literature is beginning to explore these questions (Abudu, Wesseh, and Lin 2022). In another helpful review, Waterbury (2013) explores the political economy of climate change in the region, pointing to evidence over past decades suggesting that inaction, rather than action, has been the norm in responding to climate risks. Weak accountability mechanisms may also mean that authorities are unwilling to take unpopular measures to support climate adaptation (Namdar, Karami, and Keshavarz 2021). At times, this is also a problem of public outreach. Al Kurdi (2021) reviews academic material, government studies, and international reports from 2002 to 2020 to examine disaster risk planning and emergency management approaches in the region. The review finds that even in a country like Egypt, which is well versed in disaster recovery, there is little in terms of published instructions to help members of the public prepare for an emergency.

By and large, much of the adaptation response in the region has been piecemeal and technically heavy, with a dominant focus on infrastructure – for example, the development of expensive facilities, investment in large-scale coastal protection programs, or the reallocation of water resources away from agriculture as a key tactic. As Sowers et al. (2010) and Schilling et al. (2020), among others, show, comprehensive adaptive governance strategies appear to be a lower priority for political leaders in the region. This is the case even though the regional focus on climate change, following the hosting of the annual Conference of the Parties (COP) in

2022 and 2023, appears to have nudged the climate agenda further into view. Yet, in material terms, adaptation efforts have been relatively small-scale, fragmented, and largely focused on the supply side (Saghir 2021). Comparably, programs and policies that address the interdependence of climate vulnerability across urban-rural divides and the water-energy-food nexus, and that adopt biodiversity-cognizant ecosystem approaches, are still in their infancy (Saghir 2021). Similarly, approaches that systematically coordinate between central governments and local authorities remain deeply underdeveloped. If, for instance, one looks specifically at the water sector, existing institutions governing water allocation and decisions on how to adapt the sector across competing needs are deeply centralized and highly technocratic. They are also very rarely set up with participatory and collaborative decision-making mechanisms that would support the effective resolution of community conflicts over water use and service trade-offs (De Waal et al. 2023).

More generally, fewer resources have been directed toward participatory formulations of climate adaptation, given the nature of the region's regimes, with top-down governance modalities and restrictive civic space characterizing much of MENA. Oxfam International explores early indicators for the development of the region's third iteration of NDCs, finding a pattern in which frontline communities and civil society groups are routinely left out of, or inconsistently included in, deliberative spaces for designing national climate plans (Oxfam 2025). Underlying this imbalance is a general underarticulation of the "political" in climate strategies. Most of the region's submissions to the UNFCCC offer vague nods to socio-political realities but rarely include analysis of the structural dimensions shaping climate vulnerability, focusing narrowly on biophysical framings of climate impacts (Zayed 2021).

As already touched upon, the macroeconomic capacity of countries to adapt to climate change varies across the region. For the least developed Arab countries, many of which face acute conditions of chronic and protracted conflict, not only are they the most sensitive to changing climatic conditions, but they are also the least able to mobilize resources. While this paper does not focus on the state of climate finance in the region, as that merits its own analysis, it should be noted that, despite the region's unquestionable vulnerabilities, it receives one of the lowest shares of climate finance in the world. MENA received around $2 billion, roughly equivalent to 1 percent of global mobilized funds (Issa 2024; Atef 2022; Mahmoud 2023). More crucially, most of the limited funding directed toward climate action covers mitigation projects, with estimates suggesting that cumulative funding from multilateral climate funds for adaptation projects in MENA does not exceed 35 percent of mitigation financing (Watson, Schalatek, and Evéquoz 2025). Taking bilateral, regional, and other flows into consideration, financing for mitigation exceeds finance for adaptation by a factor of 5 to 1 (ESCWA 2019). Funding is also highly concentrated, with the two top recipients being Morocco and Egypt (Saab and Sadik 2018). By contrast, the region's least developed countries, including Somalia, Djibouti, Sudan, and Yemen, receive a meagre 4.3 percent of already minuscule climate finance flows to the region (cited in Ezzeldin, Adshead, and Smith 2023).

Most funding to the region has also come in the form of loans and concessional loans, with just $775 million provided in grants (Watson, Schalatek, and Evéquoz 2025). In its simplest terms, this creates a structural

disincentive for adaptation programming, as the region's vulnerabilities are unfolding within a broader context of overwhelming external debt. MENA's external debt climbed to $443 billion last year, as low- and middle-income countries more widely spent a record $1.4 trillion on servicing foreign debt. For the region, this constitutes a 23 percent increase since 2020, according to the World Bank's International Debt Report (2024). This increase has outpaced the global trend, under which total external debt owed by all low- and middle-income countries reached $8.8 trillion. For poorer and more fragile economies in the Arab world, the financial requirements of climate adaptation therefore confront an increasingly debt-constrained fiscal context, in which current expenditure on basic social and health infrastructure must be weighed against the cost of external debt servicing. Oil-importing countries in the region already have debt-to-GDP ratios almost three times higher than those of oil-exporting countries (Gatti et al. 2024). Many of MENA's poorest and most fragile countries are also spending as much as five times more on debt servicing than on health expenditure, with their capacity to invest in resilience severely constrained (Giovanis and Ozdamar 2022).

In conclusion, despite the region's interdependent and increasingly multifaceted climate vulnerabilities, climate adaptation policy responses continue to fall short of the scale of the problem, even though significant efforts have been made to change this equation. Yet the lion's share of work has focused on large-scale infrastructure projects, with programs on inclusion and the governance of adaptation lagging significantly behind. This is largely because resources for climate adaptation are characterized by uneven flows and intrinsic inequality across and within the region. This landscape therefore requires strong commitments to research and knowledge production to bring rights-based questions of equity and inclusion to the fore. This will be the focus of the following section.

04

WHOSE KNOWLEDGE? POLITICS, AGENCY, AND PUBLIC CHOICE(S)

Drawing on the research questions outliThis review has so far discussed the diagnosis of climate risk in the region, and has also offered a broad overview of the policy landscape shaping adaptation responses. What appears clear throughout the literature is that there are a few observable gaps that merit attention. First, several of the works reviewed for this analysis frequently emphasize poor monitoring across the region, with gaps in meteorological and hydrological information. As previously touched upon, the Arab region encompasses numerous climatic zones, and different sub-regions will likely respond to and experience climate change in diverse ways. More centrally, to accurately understand the prospects and state of climate adaptation in the region, we need social science research framed around questions of access, equity, and power, and that rigorously documents empirical and agential responses to the climate crisis.

Yet there appears to be an unquestionable comparative dearth of social science work on the climate crisis, even though analogous and relatively cohesive bodies of scholarship on environmental politics offer instructive parallels. Dedicated work on climate change in the region notably lags. A bibliometric analysis by Zyoud and Fuchs-Hanusch (2020) identifies just 2,074 documents from the Arab world, constituting less than 1.2 percent of total global research output across disciplines. Interestingly, Saudi Arabia holds the leading position in terms of the number of publications produced. Eladawy's (2025) subsequent analysis of 25,899 publications from the Web of Science database shows that just over 12 percent of studies on climate change in Africa and the MENA region originate from within those regions themselves. Just four African countries – and none from the Middle East – feature among the top 20 countries in international collaborative efforts. These stark gaps are not only indicative of the underdevelopment of knowledge production in the region; they also suggest that research agendas rarely integrate local voices, thereby diminishing regional expertise and isolating it from international collaborations. The research environment is further characterized by insufficient primary data collection and compromised information-sharing cultures, with a disproportionate focus on global rather than local issues (Eladawy 2025).

The comparative absence of MENA scholarship in the global climate conversation extends to several sectoral issues, including a lag in archaeological research examining the impacts of rising sea lev-

els and shifting climate realities on the region's important heritage sites (Westley et al. 2021). Similarly, while the global literature on the complex relationship between social vulnerability and climate change is a growing and evolving field, this relationship remains particularly understudied in the Arab region. Pre-existing conditions such as poverty, unemployment, access to public services, and structural inequality are rarely examined in depth to understand how communities' exposure, sensitivity, and adaptive capacities are shaped. This is especially concerning given the region's systematic underinvestment in social protection infrastructure: only 39.5 percent of the region's citizens are covered by effective social protection programs, which is below the global average (Arab Water Council/World Food Programme 2022). There are a few important exceptions, including a 2022 study by the World Food Programme and the Arab Water Council in Jordan that examines drought and how it intersects with other social vulnerabilities.

The interplay of conflict and climate change is a central theme in the social science literature on the region. A substantive share of the limited specialized work that does exist routinely conceptualizes climate change in biophysical terms, treating it as a threat that played a role within a chain of "complex causality" triggering mass protests and bearing some responsibility for conflicts such as the Syrian uprising (Johnstone and Mazo 2011; Werrell et al. 2013; Sternberg 2012). In this narrative, climate-induced global food price shocks are proposed to be particularly severe in a region that includes nine of the world's 10 largest per capita wheat importers. Seven of these countries experienced protests during what became known as the Arab Spring (Sternberg 2012). Despite gaining traction in high-level international policy circles, these claims have been supported by limited consistent evidence. They have also been critiqued for overlooking how environmental scarcities are shaped by governance failures (Selby and Tadros 2016; Turhan 2017).

These narratives have also informed a large body of research seeking to empirically unpack these claims and respond to them. Several works now argue that such claims have been problematically tenuous and, as Barnes (2018) puts it, "simplifying and depoliticizing" by distorting the "allocation of responsibility," thus erasing significant nuance in the attempt to demonstrate the urgency of climate change. Kim and Garcia Esade-Ramon (2023) systematically review literature that directly or indirectly links climate change with conflict from 1989 to 2022. They find that the relationship between the two, despite growing popularization, is far from uniform, and that there is a clear need to avoid what they describe as "oversimplified assumptions." How climate change contributes to conflict risk is mediated by a range of factors, from institutional weakness and political-economic conditions to elite competition. Akther and Alam (2020) further reinforce this conclusion, showing that triggers of war, migration, and violence are rooted in a myriad of other empirical and often governance-related conditions, with climate change exploited as another vehicle for instability. This proposition is also supported by Ide et al. (2021), Weiss (2015), and Mason (2019), among others. As Marwa Daoudy has put it elsewhere, portraying governments in the region as passive victims overlooks their agentive and political role and diffuses their accountability for shaping and sustaining policies that produce and reproduce conditions of vulnerability (Daoudy

2023).

Work outside that securitized spectrum is limited. Indeed, a scarcity of social science engagement with climate adaptation can, in some ways, be expected, given that environmental research – especially work that engages questions of authority – occupies a relatively marginal position in regional socio-political scholarship across the Arab world. An exception, as Verhoeven (2018) notes, is scholarship on rentierism and oil and water resources. Arab ecologies have long been depicted as "desolate" or "empty and parched" and, through a history of colonial imagery, cast as ecologically marginal, almost devoid of citizens shaping their own narratives of environmental change (David and Burke III 2011). These colonial narratives have also been systematically exploited by various powers to justify mass surveillance technologies and to institute radical ecological landscape changes (see Verhoeven 2018). Emerging scholarship across the region is beginning to address some of these gaps, and important work on the politics of the energy transition in particular is beginning to emerge (Hamouchene and Sandwell 2023; Popperl 2018; Barnes 2017; Mason et al. 2011; Farmer and Barnes 2018; Malm 2013).

Further, important and emerging analyses on the role of civil movements and mobilization are beginning to disrupt the erasure of publics interacting with complex, highly fluid, and deeply dynamic backdrops. Environmental breakdown and conflict may erode traditional knowledge and practices in some parts of the region, even while simultaneously reviving tactics of survival in hardship in others (Boulos 2025). Highly informal and community-driven participatory approaches are on display in many local settings and are also cross-pollinating to other locations, suggesting that they deserve credible and consistent external support to strengthen social capital across the region (Ibid.). It is worth noting that what is signified as "climate change"-related or "adaptive" in nature encompasses a wide range of social and political mobilization efforts. To keep the scope of this analysis contained, emerging work on contentious environmental mobilization in the region has not been included in this review. However, it is undoubtedly relevant. While the focus of some of these studies is not explicitly on "climate adaptation governance," if mobilization revolves around core questions of how natural resources are managed, there is little conceptual reason not to analyze these cases for the insights they offer. As Vizoso (2025) and others have begun to explore, there have been at least 239 cases across 21 Arab countries involving explicit socio-environmental claims, and the true number of mobilizations is likely much higher. The Moroccan Institute for Policy Analysis's (2025) work on Figuig, a southeastern oasis city grappling with a history of marginalization and water scarcity, and Domalain's (2023) and Khalaf and Vizoso's (2024) exploration of civil society infrastructure in Iraq offer helpful context on civil society's ability to engage on rights-based issues under conditions of environmental change.

In that vein, work on public opinion and perceptions of climate change in the region is scarce, but there are important indicators suggesting that climate change is an increasing priority for citizens across the region. Yasmina Abouzzohour (2025) examines results from the Arab Barometer survey of over 13,000 respondents in Tunisia, Mauritania, Morocco, Lebanon, Palestine, Jordan, Iraq, and Kuwait, as well as a Euromed survey of professionals in eight MENA countries. She finds that an over-

whelming majority view climate change as a "serious national security threat," with water emerging as the primary concern. There is also some, although limited, cross-comparative evidence engaging these questions systematically across the region (Eskjær 2017; Zayed 2022; Salem et al. 2022; Ashour 2025).

In summary, there is still much more work to be done, despite the fact that the social science literature on climate change has grown, at the very least reflecting more nuanced engagement with the agency of political actors across the Arab world, and helping to problematize linear narratives of conflict and environmental determinism. In particular, further research is needed to explore the lived nature of environmental change and how it intersects with attendant political structures. Moreover, work that explicitly engages with climate adaptation, and that links regional analysis to the broader global literature, remains palpably underdeveloped. The Arab world, despite its climate vulnerability and the complexity of its governance choices, remains underrepresented in global climate change research agendas.

05

CONCLUSION: BRINGING IN POLITICS

The Arab region is one of the world's most climate-vulnerable hotspots, and as this integrative review of the literature has shown, climate change is already disproportionately affecting the region and its citizens' lives and livelihoods. Extreme weather events, amplified water insecurity, and increased droughts and flash flooding are now realities that governments across the region must contend with.

Yet, in assessing the policy, research, and knowledge landscape on climate change adaptation in the Middle East and North Africa, it is clear that the region lags in formulating cohesive, comprehensive, and integrated national and regional strategies to cope with the climate crisis. The policy environment, inequities in funding flows, and patterns of research production on the region continue to underinvest in meaningful and material engagement with the role of ordinary citizens and civil society in managing climate change, as well as with a broader host of political actors. The important strides made in documenting the scale of the region's vulnerability are welcome. However, we must also caution against framings of "scarcity" and "crisis" that do not reckon with the governance choices that shape and reproduce climate vulnerability. Civil society across the region, and rights-committed actors more broadly, must be clear-eyed that long-standing approaches to water and environmental scarcities – approaches that have superficially and narrowly overlooked political questions of allocation and access – cannot be reproduced in how we engage with climate change.

For the region to adapt, it must prioritize programs and policies that help its citizens achieve greater autonomy over their futures and lives, end dependency, and reduce poverty (El Nour 2023). It is also clear that climate adaptation in the region cannot be discussed in fragments or through a narrow sectoral focus. A holistic, systems-based perspective that engages with the myriad feedback loops and interconnected vulnerabilities visible in the region must be prioritized, and current research gaps in analyzing these connections must be closed. More centrally, the lack of work that empirically engages with the role of publics in constructing and resisting narratives of climate crisis merits urgent attention. In this review, a simple keyword search for the term "public" yielded little to no results. We have an obligation to overturn this picture and, as the region continues to experience more aggressive and accelerating climate impacts, to center an ethos of equity, justice, and opportunity. Quite simply, there is no way to seriously tackle climate change in the region if we intentionally, or by omission, conceptualize it as devoid of citizens.

REFERENCES

- Abahussain, A., Abdu, A., Al Zubari, W., ElDin, N. A., and Abdelrahim, M. (2002) Desertification in the Arab Region: Analysis of Current Status and Trends. Journal of Arid Environments 51(4): 521-545.
- Abdel Hamid, M. A. R. (2009) Climate Change in the Arab World: Troubled Waters. In: Climate Change, Hydropolitics, and Transboundary Resources. Washington, DC: Stimson Center.
- Abouzzohour, Y. (2025) Bridging Public Opinion and Stakeholder Perspectives on Climate Change in the Middle East and North Africa. Qualitative Analysis: 100-109.
- Abudu, H., Wesseh, P. K., and Lin, B. (2022) Climate Pledges versus Commitment: Are Policy Actions of Middle East and North African Countries Consistent with Their Emissions Targets? Advances in Climate Change Research 13(4): 612-621.
- Ahmed, A., et al. (2021) The Impacts of Climate Change on Displaced Populations: A Call for Action. The Journal of Climate Change and Health 3: 100057.
- Akpinar-Elci, M., Berumen-Flucker, B., Bayram, H., and Al-Taiar, A. (2021) Climate Change, Dust Storms, Vulnerable Populations, and Health in the Middle East: A Review. Journal of Environmental Health 84(3): 8-15.
- Akther, S., and Alam, G. M. (2020) Climate Change Causing Political Instability in the Middle East Region: A Critical Analysis. Society and Change XIV(2): 75-91.
- Al Kurdi, O. (2021) A Critical Comparative Review of Emergency and Disaster Management in the Arab World. Journal of Business and Socio-Economic Development 1(10): 24-46.
- Alatout, S. (2008) States of Scarcity: Water, Space, and Identity Politics in Israel, 1948-59. Environment and Planning D: Society and Space 26: 959-982.
- Allan, J. A. (2011) The Middle East Water Question: Hydropolitics and the Global Economy. London: I.B. Tauris.
- Al-Sarihi, A. (2025) Energy Transition in the Gulf: Best Practices and Limitations. Carnegie Endowment for International Peace, 17 April. Accessed online: Link.
- Arab Human Development Report (2009) Challenges to Human Security in the Arab Countries. New York: United Nations Development Programme, Regional Bureau for Arab States.
- Arab Water Council/World Food Programme (2023) Climate Change and Social Vulnerability: Using Multi-Sectoral Indicators to Assess Compound Drought Risk and Social Vulnerability in Jordan. Cairo: The SDG-Climate Facility.
- Ashour, H. (2025) Exploring the Role of Religious Media in Shaping Public Perceptions Towards Climate Change in Egypt. Master's dissertation, The American University in Cairo.
- Atef, A. N. (2022) Scaling Up Sustainable Finance and Investment in the Middle East and North Africa. In: Schoenmaker, D., and Volz, U. (eds) Scaling Up Sustainable Finance and Investment in the Global South. London: Centre for Economic Policy Research.
- Awange, J. L., et al. (2013) Potential Impacts of Climate and Environmental Change on the Stored Water of Lake Victoria Basin and Economic Implications. Water Resources Research 49(12): 8160-8173.
- Barnes, J. (2016) Uncertainty in the Signal: Modelling Egypt's Water Futures. Journal of the Royal Anthropological Institute 22(S1): 46-66.
- Barnes, J. (2017) States of Maintenance: Power, Politics, and Egypt's Irrigation Infrastructure. Environment and Planning D: Society and Space 35(1): 146-164.
- Borghesi, S., and Ticci, E. (2021) Climate Change in the MENA Region: Environmental Risks, Socioeconomic Effects and Policy Challenges for the Future. In: Mediterranean Yearbook 2019. Barcelona: European Institute of the Mediterranean.

- Boulos, Z. (ed.) (2025) Participatory Approaches to Conflict, Climate Change and Environment: Case Studies from the Middle East and North Africa. Arab Reform Initiative and Robert Bosch Stiftung GmbH.
- Chenoweth, J., et al. (2011) Impact of Climate Change on the Water Resources of the Eastern Mediterranean and Middle East Region: Modelled 21st Century Changes and Implications. Water Resources Research 47(6).
- Daoudy, M. (2023) Climate Change and Regional Instability in the Middle East. Discussion Paper Series on Managing Global Disorder No. 14. Council on Foreign Relations, Center for Preventive Action.
- Daoudy, M., Sowers, J., and Weinthal, E. (2022) What Is Climate Security? Framing Risks around Water, Food, and Migration in the Middle East and North Africa. WIREs Water 9(3): e1582.
- David, D. K., and Burke III, E. (eds) (2011) Environmental Imaginaries of the Middle East and North Africa. Ohio University Press Series in Ecology and History. Athens, OH: Ohio University Press.
- De Waal, D., Khemani, S., Barone, A., and Borgomeo, E. (2023) The Economics of Water Scarcity in the Middle East and North Africa: Institutional Solutions. Washington, DC: World Bank Group.
- Dezfuli, A., et al. (2022) Compound Effects of Climate Change on Future Transboundary Water Issues in the Middle East. Earth's Future 10(4): e2022EF002683.
- Domalain, B. (2023) Climate Change, Internal Displacement and Humanitarian Crises in Iraq. Rudaw Research Center.
- Economic and Social Commission for Western Asia (ESCWA) (2019) Climate Finance in the Arab Region: Technical Report. E/ESCWA/SDPD/2019/TP.10. Beirut: United Nations ESCWA.
- El Nour, S. (2023) Towards a Just Agricultural Transition in North Africa. In: Hamouchene, H., and Sandwell, K. (eds) Dismantling Green Colonialism: Energy and Climate Justice in the Arab Region. London: Pluto Press.
- Eladawy, A. (2025) Climate Governance in MENA and Africa: Knowledge, Policies, and Cooperation. Carnegie Endowment for International Peace, 25 February. Accessed online: Link.
- Elasha, O. B. (2010) Mapping of Climate Change Threats and Human Development Impacts in the Arab Region. United Nations Development Programme. Accessed online: Link.
- El-Katiri, L., and Fattouh, B. (2017) A Brief Political Economy of Energy Subsidies in the Middle East and North Africa. In: Luciani, G. (ed.) Combining Economic and Political Development: The Experience of MENA. International Development Policy 7: 58-87.
- Eskjær, M. F. (2017) Climate Change Communication in Middle East and Arab Countries. In: Oxford Research Encyclopedia of Climate Science. Oxford: Oxford University Press.
- Ezzeldin, K., Adshead, D., and Smith, P. (2023) Adapting to a New Climate in the MENA Region: An Assessment of Physical Risk Management and Climate Adaptation Finance in the MENA Region. UN Environment Programme Finance Initiative.
- Farmer, T., and Barnes, J. (2018) Environment and Society in the Middle East and North Africa: An Introduction. International Journal of Middle East Studies 50(3): 375-382.
- Feitelson, E., and Tubi, A. (2017) A Main Driver or an Intermediate Variable? Climate Change, Water and Security in the Middle East. Global Environmental Change 44: 39-48.
- Forootan, E., et al. (2016) Large-Scale Total Water Storage and Water Flux Changes over the Arid and Semiarid Parts of the Middle East from GRACE and Reanalysis Products. Surveys in Geophysics: 1-25.
- Francis, D., and Fonseca, R. (2024) Recent and Projected Changes in Climate Patterns in the Middle East and North Africa (MENA) Region. Scientific Reports 14: 10279.
- Fu, H.-Z., and Waltman, L. (2022) A Large-Scale Bibliometric Analysis of Global Climate Change Research between 2001 and 2018. Climatic Change 170(3): 36.

- Gatti, R., Bennett, F., Assem, H., Lotfi, R., Mele, G., Suvanov, I., and Islam, A. M. (2024) Conflict and Debt in the Middle East and North Africa. Middle East and North Africa Economic Update (April). Washington, DC: World Bank.
- Gaub, F., and Lienard, C. (2021) Arab Climate Futures: Of Risk and Readiness. Chaillot Paper No. 170. Paris: European Union Institute for Security Studies.
- Giovanis, E., and Ozdamar, O. (2022) The Impact of Climate Change on Budget Balances and Debt in the Middle East and North Africa (MENA) Region. Climatic Change 172 (34).
- Göll, E. (2017) Future Challenges of Climate Change in the MENA Region. Future Notes 7. Middle East and North Africa Regional Architecture (MENARA), Istituto Affari Internazionali, Rome Accessed online: Link.
- Gubash, C. (2018) Searing Heat Could Make Countries in North Africa and Along the Persian Gulf Unlivable. NBC News, 12 August.
- Haas, L. (2002) Water, Wetlands, and Climate Change: Building Linkages for their Integrated Management 'Mediterranean Water Resources'. Based on various primary sources: IPPC, Scientific Blue Plan Report, Planning and Climate Change Adaptation, for IUCN.
- Hamouchene, H., and Sandwell, K. (eds) (2023) Dismantling Green Colonialism: Energy and Climate Justice in the Arab Region. London: Pluto Press.
- Hamouda, A. (2024) Frameworks for Addressing Opinion and Investigative Materials on Climate Change Issues in Arab Newspaper Websites and the Public's Attitudes towards Them: An Applied Study. Journal of Mass Communication Research 72(1): 9-82.
- Henderson, C. (2023) Unjust Transitions: The Gulf States' Role in the "Sustainability Shift" in the Middle East and North Africa. In: Hamouchene, H., and Sandwell, K. (eds) Dismantling Green Colonialism: Energy and Climate Justice in the Arab Region. London: Pluto Press.
- Hindiyeh, M., et al. (2023) Water-Energy-Food Nexus to Tackle Future Arab Countries' Water Scarcity. Air, Soil and Water Research 16: 11786221231160906.
- Hoerling, M., Eischeid, M., Perlwitz, J., Quan, X., Zhang, T., and Pegion, P. (2012) On the Increased Frequency of Mediterranean Drought. Journal of Climate 25(6): 2146-2161.
- Ide, T., Lopez, M. R., Fröhlich, C., and Scheffran, J. (2021) Pathways to Water Conflict During Drought in the MENA Region. Journal of Peace Research 58(3): 568-582.
- International Energy Agency (IEA) (2024) Oil Market Report (November 2024). Accessed online: https://www.iea.org/reports/oil-market-report-november-2024
- IPCC (2007) Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. In: Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K. B., Tignor, M., and Miller, H. L. (eds). Cambridge: Cambridge University Press.
- Issa, A. B. (2024) An Insight into Climate Finance: MENA Region's Flows and Flaws. Arab Reform Initiative, 14 June. Accessed online: https://www.arab-reform.net/publication/an-insight-into-climate-finance-mena-regions-flows-and-flaws/
- Jerneck, A., and Olsson, L. (2008) Adaptation and the Poor: Development, Resilience and Transition. Climate Policy 8(2): 170-182.
- Joffé, G. (2016) The Impending Water Crisis in the MENA Region. The International Spectator 51(3): 55-66.
- Johannsen, I. M., et al. (2016) Future of Water Supply and Demand in the Middle Drâa Valley, Morocco, under Climate and Land Use Change. Water 8(8): 313.
- Johnstone, S., and Mazo, J. (2011) Global Warming and the Arab Spring. Survival 53(2): 11-17.
- Khalaf, S., and Vizoso, J. C. (2024) Mobilizing for the Environment in Iraq. Arab Reform Initiative, Environmental Politics Series.

- Kharraza, J. E., El-Sadek, A., Ghaffour, N., and Mino, E. (2012) Water Scarcity and Drought in WANA Countries. Procedia Engineering 14 (29): 1877-7058.
- Kim, K., and Garcia Esade-Ramon, T. F. (2023) Climate Change and Violent Conflict in the Middle East and North Africa. International Studies Review: viad053.
- Kummu, M., et al. (2016) The World's Road to Water Scarcity: Shortage and Stress in the 20th Century and Pathways towards Sustainability. Scientific Reports 6: 38495.
- Lelieveld, J., et al. (2012) Climate Change and Impacts in the Eastern Mediterranean and the Middle East. Climatic Change 114(3-4): 667-687.
- Lorenz, R., Jaeger, E. B., and Seneviratne, S. I. (2010) Persistence of Heat Waves and Its Link to Soil Moisture Memory. Geophysical Research Letters 37(9).
- Maboudi, T., and D'Amico, E. (2025) Vulnerability, Climate Laws, and Adaptation in the Middle East and North Africa. Environmental Policy and Governance 35(1): 145-158.
- Mahmoud, M. (2023) Climate Finance Worldwide and in the MENA Region: Challenges, Opportunities, and the Way Forward. Cairo: Egyptian Banking Institute.
- Malm, A. (2013) Sea Wall Politics: Uneven and Combined Protection of the Nile Delta Coastline in the Face of Sea Level Rise. Critical Sociology 39(6): 803-832.
- Mani, Z. A., and Goniewicz, K. (2023) Adapting Disaster Preparedness Strategies to Changing Climate Patterns in Saudi Arabia: A Rapid Review. Sustainability 15(19): 14279.
- Marani, F. (2024) How to Respond to Inequalities in a Crises-Packed Arab Region? Pathfinders: For Peaceful, Just, and Inclusive Societies, 17 June. Accessed online: https://www.sdg16.plus/resources/how-to-respond-to-inequalities-in-a-crises-packed-arab-region/
- Mason, M. (2013) Climate Change, Securitisation and the Israeli-Palestinian Conflict. The Geographical Journal, Special Issue "Questioning Environmental Security": 298-308.
- Mason, M. (2019) Climate Change and Conflict in the Middle East. International Journal of Middle East Studies 51(4): 626-628.
- Mason, M., Zeitoun, M., and El Sheikh, R. (2011) Conflict and Social Vulnerability to Climate Change: Lessons from Gaza. Climate and Development 3(4): 285-297.
- McDonnell, R. A., et al. (2014) Impacting Policy: Harnessing Science on Climate Change and Water through Partnerships with Decision-Makers in the Middle East and North Africa-—Reflections. Aquatic Procedia 2: 3-8.
- Michel, D., and Yacoubian, M. (2013) Sustaining the Spring: Economic Challenges, Environmental Risks, and Green Growth. In: The Arab Spring and Climate Change. Washington, DC: Stimson Center.
- Milly, P. C. D. (2005) Global Pattern of Trends in Streamflow and Water Availability in a Changing Climate. Nature 438: 347-350.
- Mougou, R., and Mansour, M. (2005) Hendi Zitoune Case Study: Agroclimatic Characterization and Evapotranspiration Evolution in Climate Change Conditions. Fourth Tunisian semi-annual report. Contribution to the AIACC AF90 North Africa Project: Assessment, Impacts, Adaptation, and Vulnerability to Climate Change on North Africa: Food and Water Resources.
- Namdar, R., Karami, E., and Keshavarz, M. (2021) Climate Change and Vulnerability: The Case of MENA Countries. ISPRS International Journal of Geo-Information 10(11): 794.
- Neira, M., et al. (2023) Climate Change and Human Health in the Eastern Mediterranean and Middle East: Literature Review, Research Priorities and Policy Suggestions. Environmental Research 216: 114537.
- Olawuyi, D. S. (2022) Climate Change Law and Policy in the Middle East and North Africa Region. London: Routledge.
- Orlowsky, B., and Seneviratne, S. I. (2012) Global Changes in Extreme Events: Regional and Seasonal Dimension. Climatic Change 110(3-4): 669-696.

- Oxfam (2025) Climate Plans for the People: Assessing and Promoting Civil Society Participation in the Preparation of Nationally Determined Contributions in the MENA Region. Oxfam International.
- Popperl, S. (2018) Geologies of Erasure: Sinkholes, Science, and Settler Colonialism at the Dead Sea. International Journal of Middle East Studies 50: 427-448.
- Pratt, A. N., ElDidi, H., and Breisinger, C. (2018) Farm Households in Egypt: A Typology for Assessing Vulnerability to Climate Change. Regional Program Working Paper No. 12. Cairo: International Food Policy Research Institute (IFPRI).
- Prudhomme, C., Giuntoli, I., Robinson, E. L., and Wisser, D. (2012) Hydrological Droughts in the 21st Century: Hotspots and Uncertainties from a Global Multimodel Ensemble Experiment. Proceedings of the National Academy of Sciences of the United States of America (PNAS) 111(9): 3262-3267.
- Robinson, E., and Dasgupta, S. (2022) Climate Change, Food Consumption and Child Health in Egypt: How Can Outcomes Be Improved? Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science, 15 November 2022. Accessed online: Link.
- Saab, N., and Sadik, A. (2018) Financing Sustainable Development in Arab Countries. Beirut: Arab Forum for Environment and Development.
- Saghir, J. (2021) Adaptation to Climate Change in the Middle East and North Africa. Joint Commentary Series, Viewpoint. The Issam Fares Institute for Public Policy and International Affairs and the Payne Institute at Colorado School of Mines. Accessed online: Link.
- Salem, M. R., et al. (2022) Climate Change-Related Knowledge and Attitudes Among a Sample of the General Population in Egypt. Frontiers in Public Health 10.
- Schilling, J., Hertig, E., Tramblay, Y., and Scheffran, J. (2020) Climate Change Vulnerability, Water Resources and Social Implications in North Africa. Regional Environmental Change 20(1): 1-12.
- Selby, J. (2005) The Geopolitics of Water in the Middle East: Fantasies and Realities. Third World Quarterly 26: 329-349.
- Selby, J., and Tadros, M. (2016) Introduction: Eight Myths of Conflict and Development in the Middle East. IDS Bulletin 47(3).
- Sowers, J. (2011) Remapping the Nation, Critiquing the State: Environmental Narratives and Desert Land Reclamation in Egypt. In: David, D. K., and Burke III, E. (eds) Environmental Imaginaries of the Middle East and North Africa. Ohio University Press Series in Ecology and History. Athens, OH: Ohio University Press.
- Sowers, J. (2019) Understanding Climate Vulnerability in the Middle East and North Africa. International Journal of Middle East Studies 51(4): 621-625.
- Sowers, J., Vengosh, A., and Weinthal, E. (2011) Climate Change, Water Resources, and the Politics of Adaptation in the Middle East and North Africa. Climatic Change 104(3): 599-627.
- Sternberg, T. (2012) Chinese Drought, Bread and the Arab Spring. Applied Geography 34: 519-524.
- Stringer, L. C., et al. (2021) Climate Change Impacts on Water Security in Global Drylands. One Earth 4(6): 851-864.
- The Moroccan Institute for Policy Analysis (2025) Environmental Advocacy in Morocco: Challenges, Strategies, and Institutional Barriers. Rabat, Morocco.
- Turhan, E. (2017) Right Here, Right Now: A Call for Engaged Scholarship on Climate Justice in Turkey. New Perspectives on Turkey 56: 152-158.
- UNDP (2018) Climate Change Adaptation in the Arab States: Lessons Learned and Best Practices. Bangkok: United Nations Development Programme.
- UNEP-FI (n.d.) The Arab Region's Approach to Climate Change and the SDGs. United Nations Environment Programme Finance Initiative. Accessed online: Link.

- Verhoeven, H. (2018) Introduction: The Middle East in Global Environmental Politics. In: Verhoeven, H. (ed.) Environmental Politics in the Middle East: Local Struggles, Global Connections. London: Hurst and Company.
- Verner, D. (2012) Adaptation to a Changing Climate in the Arab Countries: Overview and Technical Summary. Washington, DC: World Bank.
- Vincent, K., and Cundill, G. (2021) The Evolution of Empirical Adaptation Research in the Global South from 2010 to 2020. Climate and Development: 1-14.
- Vizoso, J. C. (2025) Environmental Struggle in the Middle East and North Africa: A Research Agenda. Arab Reform Initiative, 9 May 2025. Accessed online: Link.
- Voss, K. A., et al. (2013) Groundwater Depletion in the Middle East from GRACE with Implications for Transboundary Water Management in the Tigris-Euphrates-Western Iran Region. Water Resources Research 49(2): 904-914.
- Waha, K., et al. (2017) Climate Change Impacts in the Middle East and Northern Africa (MENA) Region and Their Implications for Vulnerable Population Groups. Regional Environmental Change 17(6): 1623-1638.
- Wahby, N. (2018) Egyptian Environmentalism and Urban Grassroots Mobilization. In: Apostolopoulou, E., and Cortes-Vazquez, J. A. (eds) The Right to Nature: Social Movements, Environmental Justice and Neoliberal Natures. Taylor and Francis Group.
- Waterbury, J. (2013) The Political Economy of Climate Change in the Arab Region. Arab Human Development Report Research Series. United Nations Development Programme, Regional Bureau for Arab States.
- Watson, C., Schalatek, L., and Evéquoz, A. (2025) Climate Finance Regional Briefing: Middle East and North Africa. Climate Finance Fundamentals. ODI and Heinrich Böll Stiftung, Washington, DC. Accessed online: Link.
- Weiss, M. I. (2015) A Perfect Storm: The Causes and Consequences of Severe Water Scarcity, Institutional Breakdown and Conflict in Yemen. Water International 40: 251-272.
- Wellesley, L. (2019) How Qatar's Food System Has Adapted to the Blockade. Chatham House, 14 November 2019. Accessed online: Link.
- Werrell, C. (2013) The Arab Spring and Climate Change. Eldis; Center for American Progress. Accessed online: Link.
- Westley, K., et al. (2021) Climate Change and Coastal Archaeology in the Middle East and North Africa: Assessing Past Impacts and Future Threats. The Journal of Island and Coastal Archaeology 18(2): 251-283.
- World Bank (2014) Turn Down the Heat: Confronting the New Climate Normal. Washington, DC: World Bank Group.
- Zayed, D. (2021) Power in Fragments? The Politics of Public Participation in Climate Adaptation Governance in Egypt. Doctoral dissertation, Institute of Development Studies, University of Sussex.
- Zayed, D. (2022) Scale and Splinters in Egypt: Climate Activism and Public Engagement. In: Randall, A. (ed.) Something to Talk About - Success Stories of Public Engagement to Tackle Climate Change. Oxford: Climate Outreach.
- Zittis, G., et al. (2022) Climate Change and Weather Extremes in the Eastern Mediterranean and Middle East. Reviews of Geophysics 60(3): e2021RG000762.
- Zwiers, F. W., et al. (2013) Climate Extremes: Challenges in Estimating and Understanding Recent Changes in the Frequency and Intensity of Extreme Climate and Weather Events. In: Asrar, G. R., and Hurrell, J. W. (eds) Climate Science for Serving Society: Research, Modeling and Prediction Priorities. Springer Netherlands: 339-389.
- Zyoud, S. H., and Fuchs-Hanusch, D. (2020) Mapping of Climate Change Research in the Arab World: A Bibliometric Analysis. Environmental Science and Pollution Research 27(3): 3523-3540.

The Arab NGO Network for Development
works in 12 Arab countries, with 9 national networks (with an extended membership of 250 CSOs from different backgrounds) and 25 NGO members.

P.O.Box Mazraa 5792/14 Beirut, Lebanon