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Mediterranean Experts on Climate and environmental Change

Climate and Environmental Change in the Mediterranean Basin – Current Situation and Risks for the Future

First Mediterranean Assessment Report (MAR1)

Chapter 5 Society | Subchapter 5.3 Human security

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Executive summary

Climate change is a risk to human security (medium confidence). Climate change threatens human security by a) undermining livelihood, culture, and human rights (Sections 5.3.2.1; 5.3.2.2); b) increasing migration (Section 5.3.2.3); and c) indirectly influencing violent conflict (Section 5.3.2.4).

The impact of climate change on human security depends not only on climate events but also on country's contextual factors, such as geographical, social, cultural, economic, and political conditions, resulting in a substantial heterogeneous effect among Mediterranean countries (Section 5.3.1.1)

Climate and environmental changes interfere with the realization and enjoyment of fundamental, internationally recognized human rights such as life, self-determination, health, and education (Section 5.3.3.2).

Climate change and extreme events influence migration behavior and patterns (medium confidence). The majority of migration associated with climate change impacts is internal (mostly within southern and eastern countries of the Mediterranean Basin), but also international migration (primarily between the South and North). While fast-onset environmental and climatic events such as floods and storms lead to more sudden, involuntary, and short-term and short-distance movements, slow-onset events such as drought, desertification and salinity by allowing for adaptation, usually tend to result in immobility or in migration that is generally perceived as being voluntary and often predominantly economically motivated. Migrants themselves may be vulnerable to climate change impacts in destination areas, particularly in urban centers (Section 5.3.2.3).

Climate change could lead to conflict (low confidence). Climatic changes have likely played a role in the decline or collapse of ancient civilizations around the Mediterranean Basin. The evidence on the effect of climate change and variability on violent conflict is contested. Although there is little agreement about a direct relationship, there is evidence that climate change increases the risk of violent conflict indirectly through declining human well-being, especially in countries which are poor and are characterized by pre-existing tensions and conflict. Higher food prices caused by climate changes have led to urban social unrest in MENA countries. The relationship between climate, migration, and conflict is highly complex as it depends on the social, political, cultural, and economic conditions of a specific country (Section 5.3.2.4).

Climate change poses a severe threat to many UNESCO World Heritage sites (high confidence). A large number of cultural sites are located in low-lying coastal areas of the Mediterranean, which are predicted to experience severe floods and coastal erosion in the future, indicating an urgent need for protective measures (Section 5.3.3.1).

Climate change is likely to act as a threat multiplier in the MENA region (low confidence). Establishing a strong link between future climate change and intrastate conflicts in MENA countries is challenging due to the lack of research for this region, which makes future research essential. Climate change is likely to affect inter-state relations concerning shared water resources, if existing water institutions are not able to accommodate change (Section 5.3.3.2).

Culture is a key factor for successful adaptation policies to environmental change in the highly diverse multicultural setting of the Mediterranean Basin. Climate adaptation policies have the potential to infringe on human rights in the Mediterranean region if they are disconnected from justice, equity, poverty alleviation, social inclusion, and redistribution. To successfully implement adaptation policies, many lower-income and climate-vulnerable Mediterranean countries need sufficient financial resources and science and technology transfers (Section 5.3.4.1).

5.3.1 Concepts and evidence

5.3.1.1 Definition and scope of human security in this report

This chapter assesses what is known about the risks climate change poses to individuals and communities, including risks to livelihoods, culture, human rights, migration and political stability in the Mediterranean region. For this assessment, human security is considered a condition that exists when the vital core of human lives is protected, and where people have the freedom and capacity to live with dignity (IPCC 2014, AR5 Chapter 12:759). Human security encompasses universal (e.g., health and food), and culturally-specific (e.g., religion), material (e.g., clean water), and non-material (e.g., social recognition) elements necessary for survival, sustainable livelihoods, and dignity. Human rights, politically and legally legitimized by the international community, are a specific means of defining limits, benchmarks and social processes that provide human security.

Much research on human security focuses on various short-term threats to the vital core of people's lives, including economic crises, epidemics, extreme events, and violent conflict. There are also social and environmental threats that are more incremental in nature, for example slow economic development or land degradation. In addition, a part of existing research is biased because it disregards threats to human security, which are more pertinent to other social contexts, or tries to advance generalizable findings, which are context-specific (i.e., relevant research done either in northern or southern Mediterranean States).

This chapter specifically assesses research that investigates the ways in which climate change may exacerbate threats such as water security (Chapter 3.1), food security (Chapter 3.2), health (Chapter 5.2) and others. There are underlying processes that reduce the freedom and capacity of individuals and groups to adequately respond to these threats, including poor health, poverty, and restricted access to economic, social, political, and natural resources. The chapter also assesses research on the interaction between state security and human security that suggests that the increased human insecurity that arises from an inability to adapt to climate change may in turn create risks to national security through large-scale migration and an increased risk of violent conflicts. It also assesses countries' role in protecting human security in the presence of climate change.

Human security is an analytical lens that focuses attention on the ways in which cultural, demographic, economic, and political forces interact with climate change in ways that affect individuals and communities to different degrees. The focus is at the local level, but the analysis concerns drivers of change across multiple scales and sectors, including climate, culture, economic and political institutions, and population. Consequently, understanding the effects of climate change on human security requires evidence about social and environmental processes across multiple scales and sectors. This process-based evidence is collected through a wide array of methods (e.g., ethnographic techniques and large datasets) used in a wide range of academic disciplines including environmental sciences, economics, political science, and law.

This chapter includes assessment of empirical studies from the social sciences using both qualitative and quantitative research designs. Most of these studies examine the interactions between environmental changes and social processes to explain social outcomes. While very few studies are explicitly about climate change and human security (since they mostly focus on climate variability and extreme weather events), all provide insights that could be used to make inferences about the effects of climate change on human security (Koubi 2019). Given the complexity of the processes that link environmental change to human security, uncertainties about the biophysical dimensions of change and the nature of the social science evidence thus far, high-confidence statements about the general effects of environmental change on all aspects of human security are not possible (Scheffran et al. 2012). Yet, there is strong evidence about some aspects of the links between environmental change and human security. While the impacts of environmental change on human security will be experienced the most in developing countries (including many MENA countries), human security is at risk for vulnerable populations throughout the Mediterranean region (IPCC 2014, 2018a).

5.3.2 Past trends and current situation

5.3.2.1 Livelihood, culture, human rights

Although anthropogenic climate change may be new, significant local and regional variations in climate have occurred throughout history. Prehistoric modern humans had experienced repeated periods of abrupt and severe climate change, albeit at a slower pace than presently, which was often global in nature, and they responded and adapted to this change with varying degrees of success and a variety of different outcomes (Heyd and Brooks 2009). Many studies have shown that climate change threatens cultural dimensions of lives and livelihoods including the material and psychological aspects of culture, identity, community cohesion and sense of place (e.g., Hess et al. 2008; Brace and Geoghegan 2011; Adger et al. 2012). Since culture, differing widely between countries around the Mediterranean, is embedded in the dominant modes of production, consumption, lifestyles and social organization that give rise to emissions of greenhouse gases, the impacts of these emissions are often given meaning through cultural interpretations of science and risk (Douglas and Wildavsky 1982; Shove 2003; Hulme 2008).

Culture plays an important role in mediating human responses to environmental change and these responses depend heavily on the extent to which societies see themselves as separate from, or as part of the wider physical or 'natural' environment (Heyd and Brooks 2009). The cultural dimensions of climate change risks and responses play a role in framing environmental change as a phenomenon of concern to society and they are not less important because they might inform adaptation planning (Adger et al. 2012). Countries require a diversity of adaptation measures very much depending on individual circumstances (UNFCCC 2007). In this perspective, Heyd and Brooks (2009) analyzed the influence of culture on conceptions of, and behavior towards natural systems and processes in a non-western context, and compare this example with the mainstream of western societies (this comparison may be relevant to the Mediterranean context, especially regarding its southern and northern shores). They conclude that culture may serve as a resource in two ways, in relation to the 'management' of the non-human sphere and in relation to the development of governance processes, and that a deeper understanding of the cultural mediation of responses to environmental dynamism may be of significant value in the development of resilience to accelerating climate change.

For Richardson et al. (2009), no environmental policy will receive the support it needs, either formally in the political arena or at the pragmatic day-to-day level, unless cultures, values and world perspectives are considered from the outset – this also applies to the Mediterranean context. There are two reasons for this. First, individuals / societies do not perceive sophisticated science-based information and risk assessments in the same way, as those who produce them. Secondly, in order to be effective, policies need to consider the socio-culturally shaped setting that pre-dates the attempt to implement the policies. The following points underscore the significance of this main finding: information about climate change and local interpretations of risk assessments are culturally mediated through particular emotional ways of reasoning, typical meaning-making processes, specific conceptions of landscape and climate variability and change, and idiosyncratic notions of mitigation of risk. Local religious and spiritual beliefs, knowledge systems, understanding of nature-society relationships, and values and ethics influence how individuals and communities perceive and respond to climate change; and the implementation of adaptation strategies can raise issues that cut across power relations in existing situations of inequality, which may have unforeseen long- term effects for individuals and communities. Therefore, research on the role of culture, values, and worldviews in both the generation of and responses to climate change should become a top priority (Richardson et al. 2009).

Most regions in the Mediterranean Basin (and the rest the world) have undergone environmental change since their first occupation by humans, and understanding how people who settled in these places chose to cope and/or adapt (or failed to adapt) may play a vital role in sustainable planning of our modern societies (Latorre et al. 2016). By affecting the availability of food and water to people, environmental and climate drivers are key factors for understanding this process. It is, however, an

oversimplification to state that these drivers are directly responsible for livelihood and cultural changes. Although there are many examples in the literature of large civilizations that suffered some degree of collapse, to attribute these social changes solely on shifting climatic conditions disregards other complex processes associated with how human societies make decisions regarding resource constraints. Lattore et al. (2016) assert that the effects of climate change on past societies cannot be understated and there are often multiple feedbacks. Case by case comparative studies can bring out commonalities across livelihoods and cultures, varying geographies and global climate shifts.

5.3.2.2 Human rights

Climate change affects the rights of individuals and communities. The IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels (IPCC 2018a) recently assessed that climate change constitutes a massive threat to the enjoyment of economic, social and cultural rights. Following the release of this report, the Committee on Economic, Social and Cultural Rights adopted a statement on "Climate change and the International Covenant on Economic, Social and Cultural Rights" in which it welcomed the voluntary national commitments made under the climate change regime, and also emphasized that States have human rights obligations that should guide them in the design and implementation of measures to address climate change (CESCR 2018).

The current scientific and policy debate on links between environment and human rights increasingly perceives climate change as a' risk multiplier' and a key cross-cutting issue. Climate and environmental change thereby are seen as one of the greatest challenges to the promotion of and effective implementation of fundamental rights since its human implications are already serious and alarming. Climate change is thus rapidly becoming an issue of justice and inequality for millions of people around the world and for future generations, which will suffer severe loss and damage as well. The international community's past failure – and insufficient current actions – to mitigate and adapt to climate change according to available scientific evidence further threaten human rights (CIEL and CARE 2015). More specifically, the rights of vulnerable peoples, who are already experiencing the adverse effects of climate change, are more threatened than ever (CIEL 2013).

Recent studies and assessments have demonstrated that climate change is putting development and human security at risk (IPCC 2007, 2013, 2014) and the United Nations Human Rights Council has acknowledged in many statements (i.e., UNHRC 2008) that the environmental changes brought about by global warming can interfere with the realization and enjoyment of fundamental, internationally recognized human rights – including those protected by the International Covenants on Civil and Political Rights (ICCPR) and Economic, Social, and Cultural Rights (ICESCR).

Many Human Rights Judicial bodies, both at the universal and regional level, have underlined the link between environment and human rights effectiveness, and State-related obligations in different cases brought before them. For example, the European Court of Human Rights (the ECtHR) has developed its jurisprudence related to human rights and environment in recent years. The ECtHR emphasized on several occasions the impact of a "severe degradation of environment" on the breach of the right to life. Environmental degradation is thus increasingly recognized to threaten the human rights of individuals and minority groups. Therefore, states have the duty to respect, promote, protect, and fulfill human rights, and to secure a healthy environment by adopting positive actions to prevent environmental degradation, in order to guarantee a sustainable environment.

The 'right to the highest attainable standard of health' is considered indispensable for the enjoyment of other human rights, and it is widely protected in international and regional instruments, and under national constitutions as well (Elia 2016). Climate change is a serious challenge that undermines and places the fundamental determinants of good health (such as clean air, fresh water, food security, and freedom from disease) at risk (health, Chapter 5.2). In the Mediterranean Basin, health impacts on populations vary significantly in terms of the risks individual countries are exposed to, available health services and socio-economic status. The most severe problems are likely to be faced by those countries that already have the biggest problems today – notably those in North Africa and the near East. Climate

change could further increase the divide between northern and southern Mediterranean countries. Addressing environmental change is, therefore, perceived as a huge health opportunity that includes reducing the over 6.5 million annual deaths (WHO 2016) from air pollution (most victims are poor, elderly, women and children including rural households and people living in burgeoning low-income cities) (Sections 2.3 and 5.2.4.1).

Table 5.4 | Climate change impacts on selected human rights (source: submission by the Maldives to the Office of the High Commissioner for Human Rights (OHCHR) in September 2008, as part of OHCHR's consultative study on the relationship between climate change and human rights, reproduced in CIEL (2013)).

Climate change	Impact on people	Rights implicated
Sea Level Rise • Flooding • Sea surges • Erosion • Salinization of land and water	Loss of land Drowning, injury Lack of clean water, disease Damage to coastal infrastructure, homes, and property Loss of agricultural lands Threat to tourism, beach loss Quality of agricultural food products Fishing and marine life that may affect the quality and quantities of sea foods	Self-determination (ICCPR; ICESCR, 1) Life (ICCPR, 6) Health (ICESCR, 12) Water (CEDAW, 14; ICRC, 24) Means of subsistence (ICESCR, 1) Adequate standard of living (ICESCR, 12) Adequate housing (ICESCR, 12) Culture (ICCPR, 27) Property (UDHR, 17)
Temperature Increase • Change in the pattern of diseases • Coral bleaching • Impacts on fisheries	Spread of disease Changes in traditional fishing livelihoods and commercial fishing Threat to tourism, lost coral and fish diversity	Life (ICCPR, 6) Health (ICESCR, 12) Means of subsistence (ICESCR, 1) Adequate standard of living (ICESCR, 12)
Extreme Weather Events • High intensity • Storms • Sea surges	Displacement of populations Contamination of water supply Damage to infrastructure: delays in medical treatment, food crisis Psychological distress Increased transmission of disease Damage to agricultural lands Disruption in educational services Damage to tourism sector Massive property damage	Life (ICCPR, 6) Health (ICESCR, 12) Water (CEDAW, 14; ICRC, 24) Means of subsistence (ICESCR, 1) Adequate standard of living (ICESCR, 12) Adequate and secure housing (ICESCR, 12) Education (ICESCR, 14) Property (UDHR, 17)
Precipitation Changes • Change in disease vectors • Erosion • Change in water safety	Outbreak of disease Depletion of agricultural soils	Life (ICCPR, 6) Health (ICESCR, 12) Means of subsistence (ICESCR, 1)

Direct climate impacts, such as extreme weather events (e.g., floods) and rising sea levels, threaten millions of people in coastal and low-lying areas of the Mediterranean Basin and elsewhere. Seawater intrusion contaminates groundwater in coastal communities, negatively affecting agricultural production and potable water availability. Ocean acidification and changes in weather patterns alter ecosystems and their capacity to provide services to human communities. Increasing weather extremes constrain food security and access to nutritious forms of food while changing the prices of commodities in global markets, making food more expensive and harder to access for the poorest people (Table

5.4). The links between environmental change and human rights are being increasingly documented (Table 5.4), and therefore becoming less controversial and seem beyond dispute (Behnassi et al. 2019).

5.3.2.3 Environmental change and migration

Migration has been a defining feature of human populations in the Mediterranean for millennia, well before the emergence of nation states. Environmental changes, both in their rapid and slow-onset versions, have likely been influential to some extent in these migration flows. The question of a direct link between migration and environmental factors has therefore been debated intensely (de Haas 2011; Boas et al. 2019). Nevertheless, the empirical evidence from a large body of recent research, which employs macro-level and micro-level data as well as a diverse range of approaches, shows that, one the one hand, sudden-onset climatic events such as floods and storms lead to more sudden, involuntary, and short-term and short-distance movements (McLeman and Gemenne 2018). Empirical knowledge regarding the effects of slow-onset events such as droughts, on the other hand, remains varied (Adger et al. 2015; Hunter et al. 2015; IPCC 2018a). That is, there is no conclusive evidence on the direction and magnitude of the influence of gradual events on migration and their effects are multidimensional and heterogeneous. Still, it seems that slow-onset events usually tend to result either in migration that is generally perceived as voluntary and often predominantly economically-motivated or in immobility (Hunter et al. 2015; Koubi et al. 2016; Cattaneo et al. 2019).

On a century time-scale, the reduced dependence of Mediterranean people on subsistence agriculture during the 20th century has likely reduced possible direct causalities between environmental change and migration. This shift has been uneven both geographically along North-South and East-West axes of the Mediterranean and has been experienced at different times. Thus in a region whose migration patterns are marked with high uncertainty, environmental factors may "play a certain but rather indirect role" together with demographic, economic and political factors (de Haas 2011). While the effects of environmental and climate change are only "beginning to shape a new and more urgent need for the human security paradigm" (Behnassi and McGlade 2017), evidence about the relationship between climate change and migration in the Mediterranean is often disputed. The region is often referred to as being among the regions whose human security is most threatened by climate change (Brauch 2012).

The bulk of migration in Northern Africa (White 2011) and the eastern Mediterranean (Weinthal et al. 2015) happens locally and regionally. The effect of climatic factors on migration is, however, contentious. For instance, while some authors argue that the 2006 to 2010 drought in northeastern Syria led a large number of individuals to migrate (Kelley et al. 2015; Ash and Obradovich 2020), others take issue with both the number of migrants and the extent to which climate factors affected migration (Selby et al. 2017). Thus, "whether the drought was a relevant cause of rural livelihood loss and whether this livelihood loss facilitated a significant migration to urban areas remains contested, although the majority of studies support these claims" (Ide 2018a). Other studies on the case of Sahelian migration to Italy between 1995 and 2009, offer explanations for variance by climate factors and yields in migration data, where average annual temperatures are suggested to be the dominant factor in explaining migrations (Pasini and Amendola 2019). A recent global study suggests that climate change will not likely impact asylum seeking patterns everywhere, but probably only in countries undergoing political transformation when faced with immediate impacts of climate change due to inefficient policy response to the latter (Abel et al. 2019). Some authors also suggest that migration in the Mediterranean may be towards higher environmental risk rather than away from it due to pressing challenges of rapid urbanization, depopulation of rural areas, and the decline of traditional livelihoods (Geddes 2015). The challenge, therefore, is to better prepare and adapt infrastructure to sustain and protect migrants in their destinations.

A part of this framing can likely be credited to the work of NGOs and think tanks (Felli 2013). The eastern and southern shores of the Mediterranean Basin (MENA) in particular are frequently "cast as hotspots of mixing social, political and ecological problems, populated by racialized, helpless and

passive victims, exposed to erratic and dangerous climate change" (Methmann and Rothe 2014). Rothe (2017) details how the Mediterranean came to be seen as the hotspot of climate migration with "interventions coming mainly from either international organizations or scientists and think tanks in northern industrialized countries."

5.3.2.4 Conflict and collapse of civilizations

There is a recent increase in research examining the effects of climate change and violent conflict, reflecting policy discourses that climate change impacts and resource scarcity could lead to conflict. While changes in climate could bring groups of people into conflict over scarce resources (Homer-Dixon 1999), there is also evidence that in specific circumstances resource scarcity may drive adaptation and innovation (Butzer 2012). While, on a decadal time-scale, violent conflict appears to have become less common and less intense after the end of the Cold War, since 2013, there have been upsurges in both the number of armed conflicts in the Mediterranean region, and also in the number of battle deaths - mainly as a result of the civil wars in Syria and Iraq (Dupuy et al. 2017). During the same period, there has been an increase in the occurrence and severity of drought events (Chapter 2), which by affecting agricultural production and crop yields (Chapter 3) (Durigon and de Jong van Lier 2013; Siebert et al. 2014; Schauberger et al. 2017), raise the question whether these factors could contribute to social unrest and conflict (discussed in Box 5.3.1).

A few studies explore the relationship between longer-term climate variations and the collapse of past civilizations and empires around the Mediterranean Basin using statistical analysis and data derived from archeological and other historical records (Holmgren et al. 2016; Kaniewski et al. 2018). Major changes in weather patterns, in particular drought conditions, have coincided with the collapse of several previously powerful civilizations in the Aegean and Eastern Mediterranean (Kaniewski et al. 2015), as well as of empires such as the Akkadian (Weiss et al. 1993; Carolin et al. 2019), and the Ottoman empires (Kaniewski et al. 2012). Regarding the Akkadian Empire, which ruled Mesopotamia from the headwaters of the Tigris-Euphrates Rivers to the Persian Gulf (all in what is now Iraq, Syria and parts of southern Turkey) during the late third millennium B.C., archeological evidence has shown that this highly developed civilization collapsed abruptly around 4200 years ago, possibly due to a shift to more arid conditions (Weiss et al. 1993). A recent study using speleothem geochemical records from northern Iran identified two major drought periods, which started 4510 and 4260 years ago, and lasted 110 and 290 years respectively. The latter event occurred precisely at the time of the Akkadian Empire's collapse (Carolin et al. 2019). Similarly, a study coupling climate proxies with archaeological-historical data and a pollen-based record of agriculture shows that an abrupt shift to drier conditions at ca. A.D. 1400 could have contributed to the Ottoman Empire's decline (Kaniewski et al. 2018).

Several studies also provide evidence for a climate-conflict relationship via reduced agricultural production across many centuries. The Little Ice Age appears to have been associated with more cases of political upheaval and warfare in the Ottoman (White 2011; Haldon et al. 2014) and Byzantine (Xoplaki et al. 2016) empires. In particular, the Gelali rebellions between the years 1550 and 1603 were reactions to social and economic crisis stemming in part from climatic hardship associated with the Little Ice Age. This evidence from historic antecedents, however, cannot be taken to mean that future changes in climate would lead to large-scale political collapse mainly due to globalization in the contemporary world (Butzer 2012).

Most of the recent research on the connections between climate change and conflict focuses on the effects of climate variability, mainly temperature, precipitation, and, to a lesser extent, natural disasters as proxies for the kinds of longer-term changes that might occur due to climate change on interstate conflict, e.g., civil conflict/war, communal violence as well as low intensity conflict such as demonstrations, protests, and riots. There is very limited research on the climate-conflict nexus in the Mediterranean region. Studies using global datasets have failed to uncover a robust direct relationship between climate variability or natural disasters and civil conflict. On the one hand, some studies report a positive effect of temperature on conflict onset or incidence at the global level (e.g., Landis 2014;

Bollfrass and Shaver 2015). In particular, in countries with climates that have strong seasonality such as in most countries in the Mediterranean basin, civil conflict is more likely to occur when warm weather is prolonged (Landis 2014). Deviations in temperature, whether they are positive or negative, as well as changes in mean precipitation show no statistical association with the onset of civil war. On the other hand, others find that precipitation, in particular more rainfall, rather than temperature anomalies are associated with increases in organized political violence—especially in less developed countries (Salehyan and Hendrix 2014). Yet, other studies do not find any effect.

For the Mediterranean region, Böhmelt et al. (2014) report that climate variability measured as a deviation of the current level of precipitation and temperature, respectively, from their past long-run levels, did not affect the onset of armed conflict during the 1997-2009 period. In addition, the authors show that population pressure, agricultural productivity, and economic development are likely to have a stronger impact on water conflict risk than climate variability (Bernauer et al. 2012; Theisen et al. 2013; Buhaug et al. 2014). They conclude that violent water conflicts are extremely rare, and that factors conducive to restraint, such as stable political conditions, may stimulate cooperation. Higher temperature, though, seems to increase the likelihood of low-level conflicts such as political instability in the form of irregular leader transitions (i.e., coups) (Dell et al. 2012) and incumbents' electoral losses potentially speeding democratic turnover (Obradovich 2017).

A growing body of research examines the connections between natural disasters, i.e., storms, floods or droughts and conflict. By damaging public and private infrastructure, destroying crops and killing livestock, these events can cause or worsen scarcity, subsequently leading to conflict. The direct association between natural disasters and armed conflict is contested (Nel and Righarts 2008; Bergholt and Lujala 2012). However, there is some evidence that natural disasters increase the outbreak of armed conflict in highly ethnically fractionalized countries (Schleussner et al. 2016), lengthen civil conflict and communal conflict (Eastin 2015; Detges 2016; Ghimire and Ferreira 2016) and increase state-sponsored repression (Wood and Wright 2016) and the likelihood of transnational terrorism (Paul and Bagchi 2018). Feitelson and Tubi (2017) examine the effect of the extreme 2007–2010 drought on armed conflict in the Euphrates and lower Jordan River basins and find that, with the exception of Syria, and the consequent spillover into Iraq, droughts do not constitute a main driver of armed conflict in the Middle East. They conclude that droughts may lead to conflict when more fundamental factors, especially adaptive capacity, have been compromised. There is also some evidence that widespread disasters generate solidarity and cooperation rather than conflict (Theisen 2012; Nardulli et al. 2015; Tubi and Feitelson 2016).

A limited body of research examines the connections between climate change and small-scale violent conflicts, i.e., non-state conflict or communal violence. There is some agreement that both decreased rainfall (resource scarcity) and increased rainfall (strategic advantage) in resource dependent societies increase the risk of localized violence, particularly in pastoral societies in Africa (Fjelde and von Uexkull 2012; Theisen 2012; Detges 2014; Ember et al. 2014; Maystadt et al. 2015; Nordkvelle et al. 2017). Tubi and Feitelson (2016) examine the conflictive and cooperative interactions between Muslim Bedouin herders and Jewish agricultural settlements in Israel's semi-arid northern Negev region during the 1957–1963 drought. They find that while the interactions between these two groups ranged from violent clashes to extensive cooperation and assistance, conflict was limited and that the measures taken by state institutions to directly reduce frictions and to provide relief assistance were central to the overall limited level of conflict.

In response to the challenges of finding a direct association between climate changes and violent conflict, most recent research examines the effects of climate changes on conflict via their effects on well-known drivers of conflict, in particular economic conditions and migration. Starting with the economic conditions channel, research has not established a robust link between climate variables, economic growth, and conflict (Miguel et al. 2004; Ciccone 2011; Bergholt and Lujala 2012; Koubi et al. 2012; Hodler and Raschky 2014; van Weezel 2015). However, recent studies provide consistent evidence that climate changes, via their negative effect on agricultural production, livestock prices, and incomes,

affect various types and dynamics of conflict (Bazzi and Blattman 2014; Maystadt and Ecker 2014; Fjelde 2015). Moreover, negative weather shocks occurring during the growing season of local crops increase the continuation and intensity rather than the outbreak of civil conflict (Jun 2017; Harari and Ferrara 2018), especially in regions with agriculturally dependent and politically excluded groups (von Uexkull 2014; Schleussner et al. 2016; von Uexkull et al. 2016). As an example of such shocks, dry spells during the wet season have been found to have serious economic consequences in rain-fed agriculture, which represents a significant fraction in many Mediterranean countries (> 90% of cultivated regions in Algeria, Morocco and Tunisia, 57% in Turkey, 64% in Italy or 56% in Portugal (Tramblay and Hertig 2018). As an example, Morocco's 2007 drought reduced wheat production by 76% (Schilling et al. 2012), which has been shown to play a vital socio-economic role in Mediterranean countries (Páscoa et al. 2017).

Several recent studies identify a causal link between higher food prices caused by climate changes and urban social unrest in Africa (Berazneva and Lee 2013; Smith 2014; Bellemare 2015; Raleigh et al. 2015), while Buhaug et al. (2015) disagree. Rising food prices are considered to have played a significant role in fomenting the Arab Spring unrest across North Africa and the Middle East in 2011 (Johnstone and Mazo 2011; Sternberg 2012; Newman 2020). However, Sneyd et al. (2013) show that such forms of violence are triggered by a complex set of political and economic factors rather than by higher food prices.

By reducing the supply of water in transboundary river basins, climate events can increase the likelihood of interstate conflict. Despite the menace of 'water wars' prominently discussed since the early 1990's, shared water, although it does lead to tensions, threats, and even to some localized violence, it does not lead to war (Wolf 2007). Joint precipitation scarcity reduces the likelihood of interstate militarized disputes (Devlin and Hendrix 2014), and water scarcity enhances the incentives of riparian states to cooperate rather than to fight (Dinar et al. 2011). In addition, research shows that riparian states' liberal institutional and economic structures (Kalbhenn 2011; Feitelson and Tubi 2017), commercial treaties (Dinar et al. 2015), the behavior of upper riparian (Feitelson and Tubi 2017) and upstream-downstream relations (Munia et al. 2016), the existence of transboundary treaties (Tir and Stinnett 2012), the number of agreements between riparian states (Dinar et al. 2019), the specific design of international water agreements (Dinar et al. 2015) and institutional frameworks for flexible but specific water allocation mechanisms (Dinar et al. 2015; Oktav 2017) further mitigate the risk of conflict. While hydrological disputes in the Jordan, Nile, and Tigris-Euphrates river basins are mostly seen as a part of territorial security and development-oriented concerns rather than a genuine water issue on its own, climate change is likely to further affect inter-state relations and even threaten the stability of existing water institutions, if these institutions are not able to accommodate change (Dinar et al. 2015; de Stefano et al. 2017).

Regarding the channel of migration, the literature argues that environmental migration can cause conflict in the receiving areas by increasing competition for resources and jobs between immigrants and the native population, upsetting ethnic balance when immigrants are of a different ethnicity than the native population; and by exacerbating fault lines, such as between highly employed and unemployed segments of society, rural and urban areas, etc. (Goldstone 2002; Reuveny 2007). Recent research shows that although residents in receiving areas, in particular urban centers in developing countries, view climate events (e.g., floods and storms) and conditions (e.g., drought and water/soil salinity) as legitimate reasons to migrate, yet environmental migrants are not seen as more deserving than economic migrants (Spilker et al. 2020).

However, despite the surge in the number of studies on the potential link between environmental change, migration, and conflict, this literature is still far from reaching a consensus on this relationship. For example, while some scholars provide evidence that mass population movements induced by climate shocks were an important factor leading to Syria's uprising and subsequent civil war (Kelley et al. 2015; Ash and Obradovich 2020), others conclude that the occurring drought had little if any impact on the outbreak of conflict (Fröhlich 2016; Selby et al. 2017) (see Box 5.3.1). Moreover, limited and

often ambiguous empirical evidence based on large-*N* studies further adds to the difficulty to derive conclusive statements (e.g., Brzoska and Fröhlich 2016). Reuveny (2007), for instance, shows that migration caused by extreme events can induce more conflict in receiving communities, while Raleigh et al. (2008) do not find a significant effect. Bhavnani and Lacina (2015) find that greater rates of internal migration due to climate shocks are associated with a higher risk of riots in Indian states. Ghimire and Ferreira (2016), however, report that disaster-induced migration lengthens the duration of an existing civil conflict, but it does not affect the risk of new conflict outbreaks. Climate changes have also been shown to increase intercommunal violence by affecting pastoralists' copying strategies for access to water and foliage (Adano et al. 2012; Detges 2014). Finally, while long-term climate events, such as droughts, seem to enhance environmental migrants' conflict perceptions in their destination location (Koubi et al. 2018), they may not add to their willingness to support violence (Linke et al. 2018). Migrants who experienced short-term climate events, such as storms or heavy rains, on the other hand, are more likely to support violence if they were themselves victims of violence (Linke et al. 2018). Moreover, migrants to urban areas who had experienced both sudden and gradual climate events, e.g., a drought and a storm, at their location of origin are more likely to join and participate in social movements about migrant rights such as joining a migrant interest group and participating in protest rallies organized by the group even if these may cause violent clashes (Koubi et al. 2021).

Beyond economic and ethno-political conditions, as well as migration flows, the state of social and political institutions is often found to shape the likelihood of collective violence. Various aspects of the strength and, more often, weaknesses of governments but also conflict-related institutions have been repeatedly demonstrated in recent research (Butler and Gates 2012; Koubi et al. 2012; Böhmelt et al. 2014; O'Loughlin et al. 2014; Linke et al. 2015, 2018; Tubi and Feitelson 2016; Wood and Wright 2016; Detges 2016; Fair et al. 2017; Jones et al. 2017; Ide 2018b).

In summary, there is some evidence that climate change may increase the risk of armed conflict in countries and/or regions, which are poor and highly dependent on agriculture, have few capabilities to cope with climate changes, and are characterized by pre-existing tensions and conflict (Ide et al. 2014; Koubi 2019). However, there is very limited knowledge regarding the mechanisms that connect climate change to conflict (Buhaug 2015; Koubi 2019). There is also very little research on the effects of climate changes on conflict in the Mediterranean region. Consequently, there is an urgent need for research and data collection that can be used to study the processes that could lead from changes in climate to conflict in the Mediterranean Basin.

5.3.3 Projections, vulnerabilities and risks

5.3.3.1 Livelihoods, culture, human rights

Countries with high carbon emission potential directly and massively contribute to global warming, which is associated with substantial harms to poor and vulnerable populations, including indigenous people, through their multiple impacts and associated risks (i.e., increasing frequent extreme-weather events, spread of tropical diseases, desertification, rising sea levels, biodiversity loss, decrease of crop yield and food security, etc.) (Jodoin and Lofts 2013; IPCC 2018a). Poor people are much more vulnerable to these impacts and risks because they tend to live in the most exposed areas, typically cannot protect themselves, and lack the means to cope once a threat has materialized (Hallegatte et al. 2016; Hallegatte and Rozenberg 2017; IPCC 2018a; Wallemacq et al. 2018). Assuming that the global distribution of income and wealth will remain as uneven as today, present excess emissions are likely to cause vastly greater harms to poor and vulnerable populations in the future, than they are causing today (Burke et al. 2018; IPCC 2018a; Pretis et al. 2018; Tol 2018). In addition, climate change impacts threaten traditional knowledge about livelihoods in ways that endanger culture and sense of place attachment (Adger et al. 2012; Tucker et al. 2015; Tschakert et al. 2019). Climate change could increase migration flows. While it is challenging to project the scale of future migration flows as complex interactions between economic, political, social, demographic, and environmental factors shape people's movements (Black et al. 2011), experts agree that millions of people, especially in Sub-Saharan Africa,

South Asia, and Latin America, could be forced to move within their countries in the medium term due to climate changes (Rigaud et al. 2018). The scale and geographic scope of this type of population displacement could be one of the greatest human rights challenges of our time. Most countries do not have any governance framework to manage the internal movement of people living within their boundaries and no binding international human rights instrument exists to guide national governments to prepare and respond, creating an enormous protection gap for hundreds of millions of people (McAdam 2016).

Climate change also poses a severe threat to many cultural heritage sites (IUCN 2017). Mediterranean UNESCO World Heritage sites are highly likely to be impacted by climate change over the coming decades, notably from coastal hazards due to sea-level rise. A basin-wide study investigated risks for coastal word Heritage Sites from flooding and erosion under four sea level rise scenarios until 2100. Of 49 sites located in low-lying coastal areas of the Mediterranean, 37 are at risk from a 100-year flood and 42 from coastal erosion, already today (Reimann et al. 2018). The results indicate the urgent need to better protect those sites that are already at risk. Risks will exacerbate in the course of the twenty-first century and beyond (until 2100, flood risk may increase by 50% and erosion risk by 13% across the Mediterranean region), with their magnitude depending on global-scale mitigation efforts in the coming years. For these sites, adaptation can only be implemented to a limited degree because their specific cultural values could be compromised by adaptation measures. If no steps are taken, world heritage sites could lose their values during the coming centuries and will consequently be removed from the UNESCO World Heritage list.

5.3.3.2 Conflict

The Mediterranean Basin is characterized by projections of extreme heat, drought and aridity conditions under climate change (Chapter 2). The IPCC report on 1.5°C has stated that 'climate-related risks to livelihoods including food security, water supply and economic growth are projected to increase with global warming of 1.5°C and increase further with 2°C (Summary to Policymakers: B5) (IPCC 2018b).

In this context, climate change is likely to act as a threat multiplier (CNA 2007) in the MENA region by placing additional pressure on already scarce resources and by reinforcing preexisting threats such as poverty, unemployment, and political instability as well as competition over shared water resources along river basins, ultimately leading to violence and conflict. However, establishing a link between future climate change and conflicts in MENA countries is challenging due to the lack of research and consequently scientific knowledge regarding the connections between climate change and conflict in this region. Nevertheless, considering that although the whole region is subjected to climate change but very few countries are experiencing (have experienced) conflict, a few of the main findings of the climate-conflict literature might as well apply here: climate change is very likely to lead to conflict in MENA countries that are poor and are characterized by pre-existing tensions and conflict (Ide et al. 2014; von Uexkull et al. 2016; Waha et al. 2017; Koubi 2019).

Civil conflict is "development in reverse" (Collier et al. 2003). Armed conflict kills people, destroys infrastructure that affects development outcomes, and hampers economic growth that lifts people from poverty, thus reducing the incentives to fight (Chassang 2009; Cederman et al. 2013). Gates et al. (2012) estimate the effect of conflict on income growth. According to their simulations, five consecutive conflict years with more than 1000 battle deaths reduce per capita incomes by 20% relative to a no-conflict counterfactual, whereas eight additional years of further conflict widen the gap by 5-10%. When it comes to assessing the speed and extent of post-conflict recovery, the analyses in Gates et al. (2012) reveal that the negative impact of short wars is reversed after roughly five peaceful years, whereas long wars are associated with a permanent reduction in per capita incomes of about 10%. Similarly, Costalli et al. (2017) employ synthetic control modelling for 20 conflict countries. On average, years of ongoing conflict see 17.5% lower per capita incomes than carefully constructed counterfactual peace years. Their analysis also reveals massive heterogeneity across conflicts, with estimates ranging

from a 1.8% average effect in Egypt (1993-1998) to a staggering 74% for the Liberian civil war (1989-1997 and 1999-2003). Their analysis also shows that the GDP losses due to conflict are especially high in ethnically fractionalized countries and attribute this effect to disruptions to inter-ethnic cooperation and trade.

Conflict does not only undermine the capacity of governments and non-governmental actors to provide adequate protection from the impacts of climate change, but it is also a major driver of climate vulnerability via its negative effects on economic growth, education, food security and environmental destruction. Broader socio-economic development, expressed by higher growth in education and poverty alleviation, could help in offsetting most of the conflict risk in developing countries associated with reduced economic growth due to implementation of policies to curb GHG emissions (Hegre et al. 2016). Ending violent conflict may be one of the most efficient and cost-effective ways to improve social resilience to climate change.

Regarding future interstate conflicts in the MENA region's major river basins, i.e., Nile, Jordan, Tigris and Euphrates, the limited historic evidence for 'water wars' should not lead to complacency. These river basins will face a strong increase in demand for water due to demographic pressures, industrialization, and urbanization. Simultaneously, while in many cases supply will recede due not only to earlier mismanagement, but also to the impacts of climate change through, for instance, changes in precipitation, increased evaporation, shifts in the seasonality of rain, or droughts. These changes could have security implications at the international level. Consequently, it will take coordinated efforts by all, and especially the major riparian states to adapt to climate change in order to avoid increasing conflict in the future. To the extent that each country securitizes water –i.e., transforms water into a key aspect of its national security and development whose protection justifies the use of particular means such as dams, without taking into considerations the needs of its neighbors and especially downstream states, conflict could be more likely under future climate changes (Feitelson and Tubi 2017). International water agreements and more institutionalized forms of cooperation therefore need to be flexible and robust enough to cope with the emerging threats of climate change (Dinar et al. 2015; Link et al. 2016; de Stefano et al. 2017). There is very little research on the effects of future climate changes on conflict in the Mediterranean region. Consequently, there is an urgent need for research and data collection that can be used to forecast conflict in the face of climate change in the Mediterranean Basin.

5.3.4 Adaptation

5.3.4.1 Livelihoods, culture, human rights

Climate change acts directly to change natural weather patterns, but the effects cascade quickly through many sectors with implications for livelihoods (i.e., loss of revenues and subsistence assets), culture (cultural ties to the land, biodiversity and food patterns), and human rights (i.e., rights to food, water, health, etc.). For this reason, governments have a large stake in making adaptation a national priority (Tolba and Saab 2009), and this applies to the Mediterranean as well given the severity of climate impacts in this region, which is increasingly considered as hot spot in many IPCC reports (IPCC 2007, 2014, 2018a). In addition to prevention and mitigation, adaptation is increasingly becoming the focus of formal and informal discussions on human responses to climate change both on the international level and in the Mediterranean.

The effectiveness of different ways to address adaptation to climate change is dependent on the underlying cultural fabric of the human groups involved for their successful implementation (Heyd and Brooks 2009). There are important cultural dimensions to how societies respond and adapt to climate-related risks since culture mediates changes in the environment and changes in societies. Culture is no less central to understanding and implementing adaptation; the identification of risks, decisions about responses, and means of implementation are all mediated by culture. Cultures are dynamic and reflexive and are therefore in turn shaped by the idea of climate change. Hence culture, and its analysis, is central to understanding the causes and meaning of, and human responses to climate change (Douglas

and Wildavsky 1982; Shove 2003; Hess et al. 2008; Hulme 2008; Brace and Geoghegan 2011; Adger et al. 2012). This is highly relevant to the Mediterranean context, which is a rich multicultural region composed of countries in Europe, the Middle East, and North Africa, with different, sometimes heterogeneous, cultural representations (The Anna Lindh Report 2018).

Heyd and Brooks (2009) define culture as comprising the ways of living, which involve values, beliefs, practices and material artefacts that condition the production of tangible as well as intangible goods and services needed for the satisfaction of a human group's needs and wants. The culture of any group has to be conceived of as dynamic, subject to constant transformation and in regular interaction with that of other groups, especially given the interrelationships of human populations in today's increasingly globalized context. Moreover, any set of values, beliefs or practices common to a human group is mediated by power relations, and is not simply the result of adaptation to objective conditions of the natural environment. Nevertheless, particular cultural patterns are among the factors that distinguish human groups, and may play a crucial role in the ability of these groups to cope with environmental/climate changes. In line with this perspective, Rull et al. (2016) tried to explain in a case study the concurrence of conspicuous climatic, ecological and cultural changes during the last millennia and how natural and anthropogenic drivers of change, as well as their potential synergies, might have been influential in determining some cultural shifts.

Climate adaptation policies have the potential to infringe on human rights in the Mediterranean region if their conception and implementation are not adequate or disconnected from some concerns such as justice, equity, poverty alleviation, social inclusion, and redistribution (Behnassi 2019). For instance, adaptation actions, such as relocation in response to sea-level rise or other environmental factors, may affect the right to culture, particularly for indigenous peoples, local communities and other vulnerable groups. Undeniably, relocation can have a particular impact on the right to culture of indigenous peoples whose cultural and spiritual practices are tied to the land, or for local communities who might lose access to significant sites such as ancestral burial grounds (Jodoin and Lofts 2013). Adaptation policies in the Mediterranean may have human rights implications, such as those pertaining to food, water, forest, and the availability of other resources to support the adaptation needs of vulnerable populations.

Governments' legal duty under universally recognized, international human rights instruments to protect people from harm, implies the mainstreaming of human rights into adaptation policy and governance (Behnassi 2019). States must therefore ensure that appropriate adaptation measures are taken to protect and fulfill the rights of all persons, particularly those most threatened by negative climate impacts (e.g., individuals and communities living in vulnerable areas of the Mediterranean such as small islands, riparian and low-lying coastal zones, and arid regions). In the context of adaptation, the protection of cultural rights requires that states avoid or minimize policies that could affect these rights. To this end, the protection of cultural rights is increasingly considered as part of adaptation – and even mitigation – policies, and appropriate scoping and risk assessment activities should be undertaken during the process.

To implement adaptation policies, Mediterranean countries need sufficient resources. Lower-income and climate-vulnerable countries, especially on the south shore of the Mediterranean, which are characterized by limited adaptive capacity due to poverty and political instability (Price 2017), are not generally in a financial position to efficiently deal with climate change and fully protect their populations from its adverse impacts. Their limited public budgets are usually dedicated to cover other vital sectors, such as infrastructure, health, nutrition, and education. Any attempt to allocate available resources to fund adaptation policies may negatively affect these sectors. The development and application of financial safeguards can prevent social and environmental harm and maximize participation, transparency, accountability, equity, and rights protection.

Although the UNFCCC established the Green Climate Fund (GCF), from which many Mediterranean countries are already benefiting to support their adaptation policies (Patel et al. 2016), mechanisms to

ensure social and environmental safeguards are yet to be applied to the fund. To do so, institutions involved in funding climate-related activities are required to provide transparent processes, maintain policies and procedures that respect internationally recognized rights, and allow meaningful opportunities for public participation.

Many lower-income and climate-vulnerable Mediterranean countries lack the scientific and technological capacities to deal appropriately and efficiently with environmental change. Thus, science and technology transfer is increasingly considered critical to supporting sustainability and avoiding the shifting of polluting industries from developed countries to the developing world (CIEL 2008), including from northern Mediterranean countries to the southern ones. Establishing an institutional mechanism for science and technology transfer could help to implement a future climate framework in the region. In terms of effective implementation of adaptation strategies, the Sustainable Development Goals (SDG) framework can help ensure that scientific inputs required by the most vulnerable peoples and communities are systematically considered a priority (Behnassi et al. 2019).

5.3.5 Knowledge gaps

The evidence reviewed in this chapter shows that climate change poses risks to various dimensions of human security in the Mediterranean region, which arise through diverse causal processes, and which will manifest at different scales. However, many knowledge gaps remain.

The effects of climate change on migration are contingent upon the vulnerability of individuals and societies to such events. In turn, vulnerability is based on physical risk, political, economic and social characteristics, and individual factors such as gender, age, education, wealth, and social capital. In addition, government strategies designed to address vulnerability and to increase resilience can provide the basis for successful adaptation to climate change. Consequently, more widespread and rigorous research is needed in the following areas:

- The conditioning effect of socio-economic and political factors at different levels. Local contextual factors might even be more important in conditioning migration as vulnerability differs significantly across climate-affected communities/areas.
- Micro-level analysis aiming at identifying the climate and non-climate-related determinants of individual migration decisions.
- The compound effects of both slow-onset climate change and sudden-onset extreme events on migration.
- Collecting better data on migration and natural disasters as well as using better modelling techniques to predict future migration flows.
- The implications of migration on vulnerability, especially in the case of rural-to-urban migration.

One of the most critical problems faced by Mediterranean populations is violent conflict, which often triggers migration and loss of life. Climate change is likely to act as a “threat multiplier” in the Mediterranean region for these processes. However, our knowledge is limited regarding how natural disasters interact with and/or are conditioned by socio-economic, political, and demographic factors that cause conflict. Future research should examine:

- When and where are climate conditions and other environmental challenges likely to lead to conflict or social unrest?
- How and why is climate change associated with conflict, and how are other environmental change drivers involved?
- How will conflict patterns evolve over time under different scenarios of future anthropogenic climate and environmental change?

- Which and how could mitigation and adaptation policies amplify the likelihood of conflict?

Box. 5.3.1 Climate change and the Syrian conflict

Climate variability is popularly reported to be a significant cause of the Syrian conflict that began in 2011. Long-term drought and vulnerability of the population to drought led to large-scale internal migration that contributed to the 2011 popular unrest, which spiraled into Syria's civil war (Gleick 2014; Kelley et al. 2015; Werrell et al. 2015).

Several studies, however, dispute these claims (de Châtel 2014; Kelley et al. 2015; Hendrix 2017; Selby et al. 2017), and argue that the conflict in Syria was not caused by drought but rather was the result of several factors, including water resource degradation, income inequality and increasing poverty, pre-existing socio-economic grievances, long-standing natural resource mismanagement by the government, and the collapse of Syria's agrarian and rentier model of state–building and development. These studies identify government practices as being far more influential drivers than drought, especially since similar drought conditions did not stimulate conflict in neighboring countries (Hendrix 2017).

Authors of the original study on the Fertile Crescent rebut these claims and insist that overlap of acute vulnerability and the long-term drying trend was compounded with "population growth, poor agricultural policies, aggressive economic liberalization and the influx of Iraqi refuges" to create the suggested link between climate change, drought, displacement and unrest (Kelley et al. 2017). However, other critics suggest that the driving mechanisms between weather-related risks, the resource base and the subsequent risks through which climate-conflict-migration interaction occurs, as well as the evidence for exacerbation of displacement due to climate factors are rather poor (Challinor et al. 2018). In his review of the available literature on the Syrian civil war, migration and climate change relations, Ide et al. (2018a) conclude that despite the multidecadal drying trend and an exceptional drought before the onset of the conflict "comprehensive evidence through attribution studies of a (probabilistic) link to climate change is still lacking", and that that there is still a lack of knowledge regarding whether the drought induced "migration, intensified existing grievances and facilitated the onset of protests and the subsequent civil war."

End Box 5.3.1

References

Abel GJ, Brottrager M, Cuaresma JC, Muttarak R 2019 Climate, conflict and forced migration. *Glob. Environ. Chang.* 54, 239–249. doi: 10.1016/j.gloenvcha.2018.12.003

Adano WR, Dietz T, Witsenburg K, Zaal F 2012 Climate change, violent conflict and local institutions in Kenya's drylands. *J. Peace Res.* 49, 65–80. doi: 10.1177/0022343311427344

Adger WN, Arnell NW, Black R, Dercon S, Geddes A et al. 2015 Focus on environmental risks and migration: Causes and consequences. *Environ. Res. Lett. 1* 10, 060201. doi: 10.1088/17489326/10/6/060201

Adger WN, Barnett J, Brown K, Marshall N, O'Brien K 2012 Cultural dimensions of climate change impacts and adaptation. *Nat. Clim. Chang.* 3, 112–117. doi: 10.1038/nclimate1666

Ash K, Obradovich N 2020 Climatic stress, internal migration, and Syrian civil war onset. *J. Conflict Resolut.* 64, 3–31. doi: 10.1177/0022002719864140

Bazzi S, Blattman C 2014 Economic Shocks and Conflict: Evidence from Commodity Prices. *Am. Econ. J. Macroecon.* 6, 1–38. doi: 10.1257/mac.6.4.1

Behnassi M 2019 *Mainstreaming a Rights-Based Approach in the Global Climate Regime*. Springer, Cham doi: 10.1007/978-3-319-92828-9_1

Behnassi M, Gupta H, Pollmann O 2019 *Human and Environmental Security in the Era of Global Risks*. DE: Spring. Berlin-Heidelberg: Springer International Publishing doi: 10.1007/978-3-319-92828-9

Behnassi M, McGlade K 2017 *Environmental Change and Human Security in Africa and the Middle East*. Berlin, Heidelberg: Springer

Bellemare MF 2015 Rising Food Prices, Food Price Volatility, and Social Unrest. *Am. J. Agric. Econ.* 97, 1–21. doi: 10.1093/ajae/aau038

Berazneva J, Lee DR 2013 Explaining the African food riots of 2007–2008: An empirical analysis. *Food Policy* 39, 28–39. doi: 10.1016/j.foodpol.2012.12.007

Bergholt D, Lujala P 2012 Climate-related natural disasters, economic growth, and armed civil conflict. *J. Peace Res.* 49, 147–162. doi: 10.1177/0022343311426167

Bernauer T, Böhmelt T, Koubi V 2012 Environmental changes and violent conflict. *Environ. Res. Lett.* 7, 15601. doi: 10.1088/1748-9326/7/1/015601
Bhavnani RR, Lacina B 2015 The effects of weather-induced migration on sons of the soil violence in India. *World Polit.* 67, 760–794. doi: 10.1017/S0043887115000222
Black R, Adger WN, Arnell NW, Dercon S, Geddes A et al. 2011 The effect of environmental change on human migration. *Glob. Environ. Chang.* 21, S3–S11. doi: 10.1016/j.gloenvcha.2011.10.001
Boas I, Farbotko C, Adams H, Sterly H, Bush S et al. 2019 Climate migration myths. *Nat. Clim. Chang.* 9, 901–903. doi: 10.1038/s41558-019-0633-3
Böhmelt T, Bernauer T, Buhaug H, Gleditsch NP, Tribaldos T et al. 2014 Demand, supply, and restraint: Determinants of domestic water conflict and cooperation. *Glob. Environ. Chang.* 29, 337–348. doi: 10.1016/j.gloenvcha.2013.11.018
Bollfrass A, Shaver A 2015 The effects of temperature on political violence: global evidence at the subnational level. *PLoS One* 10, e0123505. doi: 10.1371/journal.pone.0123505
Brace C, Geoghegan H 2011 Human geographies of climate change: Landscape, temporality, and lay knowledges. *Prog. Hum. Geogr.* 35, 284–302. doi: 10.1177/0309132510376259
Brauch HG 2012 Policy Responses to Climate Change in the Mediterranean and MENA Region during the Anthropocene. *Hexag. Ser. Hum. Environ. Secur. Peace*, 719–794. doi: 10.1007/978-3-642-28626-1_37
Brzoska M, Fröhlich C 2016 Climate change, migration and violent conflict: vulnerabilities, pathways and adaptation strategies. *Migr. Dev.* 5, 190–210. doi: 10.1080/21632324.2015.1022973
Buhaug H 2015 Climate-conflict research: some reflections on the way forward. *Wiley Interdiscip. Rev. Clim. Chang.* 6, 269–275. doi: 10.1002/wcc.336
Buhaug H, Benjaminsen TA, Sjaastad E, Magnus Theisen O 2015 Climate variability, food production shocks, and violent conflict in Sub-Saharan Africa. *Environ. Res. Lett.* 10, 125015. doi: 10.1088/1748-9326/10/12/125015
Buhaug H, Nordkvelle J, Bernauer T, Böhmelt T, Brzoska M et al. 2014 One effect to rule them all? A comment on climate and conflict. *Clim. Change* 127, 391–397. doi: 10.1007/s10584-014-1266-1
Burke M, Davis WM, Diffenbaugh NS 2018 Large potential reduction in economic damages under UN mitigation targets. *Nature* 557, 549–553. doi: 10.1038/s41586-018-0071-9
Butler CK, Gates S 2012 African range wars: Climate, conflict, and property rights. *J. Peace Res.* 49, 23–34. doi: 10.1177/0022343311426166
Butzer KW 2012 Collapse, environment, and society. *Proc. Natl. Acad. Sci. U. S. A.* 109, 3632–3639. doi: 10.1073/pnas.1114845109
Carolin SA, Walker RT, Day CC, Ersek V, Sloan RA et al. 2019 Precise timing of abrupt increase in dust activity in the Middle East coincident with 4.2 ka social change. *Proc. Natl. Acad. Sci. U. S. A.* 116, 67–72. doi: 10.1073/pnas.1808103115
Cattaneo C, Beine M, Fröhlich CJ, Kniveton D, Martinez-Zarzoso I et al. 2019 Human migration in the era of climate change. *Rev. Environ. Econ. Policy* 13, 189–206. doi: 10.1093/reep/rez008
Cederman L-E, Gleditsch KS, Buhaug H 2013 *Inequality, Grievances, and Civil War*. Cambridge University Press doi: 10.1017/cbo9781139084161
CESCR 2018 Climate change and the International Covenant on Economic, Social and Cultural Rights. Statement of the Committee on Economic, Social and Cultural Rights.
Challinor AJ, Adger WN, Benton TG, Conway D, Joshi M et al. 2018 Transmission of climate risks across sectors and borders. *Philos. Trans. R. Soc. A Math. Phys. Eng. Sci.* 376, 20170301. doi: 10.1098/rsta.2017.0301
Chassang S 2009 Economic Shocks and Civil War. *Quart. J. Polit. Sci.* 4, 211–228. doi: 10.1561/100.00008072
Ciccone A 2011 Economic Shocks and Civil Conflict: A Comment. *Am. Econ. J. Appl. Econ.* 3, 215–227. doi: 10.1257/app.3.4.215
CIEL 2008 A Rights-Based Approach to Climate Change Mitigation: The Clean Development Mechanism of the Kyoto Protocol. (prepared for the International Union for the Conservation of Nature).
CIEL 2013 Climate Change and Human Rights: A Primer. Brill doi: 10.1163/9789004322714_cclc_2015-0142-004
CIEL and CARE 2015 Climate change: Tackling the greatest human rights challenge of our time- Recommendations for effective action on climate change and human rights. http://www.carefrance.org/ressources/themas/1/4566,CARE_and_CIEL_-_Climate_Change_and_.pdf
CNA 2007 National security and the threat of climate change.
Collier P, Elliot VL, Hegre H, Hoeffler A, Reynal-Querol M et al. 2003 Breaking the Conflict Trap: Civil War and Development Policy. Washington, DC: World Bank Publications doi: 10.1037/e504012013-001
Costalli S, Moretti L, Pischedda C 2017 The economic costs of civil war. Synthetic counterfactual evidence and the effects of ethnic fractionalization. *J. Peace Res.* 54, 80–98. doi: 10.1177/0022343316675200
de Châtel F 2014 The Role of Drought and Climate Change in the Syrian Uprising: Untangling the Triggers of the Revolution. *Middle East. Stud.* 50, 521–535. doi: 10.1080/00263206.2013.850076
de Haas H 2011 Mediterranean migration futures: Patterns, drivers and scenarios. *Glob. Environ. Chang.* 21, S59–S69. doi: 10.1016/j.gloenvcha.2011.09.003
de Stefano L, Petersen-Perlman JD, Sproles EA, Eynard J, Wolf AT 2017 Assessment of transboundary river basins for potential hydro-political tensions. *Glob. Environ. Chang.* 45, 35–46. doi: 10.1016/j.gloenvcha.2017.04.008
Dell M, Jones BF, Olken BA 2012 Temperature shocks and economic growth: Evidence from the last half century. *Am. Econ. J. Macroecon.* 4, 66–95. doi: 10.1257/mac.4.3.66

Detges A 2014 Close-up on renewable resources and armed conflict. *Polit. Geogr.* 42, 57–65. doi: 10.1016/j.polgeo.2014.06.003
Detges A 2016 Local conditions of drought-related violence in sub-Saharan Africa. *J. Peace Res.* 53, 696–710. doi: 10.1177/0022343316651922
Devlin C, Hendrix CS 2014 Trends and triggers redux: Climate change, rainfall, and interstate conflict. *Polit. Geogr.* 43, 27–39. doi: 10.1016/j.polgeo.2014.07.001
Dinar S, Dinar A, Kurukulasuriya P 2011 Scarcity and cooperation along international rivers: an empirical assessment of bilateral treaties. *Int. Stud. Q.* 55, 809–833. doi: 10.1111/j.1468-2478.2011.00671.x
Dinar S, Katz D, de Stefano L, Blankespoor B 2015 Climate change, conflict, and cooperation: Global analysis of the effectiveness of international river treaties in addressing water variability. *Polit. Geogr.* 45, 55–66. doi: 10.1016/j.polgeo.2014.08.003
Dinar S, Katz D, de Stefano L, Blankespoor B 2019 Do treaties matter? Climate change, water variability, and cooperation along transboundary river basins. *Polit. Geogr.* 69, 162–172. doi: 10.1016/j.polgeo.2018.08.007
Douglas M, Wildavsky A 1982 Risk and culture: an essay on the selection of technological and environmental dangers. Oxford University Press (OUP) doi: 10.2307/3984511
Dupuy K, Gates S, Nygård HM, Rudolfsen I, Rustad SA et al. 2017 Trends in Armed Conflict, 1946–2016. Oslo: PRIO https://www.prio.org/utility/DownloadFile.ashx?id=1373&type=publicationfile
Durigon A, de Jong van Lier Q 2013 Canopy temperature versus soil water pressure head for the prediction of crop water stress. *Agric. Water Manag.* 127, 1–6. doi: 10.1016/j.agwat.2013.05.014
Eastin J 2015 Fuel to the Fire: Natural Disasters and the Duration of Civil Conflict. *Int. Interact.* 42, 322–349. doi: 10.1080/03050629.2016.1115402
Elia A 2016 Guaranteeing Access to Palliative Care between National Law and Emerging International Legal Framework: An Overview of the Italian and Spanish Experiences. *Asia Pacific J. Heal. Law Ethics* 10, 71.
Ember CR, Skoggard I, Adem TA, Faas AJ 2014 Rain and raids revisited: disaggregating ethnic group livestock raiding in the Ethiopian-Kenyan border region. *Civ. Wars* 16, 300–327. doi: 10.1080/13698249.2014.966430
Fair CC, Kuhn P, Malhotra NA, Shapiro J 2017 Natural disasters and political engagement: evidence from the 2010–11 Pakistani floods. *Stanford Univ. Grad. Sch. Bus. Res. Pap.* 17–42. doi: 10.2139/ssrn.2978047
Feitelson E, Tubi A 2017 A main driver or an intermediate variable? Climate change, water and security in the Middle East. *Glob. Environ. Chang.* 44, 39–48. doi: 10.1016/J.GLOENVCHA.2017.03.001
Felli R 2013 Managing Climate Insecurity by Ensuring Continuous Capital Accumulation: 'Climate Refugees' and 'Climate Migrants.' *New Polit. Econ.* 18, 337–363. doi: 10.1080/13563467.2012.687716
Fjelde H 2015 Farming or Ffghting? Agricultural price shocks and civil war in Africa. *World Dev.* 67, 525–534. doi: 10.1016/j.worlddev.2014.10.032
Fjelde H, von Uexkull N 2012 Climate triggers: Rainfall anomalies, vulnerability and communal conflict in Sub-Saharan Africa. *Polit. Geogr.* 31, 444–453. doi: 10.1016/j.polgeo.2012.08.004
Fröhlich CJ 2016 Climate migrants as protestors? Dispelling misconceptions about global environmental change in pre-revolutionary Syria. *Contemp. Levant* 1, 38–50. doi: 10.1080/20581831.2016.1149355
Gates S, Hegre H, Nygård HM, Strand H 2012 Development Consequences of Armed Conflict. *World Dev.* 40, 1713–1722. doi: 10.1016/j.worlddev.2012.04.031
Geddes A 2015 Governing migration from a distance: interactions between climate, migration, and security in the South Mediterranean. *Eur. Secur.* 24, 473–490. doi: 10.1080/09662839.2015.1028191
Ghimire R, Ferreira S 2016 Floods and armed conflict. *Environ. Dev. Econ.* 21, 23–52. doi: 10.1017/s1355770x15000157
Gleick PH 2014 Water, drought, climate change, and conflict in Syria. *Weather. Clim. Soc.* 6, 331–340. doi: 10.1175/wcas-d-13-00059.1
Goldstone JA 2002 Population and security. How demographic change can lead to violent conflict. *J. Int. Aff.* 56, 3–22.
Haldon J, Roberts N, Izdebski A, Fleitmann D, McCormick M et al. 2014 The climate and environment of Byzantine Anatolia: Integrating science, history, and archaeology. *J. Interdiscip. Hist.* 45, 113–161. doi: 10.1162/JINH{_}a{_}00682
Hallegatte S, Bangalore M, Bonzanigo L, Fay M, Kane T et al. 2016 *Shock waves: managing the impacts of climate change on poverty.* The World. Washington, DC doi: doi:10.1596/978-1-4648-0673-5
Hallegatte S, Rozenberg J 2017 Climate change through a poverty lens. *Nat. Clim. Chang.* 7, 250–256. doi: 10.1038/nclimate3253
Harari M, Ferrara E La 2018 Conflict, climate, and cells: A disaggregated analysis. *Rev. Econ. Stat.* 100, 594–608. doi: 10.1162/rest_a_00730
Hegre H, Buhaug H, Calvin K V., Nordkvelle J, Waldhoff ST et al. 2016 Forecasting civil conflict along the shared socioeconomic pathways. *Environ. Res. Lett.* 11, 54002. doi: 10.1088/1748-9326/11/5/054002
Hendrix CS 2017 A comment on "climate change and the Syrian civil war revisited." *Polit. Geogr.* 60, 251–252. doi: 10.1016/j.polgeo.2017.06.010
Hess JJ, Malilay JN, Parkinson AJ 2008 Climate Change: The importance of place. *Am. J. Prev. Med.* 35, 468–478. doi: 10.1016/j.amepre.2008.08.024
Heyd T, Brooks N 2009 Exploring cultural dimensions of adaptation to climate change: Thresholds, values, governance, in *Adapting to Climate Change*, eds. Neil Adger W, Lorenzoni I, O'Brien K (Cambridge University Press), 269–282. doi: 10.1017/cbo9780511596667.018

Hodler R, Raschky PA 2014 Economic shocks and civil conflict at the regional level. *Econ. Lett.* 124, 530–533. doi: 10.1016/j.econlet.2014.07.027
Holmgren K, Gogou A, Izdebski A, Luterbacher J, Sicre M-A et al. 2016 Mediterranean Holocene climate, environment and human societies. *Quat. Sci. Rev.* 136, 1–4. doi: 10.1016/j.quascirev.2015.12.014
Homer-Dixon TF 1999 *Environment, Scarcity, and Violence*. Princeton: Princeton University Press
Hulme M 2008 The conquering of climate: discourses of fear and their dissolution. *Geogr. J.* 174, 5–16. doi: 10.1111/j.1475-4959.2008.00266.x
Hunter LM, Luna JK, Norton RM 2015 Environmental Dimensions of Migration. *Annu. Rev. Sociol.* 41, 377–397. doi: 10.1146/annurev-soc-073014-112223
Ide T 2018a Climate War in the Middle East? Drought, the Syrian Civil War and the State of Climate-Conflict Research. *Curr. Clim. Chang. Reports* 4, 347–354. doi: 10.1007/s40641-018-0115-0
Ide T 2018b Does environmental peacemaking between states work? Insights on cooperative environmental agreements and reconciliation in international rivalries. *J. Peace Res.* 55, 351–365. doi: 10.1177/0022343317750216
Ide T, Schilling J, Link JSA, Scheffran J, Ngaruiya G et al. 2014 On exposure, vulnerability and violence: Spatial distribution of risk factors for climate change and violent conflict across Kenya and Uganda. *Polit. Geogr.* 43, 68–81. doi: 10.1016/j.polgeo.2014.10.007
IPCC 2007 *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. , eds. Parry ML, Canziani OF, Palutikof JP, Van der Linden PJ, Hanson CE Cambridge, United Kingdom and New York, NY, USA
IPCC 2013 *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. , eds. Stocker TF, Qin D, Plattner G-K, Tignor M, Allen SK et al. Cambridge, United Kingdom and New York, NY, USA
IPCC 2014 *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel of Climate Change*. , eds. Field CB, Barros VR, Dokken DJ, Mach KJ, Mastrandrea MD et al. Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press http://www.citeulike.org/group/15400/article/13497155 [Accessed March 11, 2017]
IPCC 2018a *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change,*. , eds. Masson-Delmotte V, Zhai P, Pörtner HO, Roberts D, Skea J et al. In press
IPCC 2018b Summary for Policymakers, in *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change,* eds. Masson-Delmotte V, Zhai P, Pörtner HO, Roberts D, Skea J et al. (In press).
IUCN 2017 IUCN World Heritage Outlook 2017. https://worldheritageoutlook.iucn.org/results
Jodoin S, Lofts K 2013 Economic, social, and cultural rights and climate change: a legal reference guide. *New Haven, Ct. CISDL, GEM ASAP*.
Johnstone S, Mazo J 2011 Global warming and the Arab Spring. *Survival (Lond).* 53, 11–17. doi: 10.1080/00396338.2011.571006
Jones BT, Mattiacci E, Braumoeller BF 2017 Food scarcity and state vulnerability: Unpacking the link between climate variability and violent unrest. *J. Peace Res.* 54, 335–350. doi: 10.1177/0022343316684662
Jun T 2017 Temperature, maize yield, and civil conflicts in sub-Saharan Africa. *Clim. Change* 142, 183–197. doi: 10.1007/s10584-017-1941-0
Kalbhenn A 2011 Liberal peace and shared resources – A fair-weather phenomenon? *J. Peace Res.* 48, 715–735. doi: 10.1177/0022343311420459
Kaniewski D, Guiot J, Van Campo E 2015 Drought and societal collapse 3200 years ago in the Eastern Mediterranean: a review. *Wiley Interdiscip. Rev. Clim. Chang.* 6, 369–382. doi: 10.1002/wcc.345
Kaniewski D, Marriner N, Cheddadi R, Guiot J, Van Campo E 2018 The 4.2 ka BP event in the Levant. *Clim. Past* 14, 1529–1542. doi: 10.5194/cp-14-1529-2018
Kaniewski D, Van Campo E, Weiss H 2012 Drought is a recurring challenge in the Middle East. *Proc. Natl. Acad. Sci. U. S. A.* 109, 3862–3867. doi: 10.1073/pnas.1116304109
Kelley C, Mohtadi S, Cane MA, Seager R, Kushnir Y 2017 Commentary on the Syria case: Climate as a contributing factor. *Polit. Geogr.* 60, 245–247. doi: 10.1016/j.polgeo.2017.06.013
Kelley CP, Mohtadi S, Cane MA, Seager R, Kushnir Y 2015 Climate change in the Fertile Crescent and implications of the recent Syrian drought. *Proc. Natl. Acad. Sci. U. S. A.* 112, 3241–3246. doi: 10.1073/pnas.1421533112
Koubi V 2019 Climate Change and Conflict. *Annu. Rev. Polit. Sci.* 22, 343–360. doi: 10.1146/annurev-polisci-050317-070830
Koubi V, Bernauer T, Kalbhenn A, Spilker G 2012 Climate variability, economic growth, and civil conflict. *J. Peace Res.* 49, 113–127. doi: 10.1177/0022343311427173
Koubi V, Böhmelt T, Spilker G, Schaffer L 2018 The determinants of environmental migrants' conflict perception. *Int. Organ.* 72, 905–936. doi: 10.1017/S0020818318000231
Koubi V, Nguyen Q, Spilker G, Böhmelt T 2021 Environmental migrants and social movement participation. *J. Peace Res.* 58, xx–xx.

Koubi V, Spilker G, Schaffer L, Böhmelt T 2016 The role of environmental perceptions in migration decision-making: evidence from both migrants and non-migrants in five developing countries. *Popul. Environ.* 38, 134–163. doi: 10.1007/s11111-016-0258-7

Landis ST 2014 Temperature seasonality and violent conflict. *J. Peace Res.* 51, 603–618. doi: 10.1177/0022343314538275

Latorre C, Wilmshurst J, von Gunten L 2016 Climate change and cultural evolution across the world. *Past Glob. Chang. Mag.* 24, 55. doi: 10.22498/pages.24.2.55

Link PM, Scheffran J, Ide T 2016 Conflict and cooperation in the water-security nexus: a global comparative analysis of river basins under climate change. *Wiley Interdiscip. Rev. Water* 3, 495–515. doi: 10.1002/wat2.1151

Linke AM, O'Loughlin J, McCabe JT, Tir J, Witmer FDW 2015 Rainfall variability and violence in rural Kenya: Investigating the effects of drought and the role of local institutions with survey data. *Glob. Environ. Chang.* 34, 35–47. doi: 10.1016/j.gloenvcha.2015.04.007

Linke AM, Witmer FDW, O'Loughlin J, McCabe JT, Tir J 2018 The consequences of relocating in response to drought: human mobility and conflict in contemporary Kenya. *Environ. Res. Lett.* 13, 094014. doi: 10.1088/1748-9326/aad8cc

Maystadt J-F, Calderone M, You L 2015 Local warming and violent conflict in North and South Sudan. *J. Econ. Geogr.* 15, 649–671. doi: 10.1093/jeg/lbu033

Maystadt J-F, Ecker O 2014 Extreme weather and civil war: does drought fuel conflict in Somalia through livestock price shocks? *Am. J. Agric. Econ.* 96, 1157–1182. doi: 10.1093/ajae/aau010

McAdam J 2016 From the Nansen Initiative to the platform on disaster displacement: Shaping international approaches to climate change, disasters and displacement. *Univ. N. S. W. Law J.* 39, UNSW Law Research Paper No. 17-4.

McLeman R, Gemenne F 2018 Environmental migration research: Evolution and current state of the science, in *Handbook of Environmental Displacement and Migration*, eds. McLeman R, Gemenne F (London: Routledge), 3–16.

Methmann C, Rothe D 2014 Tracing the spectre that haunts Europe: the visual construction of climate-induced migration in the MENA region. *Crit. Stud. Secur.* 2, 162–179. doi: 10.1080/21624887.2014.909226

Miguel E, Satyanath S, Sergenti E 2004 Economic shocks and civil conflict: an instrumental variables approach. *J. Polit. Econ.* 112, 725–753. doi: 10.1086/421174

Munia H, Guillaume JHA, Mirumachi N, Porkka M, Wada Y et al. 2016 Water stress in global transboundary river basins: significance of upstream water use on downstream stress. *Environ. Res. Lett.* 11, 14002. doi: 10.1088/1748-9326/11/1/014002

Nardulli PF, Peyton B, Bajjalieh J 2015 Climate change and civil unrest: the impact of rapid-onset disasters. *J. Conflict Resolut.* 59, 310–335. doi: 10.1177/0022002713503809

Nel P, Righarts M 2008 Natural Disasters and the Risk of Violent Civil Conflict. *Int. Stud. Q.* 52, 159–185. doi: 10.1111/j.1468-2478.2007.00495.x

Newman E 2020 Hungry, or hungry for change? Food riots and political conflict, 2005–2015. *Stud. Confl. Terror.* 43, 300–324. doi: 10.1080/1057610x.2018.1454042

Nordkvelle J, Rustad SA, Salmivalli M 2017 Identifying the effect of climate variability on communal conflict through randomization. *Clim. Change* 141, 627–639. doi: 10.1007/s10584-018-2303-2

O'Loughlin J, Linke AM, Witmer FDW 2014 Effects of temperature and precipitation variability on the risk of violence in sub-Saharan Africa, 1980–2012. *Proc. Natl. Acad. Sci. U. S. A.* 111, 16712–16717. doi: 10.1073/pnas.1411899111

Obradovich N 2017 Climate change may speed democratic turnover. *Clim. Change* 140, 135–147. doi: 10.1007/s10584-016-1833-8

Oktav ÖZ 2017 Turkey's Water Policy in the Euphrates-Tigris Basin. *Environ. Chang. Hum. Secur. Africa Middle East*, 239–255. doi: 10.1007/978-3-319-45648-5_13

Páscoa P, Gouveia CM, Russo A, Trigo RM 2017 The role of drought on wheat yield interannual variability in the Iberian Peninsula from 1929 to 2012. *Int. J. Biometeorol.* 61, 439–451. doi: 10.1007/s00484-016-1224-x

Pasini A, Amendola S 2019 Linear and nonlinear influences of climatic changes on migration flows: a case study for the 'Mediterranean bridge.' *Environ. Res. Commun.* 1, 11005. doi: 10.1088/2515-7620/ab0464

Patel S, Watson S, Schalatek L 2016 Climate Finance Regional Briefing: Middle East and North Africa, Climate Funds Update. *Clim. Financ. Fundam. 9*, 4. https://www.odi.org/sites/odi.org.uk/files/resource-documents/11042.pdf

Paul JA, Bagchi A 2018 Does terrorism increase after a natural disaster? An analysis based upon property damage. *Def. Peace Econ.* 29, 407–439. doi: 10.1080/10242694.2016.1204169

Pretis F, Schwarz M, Tang K, Haustein K, Allen MR 2018 Uncertain impacts on economic growth when stabilizing global temperatures at 1.5°C or 2°C warming. *Philos. Trans. R. Soc. A Math. Phys. Eng. Sci.* 376, 20160460. doi: 10.1098/rsta.2016.0460

Price RA 2017 Climate change and stability in North Africa. 18. https://assets.publishing.service.gov.uk/media/5a7052bded915d266017b8aa/242_Climate_change_and_stability_in_Northern_Africa.pdf

Raleigh C, Choi HJ, Kniveton D 2015 The devil is in the details: An investigation of the relationships between conflict, food price and climate across Africa. *Glob. Environ. Chang.* 32, 187–199. doi: 10.1016/j.gloenvcha.2015.03.005

Raleigh C, Jordan L, Salehyan I 2008 Assessing the Impact of Climate Change on Migration and Conflict. Washington, DC

Reimann L, Vafeidis AT, Brown S, Hinkel J, Tol RSJ 2018 Mediterranean UNESCO World Heritage at risk from coastal flooding and erosion due to sea-level rise. *Nat. Commun.* 9. doi: 10.1038/s41467-018-06645-9

Reuveny R 2007 Climate change-induced migration and violent conflict. *Polit. Geogr.* 26, 656–673. doi: 10.1016/j.polgeo.2007.05.001

Richardson K, Steffen W, Schellnhuber H-J, Alcamo J, Barker T et al. 2009 *Synthesis Report. Climate change: global risks, challenges and decisions, Copenhagen, Denmark, 10-12 March, 2009.* Copenhagen: University of Copenhagen
Rigaud KK, de Sherbinin A, Jones B, Bergmann J, Clement V et al. 2018 Groundswell: Preparing for Internal Climate Migration. Washington, DC https://openknowledge.worldbank.org/handle/10986/29461
Rothe D 2017 *Securitizing global warming: a climate of complexity*. Routledge doi: 10.4324/9781315677514
Rull V, Cañellas-Boltà N, Margalef O, Pla-Rabes S, Sáez A et al. 2016 Climate changes and cultural shifts on Easter Island during the last three millennia. *Past Glob. Chang. Mag.* 24, 70–71. doi: 10.22498/pages.24.2.70
Salehyan I, Hendrix CS 2014 Climate shocks and political violence. *Glob. Environ. Chang.* 28, 239–250. doi: 10.1016/j.gloenvcha.2014.07.007
Schauberger B, Archontoulis S, Arneth A, Balkovič J, Ciais P et al. 2017 Consistent negative response of US crops to high temperatures in observations and crop models. *Nat. Commun.* 8, 13931. doi: 10.1038/ncomms13931
Scheffran J, Brzoska M, Brauch HG, Link PM, Schilling J 2012 *Climate Change, Human Security and Violent Conflict: Challenges for Societal Stability*. Springer. Berlin https://www.springer.com/gp/book/9783642286254
Schilling J, Freier KP, Hertig E, Scheffran J 2012 Climate change, vulnerability and adaptation in North Africa with focus on Morocco. *Agric. Ecosyst. Environ.* 156, 12–26. doi: 10.1016/J.AGEE.2012.04.021
Schleussner C-F, Donges JF, Donner R V., Schellnhuber H-J 2016 Armed-conflict risks enhanced by climate-related disasters in ethnically fractionalized countries. *Proc. Natl. Acad. Sci. U. S. A.* 113, 9216–9221. doi: 10.1073/pnas.1601611113
Selby J, Dahi OS, Fröhlich C, Hulme M 2017 Climate change and the Syrian civil war revisited. *Polit. Geogr.* 60, 232–244. doi: 10.1016/j.polgeo.2017.05.007
Shove S 2003 *Comfort, Cleanliness and Convenience : The Social Organization of Normality*. Bloomsbury Academic doi: 10.5040/9781474214605
Siebert S, Ewert F, Eyshi Rezaei E, Kage H, Graß R 2014 Impact of heat stress on crop yield—on the importance of considering canopy temperature. *Environ. Res. Lett.* 9, 044012. doi: 10.1088/1748-9326/9/4/044012
Smith TG 2014 Feeding unrest: Disentangling the causal relationship between food price shocks and sociopolitical conflict in urban Africa. *J. Peace Res.* 51, 679–695. doi: 10.1177/0022343314543722
Sneyd LQ, Legwegoh A, Fraser EDG 2013 Food riots: Media perspectives on the causes of food protest in Africa. *Food Secur.* 5, 485–497. doi: 10.1007/s12571-013-0272-x
Spilker G, Nguyen Q, Koubi V, Böhmelt T 2020 Attitudes of urban residents towards environmental migration in Kenya and Vietnam. *Nat. Clim. Chang.* 10, 622–627. doi: 10.1038/s41558-020-0805-1
Sternberg T 2012 Chinese drought, bread and the Arab Spring. *Appl. Geogr.* 34, 519–524. doi: 10.1016/j.apgeog.2012.02.004
The Anna Lindh Report 2018 Intercultural Trends and Social Change in the Euro-Mediterranean region. https://www.interculturaltrendsreport.com/wp-content/uploads/2018/11/Anna-Lindh-Report-on-Intercultural-Trends.pdf
Theisen OM 2012 Climate clashes? Weather variability, land pressure, and organized violence in Kenya, 1989–2004. *J. Peace Res.* 49, 81–96. doi: 10.1177/0022343311425842
Theisen OM, Gleditsch NP, Buhaug H 2013 Is climate change a driver of armed conflict? *Clim. Change* 117, 613–625. doi: 10.1007/s10584-012-0649-4
Tir J, Stinnett DM 2012 Weathering climate change: Can institutions mitigate international water conflict? *J. Peace Res.* 49, 211–225. doi: 10.1177/0022343311427066
Tol RSJ 2018 The Economic Impacts of Climate Change. *Rev. Environ. Econ. Policy* 12, 4–25. doi: 10.1093/reep/rex027
Tolba MK, Saab N 2009 Impact of Climate Change on Arab Countries. http://www.afedonline.org/afedreport09/Full English Report.pdf
Tramblay Y, Hertig E 2018 Modelling extreme dry spells in the Mediterranean region in connection with atmospheric circulation. *Atmos. Res.* 202, 40–48. doi: 10.1016/j.atmosres.2017.11.015
Tschakert P, Ellis NR, Anderson C, Kelly A, Obeng J 2019 One thousand ways to experience loss: A systematic analysis of climate-related intangible harm from around the world. *Glob. Environ. Chang.* 55, 58–72. doi: 10.1016/j.gloenvcha.2018.11.006
Tubi A, Feitelson E 2016 Drought and cooperation in a conflict prone area: Bedouin herders and Jewish farmers in Israel's northern Negev, 1957–1963. *Polit. Geogr.* 51, 30–42. doi: 10.1016/j.polgeo.2015.11.009
Tucker J, Daoud M, Oates N, Few R, Conway D et al. 2015 Social vulnerability in three high-poverty climate change hot spots: What does the climate change literature tell us? *Reg. Environ. Chang.* 15, 783–800. doi: 10.1007/s10113-014-0741-6
UNFCCC 2007 Climate Change: Impacts, Vulnerabilities and Adaptation in Developing Countries, Information Services of the UNFCCC secretariat. https://unfccc.int/resource/docs/convkp/conveng.pdf
UNHRC 2008 Report of the Human Rights Council on its 7th session (A/HRC/7/78). https://documents-dds-ny.un.org/doc/UNDOC/GEN/G08/146/63/PDF/G0814663.pdf?OpenElement
van Weezel S 2015 Economic shocks & civil conflict onset in Sub-Saharan Africa, 1981–2010. *Def. Peace Econ.* 26, 153–177. doi: 10.1080/10242694.2014.887489
von Uexkull N 2014 Sustained drought, vulnerability and civil conflict in Sub-Saharan Africa. *Polit. Geogr.* 43, 16–26. doi: 10.1016/j.polgeo.2014.10.003
von Uexkull N, Croicu M, Fjelde H, Buhaug H 2016 Civil conflict sensitivity to growing-season drought. *Proc. Natl. Acad. Sci. U. S. A.* 113, 12391–12396. doi: 10.1073/pnas.1607542113

Waha K, Krummenauer L, Adams S, Aich V, Baarsch F et al. 2017 Climate change impacts in the Middle East and Northern Africa (MENA) region and their implications for vulnerable population groups. *Reg. Environ. Chang.* 17, 1623–1638. doi: 10.1007/s10113-017-1144-2

Wallemacq P, Below R, McLean D 2018 Economic Losses, Poverty and Disasters 1998–2017.

Weinthal E, Zawahri N, Sowers J 2015 Securitizing water, climate, and migration in Israel, Jordan, and Syria. *Int. Environ. Agreements Polit. Law Econ.* 15, 293–307. doi: 10.1007/s10784-015-9279-4

Weiss H, Courty M-A, Wetterstrom W, Guichard F, Senior L et al. 1993 The Genesis and Collapse of Third Millennium North Mesopotamian Civilization. *Science (80-.).* 261, 995–1004. doi: 10.1126/science.261.5124.995

Werrell CE, Femia F, Sternberg T 2015 "Did We See It Coming?: State Fragility, Climate Vulnerability, and the Uprisings in Syria and Egypt." *SAIS Rev. Int. Aff.* 35 (1), 29–46. doi: 10.1353/sais.2015.0002

White S 2011 *The Climate of Rebellion in the Early Modern Ottoman Empire*. Cambridge University Press doi: 10.1017/cbo9780511844058

WHO 2016 World Health Statistics 2016: Monitoring Health for the SDGs, sustainable development goals. https://www.who.int/gho/publications/world_health_statistics/2016/en/

Wolf AT 2007 Shared Waters: Conflict and Cooperation. *Annu. Rev. Environ. Resour.* 32, 241–269. doi: 10.1146/annurev.energy.32.041006.101434

Wood RM, Wright TM 2016 Responding to catastrophe: Repression dynamics following rapid-onset natural disasters. *J. Conflict Resolut.* 60, 1446–1472. doi: 10.1177/0022002715596366

Xoplaki E, Fleitmann D, Luterbacher J, Wagner S, Haldon JF et al. 2016 The Medieval Climate Anomaly and Byzantium: A review of the evidence on climatic fluctuations, economic performance and societal change. *Quat. Sci. Rev.* 136, 229–252. doi: 10.1016/j.quascirev.2015.10.004