

CLIMATE CHANGE, RESPONSE, AND MASS ATROCITIES

Sudikoff Interdisciplinary Seminar on Genocide Prevention

BACKGROUND PAPER JANUARY 2024



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teaches that the Holocaust was preventable and that by heeding warning signs and taking early action, individuals and governments can save lives. With this knowledge, the **Simon-Skjodt Center for the Prevention of Genocide** works to do for the victims of genocide today what the world failed to do for the Jews of Europe in the 1930s and 1940s. The mandate of the Simon-Skjodt Center is to alert the United States' national conscience, influence policy makers, and stimulate worldwide action to prevent and work to halt acts of genocide or related crimes against humanity, and advance justice and accountability. Learn more at ushmm.org/genocide-prevention.

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COVER: A girl is going to collect safe drinking water in a flash flooded village in northern part of Bangladesh. 15 July 2017. *Aminul Sawon / Alamy Stock Photo*

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INTRODUCTION

This paper aims to stimulate and frame discussion during the Sudikoff Interdisciplinary Seminar on Genocide Prevention about the relationship between climate change, climate response, and mass atrocities. Based on a review of relevant research, the paper surveys current knowledge about how factors related to (1) climate change and (2) climate response measures might contribute to the risk and prevention of mass atrocities. In the coming decade, climate change will pose significant risks for communities around the world ([Buhaug et al. 2023](#)). Mitigation and adaptation measures taken in response to these risks will occupy a large amount of international attention and have important consequences for global political events. Effective action to help prevent and respond to mass atrocities will require clear analysis of the risks and opportunities that these trends present.

The interaction between climate change and political violence has received growing attention from policy makers, civil society actors, and scholars. For example, the most recent *Global Trends* report from the US Office of the Director of National Intelligence highlights climate change as one “structural force” that may exacerbate conflict in countries “with ethnic or religious polarization; livelihoods highly dependent on natural resources or agriculture; weak or illegitimate conflict resolution mechanisms; a history of violence; and low adaptive capacity” ([ODNI 2021](#), p. 40). A large body of scholarly literature now examines the relationship between climate change and violent conflict ([von Uexkell and Buhaug 2019](#)).

This seminar is a small effort to expand discussion and deepen understanding of two specific issues: (1) the relationship between climate change and *mass atrocities*, defined as large-scale and systematic attacks on civilian populations, as distinct from conflict more generally, and (2) the potential effects of climate response measures, as distinct from climate trends themselves, on mass atrocities. This background paper mainly focuses on describing the mechanisms that might connect either climate change or climate response measures to mass atrocities.

DISCUSSION QUESTIONS

During the upcoming seminar sessions, we plan to discuss the following questions:

...about the effects of climate change:

- In addition to the findings that we highlight in the seminar background paper, what is known about the relationship between climate change and risks of mass atrocities?
- What are some of the most promising approaches that governments, international organizations, and civil society organizations are using to address these risks?
- Which new or additional actions would help reduce mass atrocity risks associated with climate change?

...about the effects of climate response measures:

- What is known about the relationship between climate response measures and risks of mass atrocities?
- Which actions would help reduce mass atrocity risks associated with climate mitigation and adaptation?
- How can various actors—including governments, international organizations, private firms, and civil society organizations—pursue climate response measures in countries at highest risk of mass atrocities in ways that also help reduce mass-atrocity risks?

KEY CONCEPTS AND DEFINITIONS

Mass atrocities refer to “large-scale, systematic violence against civilian populations” ([Straus 2016](#), p. 31). This conceptual definition overlaps with most instances of genocide and crimes against humanity, and some war crimes, as defined in international law.

Atrocity prevention, as defined by Straus ([2016](#)), is “the effort to prevent, contain, and/or mitigate violence against non-combatants either in or out of conflict.” Atrocity prevention can draw on a wide range of strategies and tools available to governments—including diplomacy, foreign assistance, defense cooperation, and military action—and non-governmental actors.

Climate change refers to the general trend and subsequent environmental effects of the global increase in surface temperature as a result of human activities, especially since the late 19th century. In addition to its direct effects on overall weather trends and extreme weather events, climate change has also “led to widespread adverse impacts on food and water security, human health and on economies and society and related losses and damages to nature and people” ([IPCC 2023](#), p. 42).

Climate response measures are normally categorized as either mitigation or adaptation. Climate mitigation refers to “a human intervention to reduce emissions or enhance” the removal of greenhouse gasses from the

atmosphere ([IPCC 2022b](#), p. 1807). Mitigation includes measures such as reducing fossil-fuel use, increasing use of renewable-energy sources such as wind, solar, hydro-, and nuclear power, and the replenishment or expansion of forests.

Climate adaptation refers to “the process of adjustment to actual or expected climate and its effects in order to moderate harm or exploit beneficial opportunities” ([IPCC 2022a](#), p. 43). Adaptation includes measures such as migration in response to climate changes and their environmental effects, changes in the use of common resources to address scarcity, and changes to physical infrastructure to improve resilience against extreme weather events.

GENERAL CONCLUSIONS ABOUT CLIMATE CHANGE AND MASS ATROCITIES

Although experts disagree about various aspects of the relationship between climate issues and political violence, the most recent report of the UN Intergovernmental Panel on Climate Change (IPCC) includes several points on which there is widespread agreement. For the last 35 years, the IPCC has been the leading body responsible for assessing scientific consensus about climate change and its consequences. In particular, a recent IPCC working group report ([Gilmore et al. 2022](#)) provides the following five major conclusions about the effect of climate change on conflict, excerpted from a summary by Buhaug, de Coning, and von Uexkull ([2023](#)):

1. ‘Climate change undermines human livelihoods and security, because it increases the population’s vulnerabilities [sic], grievances and political tensions through an array of indirect—at times nonlinear—pathways, thereby increasing human insecurity and the risk of violent conflict’ ([IPCC 2022b](#), p. 2673).
2. ‘...risks to peace will increase with warming, with the largest impacts expected in weather-sensitive communities with low resilience to climate extremes and high prevalence of underlying risk factors’ ([IPCC 2022b](#), p. 2465).
3. ‘Even with moderate climate change people in vulnerable regions will experience a further erosion of livelihood security that can interact with humanitarian crises, such as [...] violent conflict, and lead to social tipping points’ ([IPCC 2022b](#), p. 1175).
4. ...the strength of a correlation (and plausibility of a causal link) [between climate and conflict] varies across cases, depending on prevailing societal and environmental characteristics.
5. ...the relative importance of climatic factors in shaping conflict can vary widely, even if the average effect across a large number of conflicts is found to be weak.

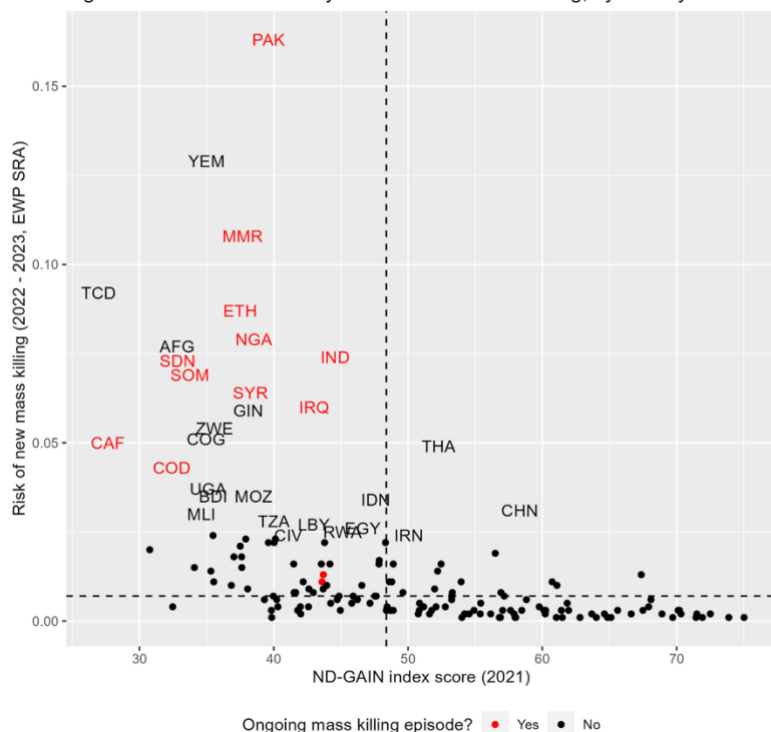
Future climate scenarios and their specific effects on mass atrocities are uncertain. To lessen this uncertainty and to account for the context-dependency of climate impacts, we focus on how climate change and climate response will influence trends in countries at greatest risk of mass atrocities. To illustrate, Figure 1 suggests an apparent association between the countries most vulnerable to climate change, on the left side of the figure,

and those at greatest risk of experiencing a new mass killing episode, towards the top.¹ This association is likely attributable to factors, such as poor governance, that may increase climate vulnerability and risks of mass atrocities in tandem.

HOW CLIMATE CHANGE MIGHT INFLUENCE MASS-ATROCITY RISKS

Although there is no widely accepted explanation for why genocide and related mass atrocities occur, there is reasonably broad consensus on the importance of certain risk factors (Straus 2016). These factors can be thought of as enabling conditions that increase the overall likelihood of new mass atrocities in a country, rather than proximate causes of violence (McLoughlin 2014). We expect that climate impacts on these risk factors will be indirect, will vary across contexts, and that climate will be one of many potential forces affecting the risk factors (Mach et al. 2019; Buhaug et al. 2023).²

Figure 1: Climate vulnerability vs. risk of new mass killing, by country



Straus (2016) highlights two factors of particular relevance to our analysis of climate risks: (1) large-scale conflict or instability; and (2) exclusionary ideologies. Large-scale conflict or instability may increase mass-atrocity risks by providing perpetrators with new capacity to commit violence, incentives to suspend or ignore the rule of law, or incentives to target specific civilian populations (Butcher et al. 2020). Exclusionary ideologies may provide perpetrators with a set of themes, symbols, and common references that justify violence against particular groups (Maynard 2022).

We highlight plausible mechanisms connecting climate change and these two mass atrocity risk factors, given extant research. Readers should interpret these mechanisms as an exercise in “informed speculation” about factors that may shift motives, means, or opportunities for violence. We do not claim that this is a comprehensive list. In addition to their separate impacts, these two factors also interact: violent conflict can increase support for exclusionary ideologies, and vice versa. At the country level, for example, von Uexkull and Buhaug (2016) find that conflict risks due to drought—one important source of resource competition—are concentrated where there are prior patterns of group-targeted exclusion.

Conflict and instability: Climate change may contribute to potential conflict and instability through two main mechanisms:

- **RAISING THE STAKES AND FREQUENCY OF DISPUTES OVER NATURAL RESOURCES**: Globally, climate change reduces the overall availability of land suitable for agricultural production ([IPCC 2022a](#), p. 49). Climate factors may also lead populations to migrate or claim access to land over which other populations or groups have conflicting claims ([Hoffmann, Šedová, and Vinke 2021](#)). The combination of constraints on the supply of essential resources, such as food, and new resource demands may create new sources of conflict between groups ([Koren and Bagozzi 2016](#)). Climate factors may also intensify conflict between groups associated with particular forms of economic production that use land for different purposes, such as farming and herding communities in the West African Sahel ([Schon et al. 2023](#)).³

Climate change also increases competition over other extractive resources beyond land ([IPCC 2022a](#), p. 49). As future supplies of these resources become increasingly scarce or uncertain as a result of climate change, those who claim access to or control over resources may resort to violent conflict to protect their claims ([Mendenhall et al. 2020](#)). In Indonesia, for example, coastal communities that depend on local fishing economies occasionally engage in violent conflict with other communities. Communities often initiate fisheries conflicts in response to illegal fishing, which environmental degradation also intensifies ([Lu and Yamazaki 2023](#)). Although some arguments suggest that resource competition will directly motivate large-scale violence such as genocide ([Snyder 2015](#)), the scholarly consensus—to which the IPCC Sixth Assessment assigns “medium confidence”—is that climate change will contribute to an increase in “low-intensity” conflicts that states prove increasingly unable to manage ([IPCC 2022a](#), p. 53).

- **PRICE INCREASES CONTRIBUTING TO PROTEST**: Climate change *may* increase food prices by making crop yields less predictable and reducing overall global food production ([IPCC 2022a](#), p. 48). Price shocks increase the likelihood of urban protest ([Smith 2014](#)) and social unrest ([Bellemare 2015](#)) because higher food prices encourage affected communities to express dissent against prevailing social conditions. The effects of these shocks may be especially severe for individuals working in “climate-sensitive” industries ([IPCC 2022a](#), p. 66). During global food-price shocks in 2007 - 2008, for example, multiple African countries—including Egypt, Tunisia, and Morocco—experienced violent protests against price increases in grain, rice, and other staple imports ([Berazneva and Lee 2013](#)). Globally, the association between prices and unrest is stronger in democracies than in autocracies ([Hendrix and Haggard 2015](#)), which may more effectively repress groups that organize food-related protests ([Rudolfson 2021](#)). However, studies disagree about the extent and direction of this relationship. Buhaug et al. ([2015](#)) find that the reduced agricultural output that triggers food-price increases is not associated with increased likelihood of violent conflict in sub-Saharan Africa. Koren ([2018](#)) also finds that conflict is more likely in locations in African countries with *higher* crop yields because groups organize violence to compete for available food resources.

Exclusionary ideologies: Climate change may increase support for exclusionary ideologies through three main mechanisms:

- **ELITE SCAPEGOATING IN RESPONSE TO CLIMATE-RELATED MIGRATION**: Climate change may affect patterns of migration, as communities adapt to adverse climate impacts by finding more secure livelihoods in other locations and countries ([IPCC 2022a](#), p. 52; [Black et al. 2011](#)). New climate-induced migration may create new opportunities for elite “entrepreneurs” to discriminate against

migrants, including climate-induced migrants, and place blame on newcomers for pre-existing social problems. As in other crises ([Savun and Gineste 2019](#); [Polo and Wucherpfennig 2022](#)), elites seeking to promote or reinforce exclusionary ideologies may use migrants as a primary target of dehumanizing rhetoric, discrimination, and violence. Governments may use targeted violence against these new migrants to reinforce anti-migrant policy goals or appease exclusionary hardliners ([Fisk 2018](#)).

- **EXPLOITATION OF CLIMATE-INDUCED HAZARDS:** In addition to scapegoating under “normal” conditions, climate change may also increase opportunities to harm civilians in response to more frequent, longer, and more severe hazards ([IPCC 2022a](#), p. 48).⁴ In the wake of extreme weather events, governments may “securitize” recovery efforts by suspending the rule of law or increasing military or law-enforcement activity. These new security measures may allow governments to justify new violence against already-vulnerable and marginalized civilian communities ([Richards and Clay 2012](#)), especially in autocracies ([Neumayer 2013](#)). Climate-induced hazards may also strengthen rule by leaders who adopt extremist ideologies ([Bagozzi et al. 2023](#)).
- **SOCIAL CONFLICT IN RESPONSE TO CLIMATE-INDUCED MIGRATION:** Although migration is a critical strategy for communities to adapt to climate extremes, climate-induced migration may lead to large-scale social changes that lead some people in host locations to be more attracted to exclusionary ideologies. In these circumstances, individuals and groups that adopt exclusionary attitudes blame newcomers whom they come to perceive as threats to their livelihoods, culture, or political authority. Resource and land-use policies that privilege some groups over others, as in the case of farmer-herder conflicts in Mali, may exacerbate these threat perceptions and contribute to conflict ([Benjaminsen and Ba 2009](#)). This violence may harden exclusionary attitudes and increase the likelihood of future group-targeted violence ([Nordqvist and Krampe 2018](#)). In India, for example, weather-induced migration prompted riots where exclusionary ideologies were already well-established ([Bhavnani and Lacina 2015](#)).

HOW CLIMATE RESPONSE MEASURES MIGHT INFLUENCE ATROCITY RISKS AND PREVENTION

As climate impacts have become more severe, governments at all levels, firms, and local communities have organized diverse responses to manage climate-related impacts and proactively adapt to future risks. We expect that the political, economic, and social changes that these response measures entail will have massive consequences that may either help prevent atrocities or, if unanticipated and unaddressed, worsen risks for civilians ([Dabelko et al. 2013](#); [Dabelko et al. 2022](#); [Buhaug et al. 2023](#)). In contrast to the IPCC findings about climate-conflict links that we highlight above, no analogous set of conclusions exists about the consequences for conflict of climate mitigation and adaptation. Much less research has focused on these questions ([Gilmore and Buhaug 2021](#)).⁵

Readers should not interpret our assessment of these risks as an effort to discredit the urgency of a concerted international response to climate change; quite the opposite.

Climate responses have expanded in recent years: in 2021, international “climate finance” consisted of a minimum estimate of \$850 billion in spending on mitigation and adaptation projects, a 134-percent increase

from 2011 ([Naran et al. 2022](#), p. 7). However, countries at high risk of mass atrocities—including the general category of “fragile and conflict-affected states”—have received relatively meager investments in mitigation and adaptation from international financial institutions, aid agencies, and private donors ([UNDP 2021](#); [Sitati et al. 2021](#); [Mercy Corps 2023](#)). Because mitigation and adaptation efforts will be more difficult to implement where mass atrocities are ongoing, international actors should expect that successful prevention will also create more opportunities to advance climate response goals.

Mass atrocity risks

Even as climate response measures aim to limit the negative effects of climate change and reduce global dependence on fossil fuels that may be associated with conflict ([Blair, Christensen, and Rudkin 2021](#)), these new developments may also contribute to the likelihood of new mass atrocities by creating new risks of conflict and political instability.

Climate response measures may contribute to conflict and instability, and in turn, to mass atrocity risks, through four main mechanisms:

- **LAND DISPUTES SURROUNDING MINING AND CONSERVATION EFFORTS:** Governments and firms have made dramatic changes to land use, often by protecting land from agricultural activity to limit deforestation and other forms of environmental exploitation. The proportion of protected land worldwide has increased from 11 in 2000 to 16.6 percent in 2020 ([Government of Canada 2021](#)). In some cases, as in a series of land-clearance operations in Tanzania during the early 2000s, governments seeking to designate specific land plots as conservation areas evict the previous inhabitants of the land, leading those communities to migrate into new areas and stake new land claims ([Bergius et al. 2020](#)). Governments may also use conservation mandates as a pretext for military activities against rebels and civilian communities accused of supporting them ([Marijnen, De Vries, and Duffy 2020](#)). Risks of conservation-related violence are especially pronounced for communities who are already at risk of group-targeted discrimination or violence, such as Indigenous Peoples ([Woods and Naimark 2020](#)).

Renewable energy technologies also require changes in land use and the extraction of new raw materials. Because of this new demand for land, the energy transition away from fossil fuels will involve new claims to already-settled land for mining, hydropower generation, and other renewable-energy uses ([Owen et al. 2023](#)). Government and corporate expropriation of private land for mining or other resource extraction may motivate anti-government rebellion ([De Juan et al. 2022](#)) or communal violence ([Eck 2014](#)), which may stoke larger-scale instability that worsens atrocity risks.

- **CHANGING GLOBAL COMMODITY PRICES:** The energy transition is increasing demand for the extraction of specific raw minerals—including lithium, nickel, cobalt, and copper ([Boer, Pescatori, and Stuermer 2021](#); for others, see [Manberger and Johansson 2019](#))—to support the infrastructure of renewable-energy generation, storage, and distribution. The energy transition may lead to acute increases in the prices of these key commodities. Significant short-term increases in the price of both oil and lootable mineral resources are associated with higher risk of conflict ([Blair, Christensen, and Rudkin 2021](#)). New revenues associated with increasingly-valuable mining activities can aid governments or rebels by expanding either actor’s ability to purchase weapons or maintain their

military or paramilitary forces, thereby increasing their capacity for large-scale violence. Where these revenues rely on territorial access to mining sites in conflict-affected states, these new economic activities may also increase incentives for territorial conflict.

Both weather-induced disruptions to oil production and the energy transition will likely lead to greater volatility in oil revenues, increasing risks of conflict in oil-producing states ([Dabelko et al. 2022](#), p. 66). Where the consequences of this volatility are poorly managed, price changes may lead to political instability in “petrostates” that draw a significant portion of government funds from oil windfalls. In these countries, leaders use oil revenues to shore up political support through assistance to both patronage networks and broader public works ([Karl 1997](#)). Shocks to those revenues can lead to large-scale protests or irregular political transitions, such as coups, that increase the risk of a violent crackdown ([Lango et al. 2022](#)). Petrostates with revolutionary leaders—another risk factor for mass atrocities ([Kim 2018](#))—are also more likely to initiate international conflict ([Colgan 2013](#)).

- **SUPPORT TO GOVERNMENTS RESPONSIBLE FOR MASS ATROCITIES:** Climate mitigation and adaptation policies may also provide a new influx of cash to governments and non-state groups in countries at high risk of mass atrocities. In 2019/20, 21 percent of the \$653 billion in global mitigation and adaptation spending involved transfers to governments or public-private partnerships ([Naran et al. 2022](#), p. 34). Although evidence about the effect of aid on risks of conflict in general is inconsistent (e.g., [De Ree and Nillesen 2009](#)), new aid may contribute to conflict risks by (1) increasing the capacity of governments that perpetrate mass atrocities; (2) increasing inequality between groups by propping up discriminatory patronage networks; and (3) excluding targeted groups from adaptation plans.
- **SHIFTING GEOPOLITICS:** Reducing greenhouse-gas emissions will require coordinated action by all countries, including efforts to reduce global reliance on fossil fuels, invest in renewable-energy production and use, and other mitigation and adaptation measures. The global economy that supports these responses to climate change is interdependent: some countries possess, process, and export key raw materials required for mitigation and adaptation efforts, while others consume them. Global reliance on these materials and other climate-diplomacy priorities, such as financial support for mitigation and adaptation in low-income countries, may lead other governments to avoid steps to help prevent mass atrocities if they expect that human rights-related criticism will jeopardize climate response measures.

For example, two of the countries that possess or process a large supply of minerals that contribute to the energy transition—the Democratic Republic of the Congo and Burma—are currently experiencing a mass killing episode ([IEA 2021](#)); four others—Mozambique, Indonesia, China, and Iran—are at relatively high risk of a new mass killing event ([USHMM 2022](#)).⁶ China raises particular dilemmas, given the Chinese government’s ongoing violence against the Uyghur community, its mineral supply and mass production of renewable-energy technologies, and the extent of its carbon emissions ([HRW 2022](#)).

Opportunities for prevention

In addition to considering the effects of these responses on atrocity risks, we also address how mitigation and adaptation measures may offer “co-benefits” for the prevention of conflict and mass atrocities ([UNDP 2021](#)). Although 10 percent of the \$653 billion in global climate finance in 2019/20 went to regions—South and Central Asia, the Middle East, and Africa ([USHMM 2022](#))—associated with the greatest risk of mass atrocities ([Naran et al. 2022](#), p. 35), climate mitigation and adaptation will involve global financing and assistance that dwarf global spending on atrocity prevention and peacebuilding initiatives in countries at high risk of mass atrocities. The Climate Policy Initiative estimates that global climate-resilience goals will require \$4.3 trillion in annual finance flows by 2030 ([Naran et al. 2022](#), p. 4). In 2020, the direct cost of global spending on peacebuilding totaled \$28.1 billion ([IEP 2021](#), p. 39).

First, we address preventive actions that address the *imminent* risk of atrocities ([Woocher 2023](#)), specifically by assisting the self-protection efforts of vulnerable civilian communities.

- **IMPROVING EARLY WARNING AND TRUST IN CRISIS INFORMATION:** Climate adaptation programs may aid vulnerable civilian populations by improving local early warning networks. Civilian communities use these networks to distribute information about potential emergencies, including both climate-induced hazards and imminent violence. They may also open new lines of communication to responsive government officials and international actors. When programs support participatory and inclusive community activities, they may also increase trust in crisis information and emergency-response institutions that can aid the adaptive capacity of civilian populations. For example, the World Food Programme’s (WFP) Anticipatory Action for Climate Shocks effort works with government officials and humanitarian organizations to communicate disaster early warnings and critical information to vulnerable populations. These programs help vulnerable communities gain access to cash resources and improve crisis response ([WFP n.d.](#)). WFP has implemented Anticipatory Action programs in several countries at relatively high risk of mass atrocities, including Mozambique, Ethiopia, Somalia, and Zimbabwe.
- **ENABLING FLIGHT:** Adaptation programs may also help civilian populations prepare short-term options for flight—both within countries and across borders—that allow them to evade both climate-induced hazards and violence. Some adaptation programs support community-led training in emergency preparedness, which provide civilians with additional skills and local knowledge to avoid imminent harms. For example, the Aga Khan Development Network’s (AKDN) Agency for Habitat program trains local volunteers in disaster planning and management, including in response to extreme weather events. The AKDN training sites include countries at high risk of mass atrocities, such as Afghanistan, Syria, Pakistan, and India ([AKDN 2022](#)). Research on civilian self-protection suggests that local and international training programs in emergency-response skills, such the efforts of the International Committee of the Red Cross in Colombia, improve civilian responses to imminent violence ([Kaplan 2021](#)).

Second, we consider how climate response measures may contribute to the *structural* prevention of atrocities by addressing underlying risk factors, especially risks of large-scale conflict or instability ([McLoughlin 2014](#); [Busby 2021](#)). These measures overlap with practices of environmental peacebuilding, which seek to reinforce cooperation around environmental issues such as natural-resource management and conservation ([Ide 2018](#);

[Dresse et al. 2019](#)).

- **STRENGTHENING SOCIAL COHESION:** Climate adaptation programs can improve social cohesion by encouraging cross-group cooperation to address climate risks. For example, WFP’s efforts to support agricultural practices and infrastructure in Burkina Faso and Niger reports to have increased “the resilience of vulnerable communities to various shocks and stressors while fostering social cohesion and peace among and between participating communities” through participatory planning and management programs ([WFP 2023](#)). Adaptation programs that encourage communities to set their own priorities, rather than relying on external direction, have proven especially effective at strengthening social cohesion (e.g., [Ide et al. 2021](#)).
- **IMPROVING GOVERNANCE:** Mitigation and adaptation efforts may also improve governance by creating stronger rules, regulations, and procedures around the management of scarce resources, such as water, food, and commercial goods. When designed to reduce conflicts around the distribution of resources, these programs can strengthen the rule of law and prevent disputes that may lead to violence. In the context of fisheries management—a potential source of militarized disputes in fishing-dependent countries ([Hendrix et al. 2022](#))—new governance regimes can help mitigate conflict risks by enabling better monitoring and information sharing between groups that might otherwise use violence to resolve disputes ([Hendrix et al. 2020](#)). The International Organization for Migration and the European Union are implementing a project to accomplish similar goals around water access in Somalia ([IOM 2022](#)). In some contexts, such as in the forest region of southern Kenya’s Narok District ([Adano et al. 2012](#)), effective governance programs in domains related to climate adaptation have improved the general responsiveness of government institutions in other areas, reducing incentives for conflict ([Ide 2018](#); [Simangan et al. 2023](#)).
- **ADVANCING ECONOMIC GROWTH AND EQUALITY:** Lastly, adaptation programs can increase the resilience of local economies against potential climate-related shocks. These programs may limit risks of conflict by reducing grievances and encouraging cooperation between groups to overcome economic scarcity and uncertainty. For example, the UNDP climate programming in Central Asia has provided targeted assistance to rural communities affected by flooding to increase and sustain economic output ([UNDP 2018](#)). Adaptation measures that focus on “advancing women’s empowerment” and gender-inclusive development are especially important for reducing conflict risks ([IPCC 2022a](#), p. 25).

APPENDIX A: CLIMATE-CONFLICT CASE EXAMPLES

It is difficult to establish how a broad and varied phenomenon like climate change relates to any specific instance of violent conflict or mass atrocities. Nevertheless, case studies are an important part of policy and scholarly discussions around climate and conflict. In this appendix, we highlight three cases—genocide in Darfur; the initial uprising, mass atrocities, and civil war in Syria; and recurrent conflicts in the Sahel region—that have been frequently cited in recent debates. For each, we cite selected assertions about the link between climate change and violence and summarize relevant research on these questions. The purpose is to illustrate the debates, not to represent all views or render judgment about any particular claim.

Genocide in Darfur

Genocide in Darfur, Sudan, began in 2003, when Sudanese government forces and affiliated *janjaweed* militia organized a protracted campaign of group-targeted violence against Fur, Masalit, and Zaghawa civilians in response to rebel activity in the region. At the height of violence, from 2003 - 2005, approximately 200,000 civilians died as a result of violence by government-linked forces, disease, and starvation; the conflict also displaced two million people ([Hagan and Palloni 2006](#)).

In a 2007 op-ed entitled “A Climate Culprit In Darfur,” UN Secretary-General Ban Ki-moon wrote, “the Darfur conflict began as an ecological crisis, arising at least in part from climate change” ([Ban 2007](#)). Advocating for international aid to communities whom the Darfur violence had displaced, Ban argued that instability and inter-ethnic tension in Darfur began when regional drought triggered pastoral conflicts between farmers and nomadic herders. At the first UN Security Council debate about climate change and international peace and security earlier that same year, the Danish representative to the UN also highlighted the Darfur example to illustrate climate-conflict links ([UN Security Council 2007](#)). Additionally, a report from a US think tank, conducted with guidance from a group of retired generals and admirals, highlighted Darfur as “a case study of how existing marginal situations can be exacerbated beyond the tipping point by climate-related factors” ([Catarious et al. 2007](#)).

Subsequent quantitative research has addressed the climate-conflict relationship in Darfur. Kevane and Gray ([2008](#)) find that, despite recurrent patterns of famine throughout the 1980s, there was no overall decline in rainfall prior to the onset of the violence in 2003. Studies of local-level violence provide more evidence of a climate-conflict link. For example, De Juan ([2015](#)) finds that areas with a higher rate of change in vegetation—a consequence of drought—were associated with higher levels of *janjaweed* attacks. Olsson and Siba ([2013](#)) also find that *janjaweed* violence was more likely both (1) in areas with a high concentration of ethnic groups associated with rebels and (2) in areas closer to roads and with fertile soil, indicating agricultural settlement. These findings suggest that violence in Darfur was associated with patterns of both group-based targeting and environmental change.

Uprising, mass atrocities, and civil war in Syria

In March 2011, Syrian activists organized pro-democracy protests that quickly spread into a nationwide uprising. Like other neighboring governments, the regime of Bashar al-Assad responded to the uprising with an escalating campaign of repression. By the summer of the same year, repression turned to civil war: Syrian opposition groups organized an armed rebellion, to which the Syrian government responded with disappearances and torture of opposition activists, sieges and aerial bombardments against civilian areas, and

other mass atrocities. In total, the conflict resulted in the deaths of approximately 300,000 civilians and displaced 13 million people ([USHMM 2023](#)).

Some have suggested that climatic changes are at the root of the 2011 uprising and subsequent violence in Syria. From the mid-2000s to the start of the uprising, Syria and neighboring countries experienced a massive drought and crop failure that devastated local agricultural economies ([Kelley et al. 2015](#)). Some national security practitioners ([Femia and Werrell 2012](#)), climate scientists ([Gleick 2014](#)), and conflict researchers ([Kelley et al. 2015](#)) have argued that drought-induced migration contributed to Syria's initial protest movement by concentrating populations in urban areas. Prominent policy makers have echoed these conclusions: in a 2015 speech, President Barack Obama stated that “drought and crop failures and high food prices helped fuel the early unrest in Syria” ([Obama 2015](#)). In another speech that same year, then-Secretary of State John Kerry argued that the region-wide drought “exacerbated instability on the ground and made a bad situation worse and forced people to migrate,” worsening sectarian conflict ([Kerry 2015](#)).

Other researchers have questioned the evidence about the climate-conflict relationship in the Syria case. Selby et al. ([2017](#)) observe that the proposed pathway from climate changes to protest activity in Syrian cities does not reflect the importance of events in more provincial towns like Dara'a, where repression after protests in March 2011 catalyzed the nationwide protest movement. Daoudy ([2020](#)) also observes that rural areas of Syria, which experienced both cyclical patterns of water scarcity and the most severe consequences of the mid-2000s drought, had a relatively limited impact on the initial uprising. Hendrix ([2018](#)) also argues that focusing on the “positive” case of Syria overlooks the absence of a climate-conflict link in other countries in the region, where climate-related crises occurred but large-scale conflict did not. As in the Darfur case, findings about the climate-conflict nexus differ at the local level: Linke and Ruether ([2021](#)) find that “unusually dry conditions” during the Syrian civil war were associated with a higher level of government attacks against civilians.

Conflict in the Sahel

The countries in the Sahel region of West Africa—including Burkina Faso, Cameroon, Chad, The Gambia, Guinea, Mali, Mauritania, Niger, Nigeria, and Senegal—have experienced a significant uptick in violence in the past decade. Civil wars, localized intercommunal conflicts, and attacks by transnational groups have led to thousands of civilian deaths and displaced millions of people ([CFR 2023](#)).

Practitioners emphasize that climate factors, such as desertification, resource scarcity, and climate-induced migration, will both exacerbate violence in the Sahel and compound its humanitarian costs ([Benjaminsen and Svarstad 2021](#)). The IPCC's Sixth Assessment Report ([CDKN 2022](#)) indicates that the effects of climate change—including temperature changes, volatility in rainfall patterns, seasonal migration patterns, and food insecurity—will be especially acute in the Sahel. Policy reports (e.g., [Tesfaye 2022](#)) and statements suggest that these trends will reinforce economic and political crises in countries in the region. In the same public remarks in 2015 in which he identified drought as one explanation for Syria's uprising, John Kerry also observed that “the severe drought that [Nigeria] suffered—and the government's inability to cope with it—helped create the political and economic volatility that the [Boko Haram] militants exploited to seize villages, butcher teachers, and kidnap hundreds of innocent school girls” ([Kerry 2015](#)).

Some research has questioned evidence about the compounding impact of climate factors on violence in the Sahel. Contesting “scarcity” arguments, Benjaminsen et al. ([2012](#)) find that longer-term changes in agricultural

policy and waning trust in conflict-management institutions, rather than more recent climate factors, are the primary catalyst for land-use conflicts in the Sahel. Schon et al. (2023) find that conflict in the Sahel is most likely in areas characterized by environmental *abundance*, because abundant resources provide greater incentives for governments, rebel groups, and other communal actors to initiate violence (see also [Koren and Schon 2023](#)). By contrast, some qualitative studies conclude that climate-related scarcity may encourage participation in new violence. For example, Mbaye (2020) finds that the combination of decreased rainfall and government discrimination against herder communities in the Niger River Delta in Mali encourages those communities to support jihadist rebel group.

ENDNOTES

¹ Data about climate vulnerability, on the X-axis, are from the 2021 Notre Dame Global Adaptation Initiative (ND-GAIN) Index ([ND-GAIN 2021](#)). Data about mass killing risk, on the Y-axis, are from the Early Warning Project's (EWP) 2022 - 2023 assessment of countries' risk of experiencing a new mass killing episode ([USHMM 2022](#)). The ND-GAIN score combines separate vulnerability and readiness scores, with a lower score indicating that the country is more vulnerable to climate change. The 30 countries with the highest risk in the EWP assessment are indicated with a three-letter country code. For reference, the median ND-GAIN score in 2021 was 48.4, as indicated by the vertical dashed line. The median EWP score for 2022 - 2023 was 0.007, or 0.7 percent, as indicated by the horizontal dashed line.

The ND-GAIN index measures both a country's vulnerability and readiness to adapt to the negative effects of climate change on a scale from 0 to 100. A country's vulnerability score includes six sectors (food, water, health, ecosystem service, human habitat, and infrastructure) and measures the degree to which the sector is exposed to significant climate change, how sensitive the country is to negative impacts of climate change in that sector, and the capacity of the country to implement sustainable adaptation measures in that sector. A country's readiness score measures its ability to convert investments into adaptation measures that reduce vulnerability, including economic opportunity, political stability and good governance that encourages investments, and social components like inequality and education.

² Adams et al. (2018) observe that the literature about the relationship between climate and conflict relies to a significant degree on cases and quantitative analysis about African countries. The empirical bias towards Africa creates a "streetlight" effect in which only cases that affirm both high conflict risk and high climate vulnerability receive attention from scholars ([Hendrix 2018](#)). We thank Ore Koren for these references.

³ As we discuss in Appendix A below, one study has challenged the association between climate factors and conflict in the Sahel ([Benjaminsen et al. 2012](#)).

⁴ In its [glossary](#), the IPCC defines climate hazards as "[t]he potential occurrence of a natural or human-induced physical event or trend that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources." In general, climate scientists use the term "hazard," rather than "disaster," to reflect the possibility of extreme damage and losses from less-concentrated events, such as heatwaves, or environmental or social processes, such as the decay or collapse of ecosystems or infrastructure ([Simpson et al. 2021](#)).

⁵ As mitigation and adaptation entail a wide range of actions whose future design and implementation are both uncertain and can vary tremendously, their effects on conflict or mass atrocities might be less fixed than those of climate change.

⁶ EWP does not classify China's violence against the Uyghur community as an ongoing mass killing episode. However, separate legal analysis by the Simon-Skjoldt Center indicates that there is "a reasonable basis to believe that the crimes against humanity of forced sterilization, sexual violence, enslavement, torture, and forcible transfer [against China's Uyghur community in Xinjiang province] are...being committed" ([USHMM 2021](#), p. 2).

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ACKNOWLEDGMENTS

We thank Elisabeth Gilmore, Ore Koren, Lawrence Woocher, and our other colleagues at the Simon-Skjodt Center for their feedback on earlier drafts of this paper; Elisabeth Gilmore and Ore Koren also suggested additional references that broadened our understanding of the relevant literature. We thank Jenna Galberg for her research assistance. This seminar was made possible by the generous support of the Sudikoff Family Foundation, which funds the Museum's Sudikoff Annual Interdisciplinary Seminar on Genocide Prevention.

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