

Review

Climate change and community conflicts in Sub-Saharan Africa: A review of the evidence

Aly Dramé

Oak Ridge Institute for Science and Education (ORISE) Fellow, US Centers for Disease Control and Prevention, United States.

Received 7 February, 2024; Accepted 23 February, 2024

This paper delves into the link between climate and conflict in Africa, drawing insights from climate science, political ecology, and peace studies, and it emphasizes the need for integrated climate adaptation and peacebuilding policies, rooted in inclusive governance, social justice, and community-based approaches aligned with the Sustainable Development Goals. Quantitative data analysis supports associations between climate variables and conflict incidence, while case studies in the Sahel, Horn of Africa, and Lake Chad Basin demonstrate climate influences on communal violence. Further research into root causes is needed to inform structural solutions.

Key words: Climate change, conflict, Sub-Saharan Africa, evidence review, climate adaptation, peacebuilding policies.

INTRODUCTION

Climate change is increasingly recognized as exacerbating conflicts in Africa [United Nations Environment Programme (UNEP), 2015]. The Intergovernmental Panel on Climate Change (IPCC) (2023) highlights that shifts in rainfall, rising temperatures, and severe weather events can negatively impact livelihoods (IPCC, 2023), leading to heightened social and political tensions, particularly in humanitarian emergencies such as those observed in the Sahel (Global Risk Insights, 2019). This evidence underscores the first key question of our review: What does empirical evidence indicate about the statistical relationships between climate variables and African conflict incidence? According to the IPCC, climate change affects every region of the world differently, with varying levels of impact (IPCC, 2023). Climate change is now understood to result in negative impacts such as more intense rainfall, potentially leading to flooding, and severe

droughts in many regions (Boehm and Schumer, 2023, March 20). These observations highlight the second key question of our review: How does climate change interact with contextual political, economic, and social factors to influence conflict risks? This review synthesizes evidence from multiple academic disciplines regarding climate-conflict linkages in Africa. It unpacks these complex dynamics by applying perspectives from climate science, political ecology, and peace and conflict studies. Case studies of community clashes in the Sahel, Horn of Africa, and Lake Chad Basin are presented to illustrate the third key question of our review: What conflict prevention and peacebuilding strategies are necessary to integrate climate change adaptation?

Evidence gaps, policy implications, and areas for further research are discussed in this review. Each part elaborates on the three key questions, providing a comprehensive

E-mail: dramsocial@hotmail.com.

Author(s) agree that this article remain permanently open access under the terms of the [Creative Commons Attribution License 4.0 International License](https://creativecommons.org/licenses/by/4.0/)

overview of the current state of knowledge on the climate-conflict nexus in Africa. Climate change's role in exacerbating African conflicts is increasingly recognized (United Nations Environment Programme [UNEP], 2015). The Intergovernmental Panel on Climate Change (IPCC) (2023) highlights that shifts in rainfall, rising temperatures, and severe weather events can adversely affect livelihoods (IPCC, 2023), leading to heightened social and political tensions, often culminating in humanitarian emergencies, as observed in the Sahel (Global Risk Insights, 2019, July). According to the IPCC, climate affects every region of the world differently (IPCC, 2023), with climate change known to cause negative impacts such as more intense rainfall, potentially leading to flooding, and severe droughts in many regions (Boehm and Schumer, 2023, March 20). This review synthesizes evidence from various academic disciplines on climate-conflict linkages in Africa, analyzing the complex dynamics through perspectives from climate science, political ecology, and peace and conflict studies. Case studies of community clashes in the Sahel, Horn of Africa, and Lake Chad Basin are presented to illustrate these dynamics.

The review addresses the following key questions:

1. What does empirical evidence indicate about statistical relationships between climate variables and African conflict incidence?
2. How does climate change interact with contextual political, economic, and social factors to influence conflict risks?
3. What conflict prevention and peacebuilding strategies are needed to integrate climate change adaptation?

CLIMATE CHANGE IMPACTS IN AFRICA

Temperatures in Africa have risen faster than the global average over the past 50 years (Serdeczny et al., 2017). In its 2022 report, the IPCC states that extreme weather events such as droughts, floods, and tropical cyclones have increased in frequency and severity (IPCC, 2022), necessitating greater resources to address them. Specifically focusing on Africa, temperatures are projected to rise between 4–6°C over subtropical regions and between 3–5°C over tropical regions by 2100 under the A2 scenario of the Special Report on Emission Scenarios (low mitigation) (Engelbrecht et al., 2015). Furthermore, temperatures in Africa are projected to increase by an average of 2 to 8°C compared to 1986 to 2005 levels under high emissions scenarios (Engelbrecht et al., 2015). These climatic shifts significantly impact the livelihoods of populations dependent on climate-sensitive sectors such as agriculture, fisheries, and pastoralism (UNEP, 2011). Mbow et al. (2019) emphasize that rising temperatures, altered rainfall patterns, and desertification can lead to

decreased crop yields, livestock productivity, and fishery outputs, thereby threatening rural food supply and income. Additionally, sea-level rise and coastal erosion degrade settlements, infrastructure, and ecosystems in coastal regions (IPCC, 2022). Unpredictable rainfall disrupts the hydropower potential and water supplies of many nations (Conway et al., 2017). Climate "hotspots" are expected to result in population displacement to urban areas and across borders, often exacerbating social tensions (Rigaud et al., 2018).

QUANTITATIVE EVIDENCE ON CLIMATE-CONFLICT LINKAGES

The interplay between climate change and conflict unfolds amidst a spectrum of meteorological extremes. According to a study conducted by researchers at the University of California, Berkeley, and Princeton University, even minor changes in normal temperature and precipitation patterns can significantly increase the potential for conflict (University of California, Berkeley, 2013). Furthermore, Burke et al. (2013) analysis of 60 quantitative studies revealed a notable and positive correlation between rising temperatures and conflict. Finally, a 1% temperature increase might escalate civil war risks by 4.5%, potentially leading to a 54% surge in armed clashes by 2030 (Earth.Org, 2020).

Studies indicate that even minor temperature changes can substantially elevate conflict potential, with a 1% temperature increment potentially increasing civil war risks by 4.5%, suggesting a 54% surge in armed clashes by 2030 (Earth.Org, 2020). While socio-political strife often sparks conflict, climate-related challenges, accentuated by the Clausius-Clapeyron equation, exacerbate hydro-meteorological disasters. These climatic fluctuations, whether in the form of prolonged droughts or sudden downpours, can either exacerbate or intensify conflict across various landscapes.

This phenomenon is particularly evident in Africa, where climate change acts as both a precursor to and a consequence of conflict (The Conversation, 2022). These swings in climatic conditions, manifesting as prolonged droughts or sudden downpours, either amplify or escalate conflict across diverse terrains, notably in Africa, where climate change serves as both a signal of and a response to strife (Earth.Org, 2020).

According to those involved in research, implementation, and policy-making, the nexus between climate change and conflict presents a potential risk for climate change to intensify and escalate conflict (Mercy Corps, 2020). This issue is particularly noticeable in fragile situations affected by conflict, placing them in dual jeopardy: they are more vulnerable to the severe ramifications of climate change while simultaneously lacking the ability to accommodate or mitigate these effects. This situation amplifies preexisting factors contributing to instability and violent contention in

these susceptible contexts (Mercy Corps, 2020). Moreover, stakeholders recognize that this issue is nuanced and multi-dimensional, with indications pointing to a notable escalation in conflict risk due to climatic fluctuations (Earth.Org, 2020; Mongabay News, 2022). Conflicts can arise from both ends of meteorological extremes, whether excessive rainfall or drought scenarios.

Persistent rainfall shortages tend to indicate instability over a broader geographic expanse, while intense rainfall events appear to increase the likelihood of clashes within more confined spaces over wider spans (Earth.Org, 2020).

The ongoing conflicts across Africa underscore the profound effects of climatic changes on pastoralist rangelands, agroecological zones, and water access points. These environmental pressures intersect with governance challenges and demographic stressors, exemplified by the Darfur conflict, recognized as the first major conflict primarily driven by climate change (Scientific American, 2009). Specifically, droughts and desertification in Darfur have precipitated clashes between pastoralist and farming communities over severe resource shortages (Audubon, 2012).

Similarly, variations in rainfall and recurrent droughts have sparked uncontrolled migration patterns and intense competition over grazing lands and water points across the Horn of Africa's agro-pastoralist systems (McGuirk et al., 2020). Lake Chad serves as another example where climate stresses have significantly diminished vital resources, with the lake losing 90% of its water over recent decades, leading to tensions between fishers, herders, and farmers in the borderlands between Niger, Nigeria, Chad, and Cameroon (AP News, 2023). As the impacts of climate change intensify across Africa's agro-pastoralist systems, the complex secondary effects of environmental degradation and demographic shifts contribute to escalating conflicts (SEI, 2022).

Current conflicts across the African continent reflect the significant impact of climatic changes. A case in point is the Darfur conflict, acknowledged as the first conflict majorly driven by climate change. The region experienced a drastic shortfall in rainfall, marked by 30 to 75% below expected levels, playing a pivotal role in triggering civil unrest (Earth.Org, 2020).

However, it is crucial to clarify that climate change is not the sole instigator but a potent exacerbator of conflicts. The tapestry of socio-political dynamics significantly shapes the conflict landscape (Mongabay News, 2022), necessitating a broader lens to understand and address the confluence of factors intensifying tensions and conflicts.

Several quantitative studies have explored the correlation between climate variables, such as temperature and rainfall, and African conflict risks. For instance, Burke et al. (2009) and Hsiang et al. (2013) outlined how deviations from typical climatic conditions, like mild temperatures and normal precipitation, significantly heightened conflict risks, especially within impoverished

populations. Their findings revealed that each standard deviation of higher rainfall or warmer temperatures escalated intergroup conflict by 14% and, in certain regions, by over 50%.

Moreover, rising temperatures strongly correlate with higher risks of conflicts in Sub-Saharan Africa from 1981-2002, as encapsulated in Burke et al. (2015)'s study. Specifically, computing cumulative effects, they found that, on average, a 1 standard deviation shift toward more adverse climatic conditions spurred a 1.2% rise in interpersonal clashes and a 4.5% increase in intergroup contention across the region over this period (Burke et al., 2015).

Other researchers argue that socio-political factors can create an indirect connection through climatic disruptions that significantly mediate the connection between climate variables and conflicts (Buhaug, 2015; Benjaminsen, 2016).

For example, Raleigh and Kniveton (2012) postulate that adverse effects on economic growth and activity in climate-sensitive sectors mediate climate impacts on conflicts. Additionally, political marginalization of certain groups emerges as a crucial determinant in this narrative (Rüttinger et al., 2015).

Under the lens of Political Ecology and Environmental Security, the framework proposed by Peluso and Watts (2001) emphasizes how environmental factors, including climate change, intersect with political, social, and economic contexts to shape conflicts. This perspective challenges the deterministic notion that environmental shifts inevitably lead to conflict, highlighting instead the importance of understanding how such environmental changes are influenced by power dynamics, governance shortcomings, and historical antagonisms among groups (Ide, 2018). For example, changes in rainfall patterns can significantly impact agricultural livelihoods, but these impacts do not inherently provoke violence.

The response to these environmental shifts is often shaped by a complex interplay of factors, including power dynamics, governance structures, and historical tensions among diverse groups (Ide, 2018). Emerging from this perspective, the political ecology framework views environmental factors such as climate change as intertwined with political, social, and economic contexts, creating conditions conducive to violent conflicts (Peluso and Watts, 2001). The challenges faced by agricultural livelihoods due to variations in rainfall do not directly lead to violence; rather, the response is influenced by power relations, governance failures, and historical discord among groups (Ide, 2018).

Concurrently, the environmental security paradigm suggests that climate-related impacts, such as diminishing water availability, act as 'threat multipliers,' exacerbating tensions in populations already vulnerable due to poverty, inequality, and weak state infrastructures (Scheffran et al., 2012).

While climate disturbances rarely directly initiate conflict,

they increase risks by compromising human security and livelihoods. This interpretation is supported by Mach et al. (2019), who argue that climate disruptions heighten conflict risk by undermining human security and livelihoods. The environmental security paradigm interprets climate impacts such as reduced water availability as 'threat multipliers,' exacerbating tensions, particularly when populations are already vulnerable due to poverty, inequality, and weak state structures (Scheffran et al., 2012). Direct causation of conflict by climate disruptions is seldom observed. However, they amplify risks by threatening human security and livelihoods (Mach et al., 2019). Both theoretical frameworks underscore the necessity to move beyond mere climatic variables and explore the complex socio-political and economic dynamics that fuel conflicts across the African terrain in conjunction with climate change.

CLIMATE INTERACTIONS WITH COMMUNAL CONFLICTS: SAHEL, LAKE CHAD BASIN, AND THE HORN OF AFRICA

The Sahel has experienced rising temperatures, reduced and erratic rainfall, and desertification (Mbow et al., 2019). Indeed, the Sahel region has been experiencing significant environmental changes, including rising temperatures, reduced and erratic rainfall, and desertification (Mbow et al., 2019). These changes have reduced farmers' arable lands and pastoralists' pastures, intensifying resource competition (Copernicus, 2016).

The Darfur conflict perfectly illustrates how these environmental stresses can contribute to conflict. Indeed, this protracted conflict emerged from a complex interplay of environmental stress, traditional land rights loss, and ethnic tensions (Tufts University, 2019).

Similarly, the Lake Chad region has been significantly impacted by climate change. The lake's surface area has shrunk by 90% since the 1960s due to rising temperatures (AP News, 2021). This dramatic decrease and overexploitation have led to diminishing water resources and collapsing fisheries, disrupting local livelihoods and contributing to social unrest (Cornell University, 2015). Now, the insurgent group Boko Haram has been exploiting these desperate conditions. They have capitalized on the hardships communities face due to climate change, using it as a recruitment tool (Mercy Corps, 2016.). Indeed, increased rainfall variability in the Horn of Africa has been linked to heightened pastoral conflicts (Greiner, 2013). Recurrent droughts have also been identified as triggers for ethnic violence between Kenyan herders and farmers competing for pasture and water resources (Linke et al., 2018). However, the interconnection between climate change and conflict is intricate. While some research underscores a direct tie between droughts and disputes, others suggest it is more about how these environmental challenges amplify existing societal issues. This regionally diverse research affirms that climate disruptions intersect

with historical, political, and socioeconomic stressors to amplify insecurity and conflicts. Further case study insights are needed from central, southern, and north African sub-regions.

RESEARCH GAPS AND FUTURE DIRECTIONS

There are still many areas that require further exploration to understand the relationship between climate change and conflict. Firstly, the cultural and gender dimensions of climate fragility risks are poorly understood (UN Women, 2022a).

This includes examining how different cultural identities and gender roles influence communities' responses to the effects of climate change (UN Women, 2020). For example, in many societies, particularly in sub-Saharan Africa, women are often more vulnerable to the impacts of climate change due to their roles in food production and water collection (UNEP, n.d.). Secondly, the precise mechanisms linking climatic variables to conflict remain unclear, indicating a need for further research (Burke et al., 2009). While some studies suggest that climate change can exacerbate existing social and economic inequalities, potentially leading to conflict in Africa (Hsiang and Burke, 2014), others argue that the relationship is not straightforward (NBER, 2014). Thirdly, significant uncertainties exist in the quantitative findings of climate-conflict research (Ide, 2020). These uncertainties arise from various factors, including the complexity of the climate system, the challenge of isolating the effects of climate change from other conflict drivers, and the limitations of current climate models (Burrows and Kinney, 2016).

Lastly, there is often a lack of concrete policy solutions for addressing climate-related conflicts (PreventionWeb, 2022). While some strategies have been proposed, such as improving climate change adaptation and mitigation efforts, more work is needed to develop effective and sustainable solutions (IPCC, 2022). In terms of future research directions, there is a need for more contextual studies focused on Africa. These studies could explore how conflict responses to climate pressures influence cultural identities, perceptions, and power dynamics. Moreover, given the gendered vulnerabilities associated with climate change, it is crucial to pay closer attention to women in these research efforts (CR, 2023).

Finally, using mixed methods and other socio-demographic approaches could provide more insights into the complexities of climate-conflict interactions (NBER, 2013).

CONCLUSION

Climate change is considered a catalyst as it amplifies the risks of conflict in Africa. However, analyzing this relationship through a purely environmental lens should not

longer suffice. To devise effective structural solutions, we must deeply understand the intertwining sociopolitical contexts that shape climate fragility risks. We can counteract these amplified risks by combining peacebuilding efforts and climate adaptation strategies, building inclusive institutions, and fortifying community resilience. Ultimately, addressing the nexus between climate change and conflict requires adopting a holistic approach that includes climate adaptation, peacebuilding, inclusive governance, and UN migration policies aligned with UN sustainable development objectives, while also fostering sustainable peace initiatives.

POLICY RECOMMENDATIONS

Integrating climate change adaptation within peacebuilding programs and conflict early warning systems can be a crucial step towards mitigating the impacts of climate change on conflict (UNDP, 2020). Inclusive governance, strengthened land tenure, and access to justice are vital in reducing group marginalization tied to resource losses from climate impacts (UNDP, 2020). Addressing barriers to climate-driven mobility through planned relocation policies and migration pathways is another important strategy (UNFCCC, 2015; UNU, 2017). Aligning interventions with Sustainable Development Goals like Goal 13 (Climate Action) and Goal 16 (Peace) can ensure that efforts to address climate change are integrated with broader development objectives (UN, 2023a, b). Lastly, supporting locally-led, community-based peace initiatives among pastoralist and farmer groups can effectively resolve resource conflicts (FAO, 2016; Peace Insight, 2019).

LIMITATIONS

The limitations of this study on climate change and conflict in Sub-Saharan Africa stem from the dynamic nature of the fields and the availability of regional literature. It primarily relies on existing literature, which might not fully capture the intricate relationship between climate variables and conflict due to socio-political and economic complexities.

Additionally, the specific focus on Sub-Saharan Africa limits access to comprehensive and current studies, thereby affecting the depth of analysis.

ACKNOWLEDGMENTS

I would like to express my gratitude to Dr. Yang Liu and Dr. Noah Scovronick from the Rollins School of Public Health at Emory University for their exceptional guidance and supervision during my fieldwork. Their expertise and dedication were pivotal to the success of this study and served as an ongoing source of inspiration. I also extend my profound appreciation to Janna Aladdin for her meticulous review and invaluable feedback on this

manuscript, significantly enhancing its quality. Furthermore, I owe a special thank you to Dr. Talley Leisel and the entire Humanitarian Health Team for their steadfast support, crucial for completing this work.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

REFERENCES

- AP News (2021). Lake Chad is shrinking due to climate change. Retrieved from <https://apnews.com/article/niamey-climate-and-environment-f17edcd6e0dbe3e6a5411b7de7911537>
- AP News (2023). Report: Climate change fueling conflict in Lake Chad Basin. Retrieved from <https://apnews.com/article/niamey-climate-and-environment-f17edcd6e0dbe3e6a5411b7de7911537>
- Audubon (2012). Darfur: The First Climate War. Retrieved from <https://www.audubon.org/news/darfur-first-climate-war>
- Benjaminsen TA (2016). Does climate change cause conflicts in the Sahel? Routledge handbook of environmental conflict and peacebuilding, pp. 99-113.
- Boehm S, Schumer C (2023). 10 Big Findings from the 2023 IPCC Report on Climate Change. World Resources Institute. Retrieved from <https://www.wri.org/insights/2023-ippcc-ar6-synthesis-report-climate-change-findings>
- Buhaug H (2015). Climate–conflict research: some reflections on the way forward. *Wiley Interdisciplinary Reviews: Climate Change* 6(3):269-275.
- Burke M, Hsiang SM, Miguel E (2013). Quantifying the Influence of Climate on Human Conflict. *Science* 341(6151).
- Burke M, Hsiang SM, Miguel E (2015). Climate and Conflict. *Annual Review of Economics* 7:577-617.
- Burke MB, Miguel E, Satyanath S, Dykema JA, Lobell DB (2009). Warming increases the risk of civil war in Africa. *Proceedings of the National Academy of Sciences* 106(49):20670-20674.
- Burrows K, Kinney PL (2016). Exploring the Climate Change, Migration and Conflict Nexus. *International Journal of Environmental Research and Public Health* 13(4):443.
- Conway D, Dalin C, Landman WA, Osborn TJ (2017). Hydropower plans in eastern and southern Africa increase the risk of concurrent climate-related electricity supply disruption. *Nature Energy* 2:946-953.
- Copernicus (2016). Impacts of environmental changes in the Sahel. Retrieved from <https://esd.copernicus.org/articles/7/969/2016/esd-7-969-2016.pdf>
- Cornell University (2015). Lake Chad's social unrest due to climate change. Retrieved from https://ecommons.cornell.edu/bitstream/handle/1813/72666/Luis_Felipe_Romero_Hicks_Murakami_MPS_Capstone.pdf?sequence=1
- Conciliation Resources (CR) (2023). Gender, cultural identity, conflict, and climate change. Retrieved from <https://www.c-r.org/learning-hub/gender-cultural-identity-conflict-and-climate-change>
- Earth.Org (2020). Climate Change and Conflict in Africa. Retrieved from https://earth.org/data_visualization/climate-change-and-conflict-in-africa/
- Engelbrecht F, Adegoke J, Bopape MJ, Naidoo M, Garland R, Thatcher M, McGregor J, Katzfey J, Werner M, Ichoku C, Gatebe C (2015). Projections of rapidly rising surface temperatures over Africa under low mitigation. *Environmental Research Letters* 10(8):085004.
- Food and Agriculture Organization (FAO) (2016). Pastoralist and farmer groups peace initiatives. Retrieved from <https://www.fao.org/pastoralist-knowledge-hub/news/detail/en/c/431673/>
- Global Risk Insights (2019). The Sahel Uncertainty: Climate change and Insurgency. Retrieved from <https://globalriskinsights.com/2019/07/sahel-climate-change-insurgency/>

- Greiner C (2013). Guns, land, and votes: Cattle rustling and the politics of boundary (re) making in Northern Kenya. *African Affairs* 112(447):216-237.
- Hsiang SM, Burke M (2014). Climate, conflict, and social stability: what does the evidence say? *Climatic Change* 123:39-55.
- Hsiang SM, Burke M, Miguel E (2013). Quantifying the influence of climate on human conflict. *Science* 341(6151):1235367. doi: 10.1126/science.1235367. Epub 2013 Aug 1. PMID: 24031020.
- Ide T (2018). Climate war in the Middle East? Drought, the Syrian civil war and the state of climate-conflict research. *Current Climate Change Reports* 4(4):347-354.
- Ide T (2020). Quantitative Climate-Conflict Research: Limitations and Prospects of Alternative Approaches. *Policy Brief No. 80*. Retrieved from https://www.researchgate.net/publication/342408000_Quantitative_Climate-Conflict_Research_Limitations_and_Prospects_of_Alternative_Approaches
- Intergovernmental Panel on Climate Change (IPCC) (2022). *Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press.
- Intergovernmental Panel on Climate Change (IPCC) (2023). *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland pp. 35-115. doi: 10.59327/IPCC/AR6-9789291691647
- Linke AM, Witmer FDW, O'Loughlin J, McCabe JT, Tir J (2018). Drought, Local Institutional Contexts, and Support for Violence in Kenya. *Journal of Conflict Resolution, Peace Science Society (International)* 62(7):1544-1578.
- Mach KJ, Kraan CM, Adger WN, Buhaug H, Burke M, Fearon JD, Field CB, Hendrix CS, Maystadt JF, O'Loughlin J, Roessler P, Scheffran J, Schultz KA, Von Uexkull N (2019). Climate as a risk factor for armed conflict. *Nature* 571(7764):193-197.
- Mbow C, Rosenzweig C, Barioni LG, Benton TG, Herrero M, Krishnapillai M, Liwenga E, Pradhan P, Rivera-Ferre MG, Sapkota T, Tubiello FN, Xu Y (2019). Food Security. In: *Climate Change and Land: An IPCC special report on Climate change, desertification, Land Degradation, sustainable land management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems* [P.R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.-O. Pörtner, D.C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Peltzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, J. Malley, (eds.)]. In press
- McGuirk E, Nunn N, Transhumant Pastoralism, Climate Change, and Conflict in Africa (2020). NBER Working Paper No. w28243, Available at SSRN: <https://ssrn.com/abstract=3753152>
- Mercy Corps (2016). Boko Haram exploiting climate change. Retrieved from <https://www.mercycorps.org/research-resources/boko-haram-nigerian>
- Mercy Corps (2020). Climate change, conflict, and fragile contexts: A dual jeopardy. Retrieved from <https://www.mercycorps.org/sites/default/files/2020-03/MCClimateConflictApproach.pdf>
- Mongabay News (2022). Climate change amplifies the risk of conflict, study from Africa shows. Retrieved from Mongabay News
- National Bureau of Economic Research (NBER) (2013). Mixed methods in climate-conflict research. Retrieved from https://www.nber.org/system/files/working_papers/w18929/w18929.pdf
- National Bureau of Economic Research (NBER) (2014). Climate change and conflict in Africa. Retrieved from https://www.nber.org/system/files/working_papers/w20598/w20598.pdf
- Peace Insight (2019). Community-based peace initiatives. Retrieved from <https://www.peaceinsight.org/reports/whatworks/>
- Peluso NL, Watts M (2001). *Violent environments*. Cornell University Press.
- PreventionWeb (2022). Policy solutions for climate-related conflicts. Retrieved from <https://www.preventionweb.net/news/how-can-climate-finance-work-better-fragile-and-conflict-affected-regions>
- Raleigh C, Kniveton D (2012). Come rain or shine: An analysis of conflict and climate variability in East Africa. *Journal of Peace Research* 49(1):51-64.
- Rigaud KK, de Sherbinin A, Jones B, Bergmann J, Clement V, Ober K, Schewe J, Adamo S, McCusker B, Heuser S, Midgley A (2018). *Groundswell: Preparing for Internal Climate Migration*. © World Bank, Washington, DC. <http://hdl.handle.net/10986/2946> License: CC BY 3.0 IGO
- Rüttinger L, Smith D, Stang G, Tänzler D, Vivekananda J, Vivekananda J, Pohl B (2015). A new climate for peace.
- Scheffran J, Brzoska M, Korninek J, Link PM, Schilling J (2012). Climate change and violent conflict. *Science* 336(6083):869-71. doi: 10.1126/science.1221339. PMID: 22605765.
- Scientific American (2009). Can Climate Change Cause Conflict? Recent History Suggests So. Retrieved from <https://www.scientificamerican.com/article/can-climate-change-cause-conflict/>
- Stockholm Environment Institute (SEI) (2022). Climate change amplifies the risks for violent conflicts in Africa <https://www.sei.org/perspectives/climate-change-amplifies-risks-violent-conflicts-africa/>
- Serdeczny O, Adams S, Baarsch F, Coumou D, Robinson A, Hare W, Schaeffer M, Perrette M, Reinhardt J (2017). Climate change impacts in Sub-Saharan Africa: from physical changes to their social repercussions. *Regional Environmental Change* 17(6):1585-1600.
- The Conversation (2022). Armed conflict and climate change: how these two threats play out in Africa. Retrieved from <https://theconversation.com/armed-conflict-and-climate-change-how-these-two-threats-play-out-in-africa-193865>
- Tufts University (2019). Environmental stresses and Darfur conflict. Retrieved from https://fic.tufts.edu/wp-content/uploads/Livestockreport_web_1.25.19_sm2.pdf
- UN (2023a). Sustainable Development Goal 13. Retrieved from <https://www.un.org/sustainabledevelopment/climate-change/>
- UN (2023b). Sustainable Development Goal 16. Retrieved from <https://www.un.org/sustainabledevelopment/peace-justice/>
- UN Women (2020). Gender, climate, and security: Sustaining inclusive peace on the frontlines of climate change. Retrieved from <https://www.unwomen.org/sites/default/files/Headquarters/Attachments/Sections/Library/Publications/2020/Gender-climate-and-security-Summary-en.pdf>
- UN Women (2022a). How gender inequality and climate change are interconnected. Retrieved from <https://www.unwomen.org/en/news-stories/explainer/2022/02/explainer-how-gender-inequality-and-climate-change-are-interconnected>
- United Nations Development Programme (UNDP) (2020). Integrating climate change adaptation within peacebuilding programs. Retrieved from https://www.undp.org/sites/g/files/zskgke326/files/migration/oslo_governance_centre/7d94c9e1b225dd4d5cfe9ab4952d00ebf3b89414300ada68b0d16841ea907b71.pdf
- United Nations Environment Programme (UNEP) (2011). *Livelihood Security: Climate Change, Migration and Conflict in the Sahel*. UNEP.
- United Nations Environment Programme (UNEP) (2015). *Addressing the Role of Natural Resources in Conflict and Peacebuilding: A Summary of Progress from UNEP's Environmental Cooperation for Peacebuilding Programme 2008-2015*. <https://www.unep.org/resources/publication/addressing-role-natural-resources-conflict-and-peacebuilding>
- United Nations Environment Programme (UNEP) (n.d.). Women's vulnerability to climate change. Retrieved from <https://www.unep.org/news-and-stories/story/climate-action-holds-key-tackling-global-conflict>
- UNFCCC (2015). Planned relocation policies and climate-driven mobility. Retrieved from https://unfccc.int/files/adaptation/groups_committees/loss_and_damage_executive_committee/application/pdf/briefing_paper_climate_induced_displacement_and_migration.pdf
- University of California, Berkeley (2013). Climate strongly affects human

conflict and violence worldwide, says study. *Berkeley News*.
<https://news.berkeley.edu/2013/08/01/climate-strongly-affects-human-conflict-and-violence-worldwide-says-study/>.

UNU (2017). Climate change and human mobility. Retrieved from
<https://migration.unu.edu/publications/reports/climate-change-and-human-mobility-new-perspectives-on-climate-and-migration-displacement-and-relocation.html>