Rise or Recede?

How Climate Disasters Affect Armed Conflict Intensity

Tobias Ide

Both scholars and policymakers have expressed concerns about the security implications of climate change, with disasters such as storms, floods, or droughts playing a key role in these debates.[1] During a high-level United Nations (UN) Security Council meeting on climate change and security in late September 2021, French Foreign Minister Jean-Yves Le Drian stated: "In recent years, droughts, floods, storms, tropical cyclones and extreme temperatures have directly caused nearly 2 million deaths, to say nothing of the human tragedies linked to the conflicts sometimes precipitated by these disasters." Vietnamese President Nguyễn Xuân Phúc highlighted that "successive natural disasters have led to considerable loss of life and property" and indicated that climate change has grave implications for livelihood and food security. Similarly, Tunisian Minister for Foreign Affairs Othman Jerandi identified climate change as a key driver of increasing disaster frequency and severity. "We can no longer overlook the extent to which climate change exacerbates elements of fragility and instability," he said.[2]

Disasters also played a key role in early climate security assessments.[3] In 2007, the influential German Advisory Council on Global Change report identified a "climate-induced increase in storm and flood disasters" as one of the most relevant conflict constellations.[4] Subsequently, scholars debated how droughts affected the onset of civil wars in Darfur (Sudan) and

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The author thanks Jon Barnett, Michael Brzoska, Halvard Buhaug, Luke Derrick, Arden Haar, Ilan Kelman, and the anonymous reviewers for helpful feedback on previous versions of the article. Research for this article was funded by the Australian Research Council under the Discovery Early Career Researcher Award (DECRA) scheme (DE190101268). An online appendix is available at https://doi.org/10.7910/DVN/QOZX0G.

1. For an overview, see Katie Peters, "Disasters, Climate Change, and Securitisation: The United Nations Security Council and the United Kingdom's Security Policy," *Disasters* 42, no. S2 (2018): S196–S214, https://doi.org/10.1111/disa.12307.
2. UN Security Council, *8864th Meeting: Maintenance of International Peace and Security: Climate and Security* (New York: United Nations, 2021), quotes on 7, 10, 15.
3. Joshua W. Busby et al., "Climate Change and Insecurity: Mapping Vulnerability in Africa," *International Security* 37, no. 4 (Spring 2013): 132–172, https://doi.org/10.1162/ISEC_a_00116.
4. German Advisory Council on Global Change (WBGU), *World in Transition: Climate Change as a Security Risk* (Berlin: WBGU, 2007), 3.

International Security, Vol. 47, No. 4 (Spring 2023), 50–78, https://doi.org/10.1162/isec_a_00459

Syria.[5] These debates tied in with earlier work in disaster studies that analyzed the impact of disasters—climate-related or not—on the onset and termination of various forms of conflict.[6]

Disasters, understood here as extreme natural events with significant and adverse societal impacts, hence play a crucial role in the burgeoning research field of climate change and security. This field considers disasters, along with temperature and precipitation anomalies, as a threat multiplier that can increase the risk of conflict onset or incidence.[7] Disaster-conflict interlinkages also matter for wider debates in security studies, peace and conflict research, and international relations. Analysts predict an increase in the number and severity of disasters in the next decades because of climate change, urbanization, socioeconomic inequalities, and the concentration of populations and infrastructure in vulnerable areas (e.g., coastlines and river deltas). Disasters and disaster-related damage have increased since the 1980s, while some studies detect a similar trend for disaster-related fatalities. These patterns are particularly robust for climate-related events.[8] If climate-related disasters affect political stability and conflict, then managing disaster impacts should become a crucial topic for security politics and international cooperation.

While acknowledging the relevance of disasters for human insecurity,[9] gender-based violence,[10] and political conflicts such as state repression[11] or

5. Konstantin Ash and Nick Obradovitch, "Climatic Stress, Internal Migration, and Syrian Civil War Onset," *Journal of Conflict Resolution* 64, no. 1 (2020): 3–31, https://doi.org/10.1177%2F0022002719864140; Alexander De Juan, "Long-Term Environmental Change and Geographical Patterns of Violence in Darfur, 2003–2005," *Political Geography* 45 (2015): 22–33, https://doi.org/10.1016/j.polgeo.2014.09.001.

6. A. Cooper Drury and Richard Stuart Olson, "Disasters and Political Unrest: An Empirical Investigation," *Journal of Contingencies and Crisis Management* 6, no. 3 (1998): 153–161, https://doi.org/10.1111/1468-5973.00084; Ilan Kelman, *Disaster Diplomacy: How Disasters Affect Peace and Conflict* (London: Routledge, 2012); Enrico L. Quarantelli and Russell R. Dynes, "Community Conflict: Its Absence and Presence in Natural Disasters," *Mass Emergencies* 1, no. 1 (1976): 139–152.

7. Cesare M. Scartozzi, "Reframing Climate-Induced Socio-Environmental Conflicts: A Systematic Review," *International Studies Review* 23, no. 3 (2021): 696–725, https://doi.org/10.1093/isr/viaa064.

8. Nicolas Boccard, "Analysis of Trends in Disaster Risk," *International Journal of Disaster Risk Reduction* 53, no. 1 (2021): 101989, https://doi.org/10.1016/j.ijdrr.2020.101989; Guiseppe Formetta and Luc Feyen, "Empirical Evidence of Declining Global Vulnerability to Climate-Related Hazards," *Global Environmental Change* 57 (2019): 101920, https://doi.org/10.1016/j.gloenvcha.2019.05.004.

9. Formetta and Feyen, "Empirical Evidence of Declining Global Vulnerability to Climate-Related Hazards."

10. Alyssa Mari Thurston, Heidi Stöckl, and Meghna Ranganathan, "Natural Hazards, Disasters and Violence against Women and Girls: A Global Mixed-Methods Systematic Review," *BMJ Global Health* 6, no. 4 (2021): e004377, https://doi.org/10.1136/bmjgh-2020-004377.

11. Clair Apodaca, *State Repression in Post-Disaster Societies* (New York: Routledge, 2017).

protests,[12] this article focuses on disasters and intrastate armed conflicts. Following Nils-Petter Gleditsch et al., I define the latter as "a contested incompatibility that concerns government or territory or both where the use of armed force between two parties results in at least 25 battle-related deaths," with one party being the government and its main challenger being a domestic armed group.[13]

There have been tremendous contributions to the study of climate change, disasters, and conflict in recent years. Nina von Uexkull et al. find that droughts during the growing season increase armed conflict incidence,[14] and Ramesh Ghimire and Susana Ferreira report a positive relationship between floods and armed conflict incidence.[15] Several other scholars argue that climate-related disasters increase the likelihood of armed conflict onset[16] and increase civil war duration.[17] That said, some studies remain skeptical of whether disasters drive armed conflict onset,[18] and other researchers argue that disasters can even facilitate conflict termination.[19]

This article makes four key contributions to this burgeoning literature. First, scholars have thus far mostly focused on disasters and armed conflict onset or incidence, and to a lesser degree on duration. By contrast, very little is

12. Kristina Petrova, "Natural Hazards, Internal Migration, and Protests in Bangladesh," *Journal of Peace Research* 58, no. 1 (2021): 33–49, https://doi.org/10.1177/0022343320973741.
13. Nils Petter Gleditsch et al., "Armed Conflict 1946–2001: A New Dataset," *Journal of Peace Research* 39, no. 5 (2002): 615–637, esp. 618–619, https://doi.org/10.1177/0022343302039005007. If not stated otherwise, I use the terms "conflict" and "armed conflict" synonymously.
14. Nina von Uexkull et al., "Civil Conflict Sensitivity to Growing-Season Drought," *Proceedings of the National Academy of Sciences* 113, no. 44 (2016): 12391–12396, https://doi.org/10.1073/pnas.1607542113.
15. Ramesh Ghimire and Susana Ferreira, "Floods and Armed Conflict," *Environment and Development Economics* 21, no. 1 (February 2016): 23–52, https://doi.org/10.1017/S1355770X15000157.
16. Ash and Obradovitch, "Climatic Stress, Internal Migration"; Tobias Ide et al., "Multi-Method Evidence for When and How Climate-Related Disasters Contribute to Armed Conflict Risk," *Global Environmental Change* 62 (2020): 102063, https://doi.org/10.1016/j.gloenvcha.2020.102063; Philip Nel and Marjolein Righarts, "Natural Disasters and the Risk of Violent Civil Conflict," *International Studies Quarterly* 52, no. 1 (March 2008): 159–185, https://doi.org/10.1111/j.1468-2478.2007.00495.x.
17. Joshua Eastin, "Fuel to the Fire: Natural Disasters and the Duration of Civil Conflict," *International Interactions* 42, no. 2 (2016): 322–349, https://doi.org/10.1080/03050629.2016.1115402.
18. Drago Bergholt and Päivi Lujala, "Climate-Related Natural Disasters, Economic Growth, and Armed Civil Conflict," *Journal of Peace Research* 49, no. 1 (2012): 147–162, https://doi.org/10.1177/0022343311426167; Christiane J. Fröhlich, "Climate Migrants as Protestors? Dispelling Misconceptions about Global Environmental Change in Pre-Revolutionary Syria," *Contemporary Levant* 1, no. 1 (2016): 38–50, https://doi.org/10.1080/20581831.2016.1149355; Ole Magnus Theisen, Helge Holtermann, and Halvard Buhaug, "Climate Wars? Assessing the Claim That Drought Breeds Conflict," *International Security* 36, no. 3 (Winter 2011/12): 79–106, https://doi.org/10.1162/ISEC_a_00065.
19. Yasutaka Tominaga and Chia-yi Lee, "When Disasters Hit Civil Wars: Natural Resource Exploitation and Rebel Group Resilience," *International Studies Quarterly* 65, no. 2 (2021): 423–434, https://doi.org/10.1093/isq/sqab014.

known about how disasters affect the dynamics of ongoing armed conflicts. The few existing studies on the topic mostly focus on either international conflicts[20] or individual countries such as Sri Lanka, Syria, or the Philippines.[21] To gain a full picture of how climate-related disasters affect security risks, more information is required on whether such disasters shape the intensity of ongoing armed conflicts. The resulting knowledge could help decision-makers assess under which circumstances delivering humanitarian aid may be too dangerous (if fighting intensity increases), and whether attempting mediation is feasible (if the conflict de-escalates). With armed conflicts and disaster intensity and frequency all on the rise, disaster and conflict zones are increasingly likely to overlap, making such knowledge even more valuable.[22]

Second, most discussion on the conflict implications of both climate change and disasters focuses on whether they increase armed conflict risks.[23] By also focusing on conflict de-escalation, I include the possibility of at least temporary reductions in conflict risks after disasters.

Third, this article examines the causal pathways through which a change in conflict intensity happens. It does so by qualitatively tracing disaster-conflict interlinkages and by including relevant context factors for (de-)escalation into the cross-case analysis. Given that "the mechanisms of climate–conflict linkages remain a key uncertainty"[24] and that the pathways connecting disasters to conflicts remain understudied,[25] this article addresses an important knowledge gap.

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20. Ilan Kelman, "Connecting Theories of Cascading Disasters and Disaster Diplomacy," *International Journal of Disaster Risk Reduction* 30, Part B (2018): 172–179, https://doi.org/10.1016/j.ijdrr.2018.01.024.
21. Joshua Eastin, "Hell and High Water: Precipitation Shocks and Conflict Violence in the Philippines," *Political Geography* 63 (2018): 116–134, https://doi.org/10.1016/j.polgeo.2016.12.001; Kyosuke Kikuta, "Postdisaster Reconstruction as a Cause of Intrastate Violence: An Instrumental Variable Analysis with Application to the 2004 Tsunami in Sri Lanka," *Journal of Conflict Resolution* 63, no. 3 (2019): 760–785, https://doi.org/10.1177/0022002717753919; Andrew M. Linke and Brett Ruether, "Weather, Wheat and War: Security Implications of Climate Variability for Conflict in Syria," *Journal of Peace Research* 58, no. 1 (2021): 114–131, https://doi.org/10.1177/0022343320973070.
22. Shawn Davies, Therése Pettersson, and Magnus Öberg, "Organized Violence 1989–2021 and Drone Warfare," *Journal of Peace Research* 59, no. 4 (2022): 593–610, https://doi.org/10.1177/00223433221108428.
23. Jon Barnett, "Global Environmental Change I: Climate Resilient Peace?," *Progress in Human Geography* 43, no. 5 (2019): 927–936, https://doi.org/10.1177/0309132518798077.
24. Katharine J. Mach et al., "Climate as a Risk Factor for Armed Conflict," *Nature* 571 (2019): 193–197, esp. 193, https://doi.org/10.1038/s41586-019-1300-6.
25. Jiuping Xu et al., "Natural Disasters and Social Conflict: A Systematic Literature Review," *International Journal of Disaster Risk Reduction* 17 (2016): 38–48, http://dx.doi.org/10.1016/j.ijdrr.2016.04.001.

Fourth and relatedly, existing work mostly focuses on structural context factors that make disaster-conflict linkages more likely, such as ethnic exclusion and low economic development.[26] By contrast, I also include dynamic, situation-specific factors, including how the disaster affects the capabilities of and power relations between government and rebels. I further elaborate on each of these four points below.

My article addresses these lacunae by analyzing the impact of climate-related disasters on armed conflict dynamics. First, I argue that disasters can result in armed conflict escalation or de-escalation through various pathways. In particular, I introduce a power differential mechanism, highlighting how disasters change power relations between groups and how such changes affect conflict dynamics. Then, I combine quantitative data with rich qualitative information using qualitative comparative analysis (QCA) to conduct a unique empirical analysis of twenty-one cases of disasters striking armed conflict zones. The final two sections present and discuss the study's core findings and conclude the article.

Pathways Linking Disasters and Conflict Intensity

This article follows the UN General Assembly's definition of a disaster as a "serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts."[27] There are no so-called natural disasters because natural hazards alone (e.g., a riverine flood) are insufficient to cause significant losses and other damage. Rather, hazards need to strike populated and vulnerable areas (e.g., places with weak early warning systems and insufficient river embankments) to have socioeconomic impacts. Relatedly, climate-related disasters result from a climatic hazard (e.g., extreme temperature, precipitation, or wind) striking a vulnerable society.

Disasters can increase conflict risks by causing or exacerbating strong grievances. Extreme weather events are usually associated with significant personal and material losses. In 2021 alone, disasters caused 9,200 fatalities and economic losses worth $280 billion.[28] If survivors blame governance actors

26. Ide et al., "Multi-Method Evidence"; von Uexkull et al., "Civil Conflict Sensitivity."
27. UN General Assembly, *Report of the Open-Ended Intergovernmental Expert Working Group on Indicators and Terminology Relating to Disaster Risk Reduction* (New York: UN, 2016), 13.
28. Munich Re, NatCatSERVICE, "Factsheet: Natural Catastrophes in 2021," January 2022, https://

(usually state authorities) for those losses and insufficient relief or recovery support, tensions between the governing and the governed will rise. Indeed, various studies show how disasters can cause a steep decline of trust in and support for authorities,[29] even though it remains unclear whether such a decline affects willingness to support an armed rebellion.

Tensions are particularly acute if (perceived) disaster-related inequalities overlap with existing political, socioeconomic, or ethnic cleavages. Governments have historically fueled such sentiments: by providing insufficient relief, by evicting victims from coastal areas to make space for tourism or military projects, or by increasing repression to maintain stability after extreme events.[30] Furthermore, migration facilitated by disasters can result in ethnic tensions, resource competition, or frustration about low government support in receiving areas.[31]

While these insights on disaster-related grievances are mostly derived from the literature on armed conflict onset and incidence, they can also be valid for conflict escalation. People may switch their support to an opposing conflict party if they become frustrated or disappointed by how governance actors (sometimes rebel groups, but usually governments) respond to a disaster. If there is a social contract between the government/rebels and the population, the latter might also urge their "violent representatives" to express grievances by staging further attacks.[32] Furthermore, disasters can act as symbolic trigger events that political elites draw on to justify further violence against an opponent.[33] Similarly, research tends to associate disasters with negative percep-

www.munichre.com/content/dam/munichre/mrwebsiteslaunches/natcat-2022/2021_Figures-of-the-year.pdf/_jcr_content/renditions/original./2021_Figures-of-the-year.pdf.

29. Sung Hoon Kang and Mark Skidmore, "The Effects of Natural Disasters on Social Trust: Evidence from South Korea," *Sustainability* 10, no. 9 (2018): 1–16, https://doi.org/10.3390/su10092973; Gabriel Katz and Ines Levin, "The Dynamics of Political Support in Emerging Democracies: Evidence from a Natural Disaster in Peru," *International Journal of Public Opinion Research* 28, no. 2 (Summer 2016): 173–195, https://doi.org/10.1093/ijpor/edv010.

30. Apodaca, *State Repression in Post-Disaster Societies*; Donald Grasse et al., "Opportunistic Repression: Civilian Targeting by the State in Response to COVID-19," *International Security* 46, no. 2 (2021): 130–165, https://doi.org/10.1162/isec_a_00419; Naomi Klein, *The Shock Doctrine: The Rise of Disaster Capitalism* (New York: Picador, 2007).

31. Vally Koubi et al., "The Determinants of Environmental Migrants' Conflict Perception," *International Organization* 72, no. 4 (2018): 905–936, https://doi.org/10.1017/S0020818318000231.

32. Ted Robert Gurr, *Why Men Rebel* (Princeton, NJ: Princeton University Press, 1970).

33. Stuart J. Kaufman, "Symbolic Politics or Rational Choice? Testing Theories of Extreme Ethnic Violence," *International Security* 30, no. 4 (Spring 2006): 45–86, https://doi.org/10.1162/isec.2006.30.4.45.

tions of outgroups,[34] droughts with higher support for political violence,[35] and rapid-onset disasters with more frequent civil unrest.[36]

Another pathway connecting disasters to higher conflict intensity is based on strategic incentives and opportunities. If government forces are unable to access an area, for instance because roads are flooded or destroyed, rebels can expand their influence.[37] A government's capabilities can be weakened when it deploys security forces and reconstruction funds to affected areas or when it incurs disaster-induced tax income losses. After the 1999 Quindío earthquake in Colombia, for instance, the government sent an additional six thousand soldiers and police to assist with the disaster response, while the country's gross domestic product (GDP) declined by 6 percent in the three months after the event.[38] Rebels can also be weakened by disasters—for instance, if they receive or extort lower contributions from the disaster-affected population. Furthermore, the state can use disaster relief to gain sympathies and collect information in rebel strongholds, thereby enabling pro-government forces to scale up their attacks.[39]

Disasters can also facilitate pro-government militias' and rebel groups' recruitment efforts. Engaging in violent conflict poses a high risk of injury and death, but people who have lost their livelihoods because of a disaster and who have few legal options to earn an income tend to be more willing to accept such risks.[40] This is particularly the case because disasters can result in sustained GDP reductions.[41] There is also evidence that armed groups may extract or raid some of the humanitarian aid flowing into a disaster-affected area

34. Eunbin Chung and Inbok Rhee, "Disasters and Intergroup Peace in Sub-Saharan Africa," *Journal of Peace Research* 59, no. 1 (2022): 58–72, https://doi.org/10.1177/00223433211065249.
35. Nina von Uexkull, Marco d'Errico, and Julius Jackson, "Drought, Resilience, and Support for Violence: Household Survey Evidence from DR Congo," *Journal of Conflict Resolution* 64, no. 10 (2020): 1994–2021, https://doi.org/10.1177/0022002720923400.
36. Peter F. Nardulli, Buddy Peyton, and Joseph Bajjalieh, "Climate Change and Civil Unrest: The Impact of Rapid-Onset Disasters," *Journal of Conflict Resolution* 59, no. 2 (2015): 310–335, https://doi.org/10.1177/0022002713503809.
37. Michael Brzoska, "Weather Extremes, Disasters, and Collective Violence: Conditions, Mechanisms, and Disaster-Related Policies in Recent Research," *Current Climate Change Reports* 4 (2018): 320–329, https://doi.org/10.1007/s40641-018-0117-y.
38. Dawn Brancati, "Political Aftershocks: The Impact of Earthquakes on Intrastate Conflict," *Journal of Conflict Resolution* 51, no. 5 (2007): 715–743, https://doi.org/10.1177/0022002707305234.
39. Eastin, "Hell and High Water."
40. Joshua Eastin and Steven T. Zech, "Environmental Pressures and Pro-Government Militias: Evidence from the Philippines," *Conflict Management and Peace Science* (2022, online first): 1–22, https://doi.org/10.1177/07388942221110128.
41. Nourin Shabnam, "Natural Disasters and Economic Growth: A Review," *International Journal of Disaster Risk Science* 5, no. 2 (2014): 157–163, https://doi.org/10.1007/s13753-014-0022-5.

and use the revenues to boost their war efforts.[42] After the 2010 floods in Pakistan, for instance, the UN Office for the Coordination of Humanitarian Affairs channeled more than $1.3 billion into the worst-affected regions, raising concerns that Islamist groups might benefit from the aid.[43]

Based on these considerations, I formulate the following hypothesis:

H1: Climate-related disasters facilitate the escalation of armed conflicts.

Yet, there are also several theoretical and empirical reasons for why disasters could facilitate armed conflict de-escalation. For example, Alexander De Juan and Niklas Hänze find that social trust tends to increase in post-disaster settings.[44] Contrary to the grievances approach, disaster sociology has long emphasized that at the local level, "the net result of most disasters is a dramatic increase in social solidarity among the affected populace during the emergency and immediate post emergency periods."[45] Disasters can be a shared threat that increases incentives for cooperation and facilitates a common identity among a "community of sufferers."[46] The post-disaster uptick in solidarity, trust, and cooperation may not only engender ceasefires but also cause conflict parties to scale down armed conflict intensity, at least momentarily.[47]

Furthermore, there are several ways that disasters can reduce conflict intensity by restraining conflict parties' violent actions. Perhaps most obviously, a storm that causes flooding or destroys bridges can inhibit the mobility of troops and restrict their ability to engage in battles. The same is true if fighters are injured or killed during a disaster, or if bases and equipment are damaged.

42. Kikuta, "Postdisaster Reconstruction."
43. United Nations Office for the Coordination of Humanitarian Affairs, "Humanitarian Appeals," accessed March 8, 2023, https://www.unocha.org/media-centre/news-updates/humanitarian-appeals.
44. Alexander De Juan and Niklas Hänze, "Climate and Cohesion: The Effects of Droughts on Intra-Ethnic and Inter-Ethnic Trust," *Journal of Peace Research* 58, no. 1 (2021): 151–67, https://doi.org/10.1177/0022343320974096.
45. Charles E. Fritz and Harry B. Williams, "The Human Being in Disasters: A Research Perspective," *ANNALS of the American Academy of Political and Social Science* 309, no. 1 (1957): 42–51, esp. 48, https://doi.org/10.1177/000271625730900107.
46. Quarantelli and Dynes, "Community Conflict."
47. Joakim Kreutz, "From Tremors to Talks: Do Natural Disasters Produce Ripe Moments for Resolving Separatist Conflicts?," *International Interactions* 38, no. 4 (2012): 482–502, http://dx.doi.org/10.1080/03050629.2012.697404; Rune T. Slettebak, "Don't Blame the Weather! Climate-Related Natural Disasters and Civil Conflict," *Journal of Peace Research* 49, no. 1 (2012): 163–176, https://doi.org/10.1177/0022343311425693.

The 2004 tsunami in Aceh, for instance, killed 2,698 Indonesian security forces and an unknown number of Free Aceh Movement rebels. It also caused considerable destruction to military bases and insurgent supply lines along the coast.[48]

Disaster-induced agricultural shocks and food price spikes can compromise the ability of armed groups (including state forces) to feed their fighters, hence forcing them to scale down their operations. Even if they can extract food by force, doing so risks lowered public support.[49] Given a disaster's economic impacts, revenues tend to decline for both the state (from taxes) and the rebels (from decreased levels of voluntary contributions and extortion). At the same time, rebels (just like governments) often channel additional resources to those disaster-ridden areas where they have some territorial control or a social contract with the population, thus further straining their capacities.[50] Islamist insurgents, for instance, were among the first to provide disaster assistance after the 2010 floods in Pakistan, and their ability to generate funds in these regions was reduced for several months.[51] The simultaneous increase in demand for and decrease of armed groups' capabilities could result in a (temporary) reduction of violence.[52]

My second hypothesis, running contrary to H1, is thus:

H2: Climate-related disasters facilitate the de-escalation of armed conflicts.

Armed conflict intensity is usually driven by a range of political, economic, and social factors. Therefore, disasters are likely to affect conflict dynamics only under certain circumstances and through specific pathways. The existing literature on climate-related disasters and armed conflict onset or incidence

48. Philippe Le Billon and Arno Waizenegger, "Peace in the Wake of Disaster? Secessionist Conflicts and the 2004 Indian Ocean Tsunami," *Transactions of the Institute of British Geographers* 32, no. 3 (July 2007): 411–427, https://doi.org/10.1111/j.1475-5661.2007.00257.x.
49. Benamin E. Bagozzi, Ore Koren, and Bumba Mukherjee, "Droughts, Land Appropriation, and Rebel Violence in the Developing World," *Journal of Politics* 79, no. 3 (July 2017): 1057–1072, http://dx.doi.org/10.1086/691057.
50. Colin Walch, "Weakened by the Storm: Rebel Group Recruitment in the Wake of Natural Disasters in the Philippines," *Journal of Peace Research* 55, no. 3 (2018): 336–350, https://doi.org/10.1177/0022343317741535.
51. Ayesha Siddiqi, "Climatic Disasters and Radical Politics in Southern Pakistan: The Non-Linear Connection," *Geopolitics* 19, no. 4 (2014): 885–910, http://dx.doi.org/10.1080/14650045.2014.920328.
52. For a similar argument on conflict incidence, see Idean Salehyan and Cullen S. Hendrix, "Climate Shocks and Political Violence," *Global Environmental Change* 28 (September 2014): 239–250, http://dx.doi.org/10.1016/j.gloenvcha.2014.07.007.

identifies three factors that facilitate disaster-conflict linkages: a high economic dependence on agriculture, low levels of socioeconomic development, and the political exclusion of ethnic groups.[53] Yet, as with other variables on climate, disasters, and conflict (e.g., population density, presence of transport infrastructure), these factors are mostly structural and change slowly over time. By contrast, one key feature of disasters is that they can catalyze large-scale, short-term social changes, such as rapid economic declines or extraordinary government and civil society responses.[54] As a consequence, research needs to pay greater attention to dynamic, situation-specific factors that shape disaster-conflict linkages.

I argue that disasters can trigger short-term changes in power relations between governments and rebel groups, which has follow-on effects on armed conflict intensity. International relations research has long discussed how tensions in the international system can rise if weaker actors, dissatisfied with the status quo, gain power relative to stronger actors.[55] Likewise, Kyosuke Kikuta finds that sudden perceived changes in the balance of power during civil wars cause more violence because the benefiting party seeks to capitalize on its advantage, while the opponent tries to prevent such a move.[56]

Such arguments are applicable to the impact of disasters on armed conflict dynamics. Disasters can strengthen one armed conflict actor relative to another, either because a conflict party benefits from the disaster (e.g., when it can recruit deprived survivors or loot international aid), or because a conflict party suffers from the disaster (e.g., when its income is reduced or when it needs to divert resources for the disaster response). In such a situation, the conflict party that benefits from the disaster (relative to the other) could use this advantage militarily and hence escalate the fighting, which results in higher armed conflict intensity. After the 2004 tsunami in Sri Lanka, for instance, both the government and the Liberation Tigers of Tamil Eelam believed that they could scale up their respective military activities to capitalize on their opponent's disaster-related weakening.[57]

53. Joshua Busby, *States and Nature: The Effects of Climate Change on Security* (Cambridge: Cambridge University Press, 2021); Ide et al., "Multi-Method Evidence"; von Uexkull et al., "Civil Conflict Sensitivity."
54. Jörg Birkmann et al., "Extreme Events and Disasters: A Window of Opportunity for Change? Analysis of Organizational, Institutional and Political Changes, Formal and Informal Responses after Mega-Disasters," *Natural Hazards* 55, no. 3 (2010): 637–655, https://doi.org/10.1007/s11069-008-9319-2.
55. Jacek Kugler and Douglas Lemke, eds., *Parity and War: Evaluations and Extensions of the War Ledger* (Ann Arbor: University of Michigan Press, 1996).
56. Kikuta, "Postdisaster Reconstruction."
57. Idil Tunçer-Kilavuz, "Success or Failure in the Peace Processes of Aceh and Sri Lanka: A Com-

It is also possible, however, that both the government and the rebels are weakened by the disaster and thus scale down their military activities, leading to a decline in conflict intensity. For example, the 1997 floods in Somalia heavily constrained the income sources (i.e., cattle and banana exports) and mobility of the two competing United Somali Congress factions, leaving them unable to pay their respective fighters and stage new offensives.[58]

The third hypothesis of this article tests this power differential mechanism:

H3: If disasters benefit one armed conflict party relative to the other, the conflict will escalate. On the other hand, a conflict will de-escalate if both conflict parties suffer significant adverse impacts from the disaster.

Studying the Disaster-Conflict Nexus with QCA

SAMPLE OF CASES

The sample of this study consists of twenty-one cases where major climate-related disasters struck armed conflict zones. Such a medium-N approach has two major advantages. First, it allowed me to collect qualitative information on key factors for which cross-case quantitative data were not readily available, such as the disasters' impacts on the armed conflict parties and on overall conflict dynamics. Second, evidence on various disaster and conflict types from fourteen different countries makes this analysis more comprehensive than single or small-N comparative case studies.

I chose the country as the unit of analysis in this article for all government-rebel conflict dyads because several pathways connecting disasters to conflict intensity (e.g., migration, loss of tax revenues, enhanced national solidarity) operate beyond the local level.[59] Using the International Disasters Database (EM-DAT)[60] and the Uppsala Conflict Data Program (UCDP),[61] I compiled a

parative Study," *Terrorism and Political Violence* 31, no. 4 (2019): 712–732, https://doi.org/10.1080/09546553.2017.1282860.

58. Peter D. Little, Hussein Mahmoud, and D. Layne Coppock, "When Deserts Flood: Risk Management and Climatic Processes among East African Pastoralists," *Climatic Research* 19 (2001): 149–59, https://doi.org/10.3354/cr019149.

59. The exception to this country level of analysis is India, an extremely large country with multiple ongoing armed conflicts and major disasters in any given year. For Indian cases, the state (first-level administrative unit) is the unit of analysis.

60. Centre for Research on the Epidemiology of Disasters, EM-DAT: The International Disasters Database, 2021, https://www.emdat.be/.

61. Gleditsch et al., "Armed Conflict 1946–2001."

list of all country years with an ongoing armed conflict that were struck by a disaster from 1990 to 2020 that caused more than 1,000 deaths. EM-DAT includes a disaster event in its database if it meets at least one of the following criteria: ten or more deaths, one hundred or more people affected, the government declares a state of emergency, or the government requests international assistance. I limited the sample to a maximum of three cases per country because India and the Philippines would otherwise dominate the sample. To increase sample heterogeneity regarding both countries and disaster types, the sample also includes five countries where highly destructive disasters struck but caused fewer than 1,000 deaths (Burundi, Egypt, Indonesia, Nepal, and Uganda).[62] The fourteen countries in my sample are depicted in figure 1.

ASSESSING DISASTER-RELATED CONFLICT DYNAMICS

The outcomes of interest of this article are disaster-related armed conflict escalation and de-escalation as indicated by the number and intensity of battles between the government and a rebel group. I used a two-staged procedure to assess where the outcome is present. First, I used information from UCDP's Georeferenced Event Dataset to calculate the difference (in standard deviations) between the monthly number of battle-related deaths twelve months before and after the disaster month(s).[63] Second, I assessed a wide range of academic studies, gray literature, and media reports to determine whether the quantitative trends are supported by qualitative evidence, and whether the respective disasters facilitated these trends.

The results highlight the relevance of this procedure. In several cases, large standard deviations in battle-related deaths were not disaster-related (e.g., Pakistan 2015 with −16.22, or Nepal 1996 with +7.10). In other contexts, disaster-related changes in armed conflict intensity were masked by rather small standard deviations (e.g., Indonesia 1997 with +1.77).[64]

To test H3 and to disentangle the causal pathways and context factors connecting disasters to armed conflict (de-)escalation, I ran the QCA with eight conditions.[65] The first two conditions are structural factors that researchers

62. All results reported below are robust to dropping those five additional cases. The online appendix provides details and reports the results of all robustness tests.
63. Ralph Sundberg and Erik Melander, "Introducing the UCDP Georeferenced Event Dataset," *Journal of Peace Research* 50, no. 4 (2013): 523–532, https://doi.org/10.1177/0022343313484347.
64. See table S1 in the online appendix.
65. Table S4 in the online appendix provides extensive information on how each of these eight conditions was operationalized using which data. Running a QCA with twenty-one cases and eight conditions poses a problem because too many variables are used in an analysis with too few

Figure 1. Map of Sample Countries Where Major Climate-Related Disasters Struck Armed Conflict Zones

NOTE: The shaded areas represent the sample of this study, which consists of twenty-one cases where major climate-related disasters struck armed conflict zones. In Bangladesh, India, Pakistan, the Philippines, and Somalia, several cases were analyzed. Table S1 in the online appendix provides short summaries of how disasters shaped conflict dynamics in each case.

have identified as relevant scope conditions for disaster-related conflict onset and incidence (but not yet for conflict intensity).[66]

The first structural factor is agricultural dependence (*agridep*). Agricultural economies and livelihoods are particularly vulnerable to climate-related disasters because crops are highly sensitive to extreme weather events, and fields

cases. To mitigate this problem, I subsequently ran core models with the five conditions that are analytically relevant for each outcome, and the results did not change. Axel Marx and Adrian Dusa, "Crisp-Set Qualitative Comparative Analysis (csQCA), Contradictions and Consistency Benchmarks for Model Specification," *Methodological Innovations Online* 6, no. 2 (2011): 103–148, https://doi.org/10.4256/mio.2010.0037.

66. Ide et al., "Multi-Method Evidence"; von Uexkull et al., "Civil Conflict Sensitivity."

often take several months to recover after a disaster. The resulting economic losses can lead to intense grievances among the affected population and facilitate recruitment by armed groups.[67] But these losses also reduce the conflict parties' revenue base and necessitate increased cooperation across socioeconomic cleavages.[68]

Poverty (*poverty*) is the second structural factor. Poor, marginalized communities tend to disproportionately suffer from a disaster because they tend to live in substandard housing and in at-risk areas. They usually also have fewer means to recover in the aftermath of a disaster. In addition, state emergency services more frequently ignore areas with a low socioeconomic profile.[69] Poor people consequently face lower opportunity costs to join an armed group after a disaster, particularly if they also develop disaster-related grievances (e.g., against state institutions). At the same time, high levels of post-disaster cooperation are reported in regions with high poverty rates.[70] Under-five mortality rates are a well-established indicator for poverty, with national-level data available from the World Bank and (only for India) state-level data provided by the National Family Health Survey.[71] To account for endogeneity, I used data from the pre-disaster year.

I also ran a robustness test for a third widely discussed structural factor for disaster-conflict linkages, namely the exclusion of ethnic groups from political power. This robustness test yielded no significant results.[72]

I then added two conditions measuring how the disaster affected the conflict parties. Disasters can affect rebels in various adverse ways, for instance by killing their fighters, destroying their infrastructure, undermining their revenue sources, forcing them to invest resources into the disaster response, or inhibiting their logistics. An adverse impact on rebels (*impactrebel*) was present if the disaster affected the rebels' fighting capabilities through one or several of these

67. Eastin and Zech, "Environmental Pressures and Pro-Government Militias"; von Uexkull et al., "Civil Conflict Sensitivity."
68. Quarantelli and Dynes, "Community Conflict"; Salehyan and Hendrix, "Climate Shocks and Political Violence."
69. Ben Wisner et al., *At Risk: Natural Hazards, People's Vulnerability, and Disasters* (London: Routledge, 2004).
70. Rajesh Venugopal and Sameer Yasir, "The Politics of Natural Disasters in Protracted Conflict: The 2014 Flood in Kashmir," *Oxford Development Studies* 45, no. 4 (2017): 424–442, http://dx.doi.org/10.1080/13600818.2016.1276160.
71. International Institute for Population Sciences, *National Family Health Survey (NFHS-5), 2019–21: India Report* (Mumbai: Ministry of Health and Family Welfare, 2022), http://rchiips.org/nfhs/index.shtml; World Bank, World Bank Open Data, Mortality Rate Under-5 (per 1,000 Live Births), 2022, https://data.worldbank.org/indicator/SH.DYN.MORT?view=chart.
72. See the online appendix for the robustness test results.

pathways. Similarly, *impactgov* measures a negative disaster impact on the government. According to the qualitative literature, this condition indicates whether the disaster significantly and negatively affected the fighting capabilities of government troops or pro-government militias through the loss of fighters, resources, infrastructure, troop mobility, or legitimacy.

The impact of disasters on power relations between a government and a rebel group is likely shaped by pre-disaster conditions, and specifically by the strength of the respective conflict parties. Two conditions account for such strength: capable state (*capablestate*) and weak rebels (*weakrebel*). A disaster is unlikely to weaken a state that has stable revenue sources, a strong bureaucracy, and a large military, all of which make it harder for rebels to exploit any opportunity arising in the post-disaster period. Likewise, a capable state can intensify its attacks to exploit the rebels' disaster-induced weakness. Non-capable states, by contrast, could face more rebel attacks after the disaster, for instance when states have to deploy security forces for the disaster response and are less likely to capitalize on rebel weakness. I utilize a composite indicator to measure state capability because the latter is a multidimensional concept.[73] This indicator combines information on government effectiveness, military personnel, and the government's ability to tax economic output.

Strong rebels can intensify their struggle if they perceive the government to be weakened by the disaster, or if additional opportunities for recruitment or financing arise. Weak rebel groups, by contrast, are more likely to be either preoccupied with the disaster response or incapable of upscaling their activities.

The two final conditions considered in the main analysis relate to the spatial patterns of the disaster impacts: overlap (*overlap*) and rebel dependence (*rebeldepend*). An overlap of the disaster-affected area and armed conflict zone tends to facilitate several of the mechanisms discussed previously. For instance, a disaster's adverse effect on the rebel group or government forces is more likely, and more relevant for conflict dynamics, if it occurs where bases are established, troops operate, and fighting takes place. This adverse impact is most obvious for logistical challenges and for supply chain interruptions (e.g., destroyed infrastructure). Likewise, enhanced post-disaster solidarity or grievances are more likely to affect conflict dynamics if they occur in areas where the conflict takes place.

The *rebeldepend* condition measures whether rebels depend on the local pop-

73. Cullen S. Hendrix, "Measuring State Capacity: Theoretical and Empirical Implications for the Study of Civil Conflict," *Journal of Peace Research* 47, no. 3 (2010): 273–285, https://doi.org/10.1177/0022343310361838.

ulation in disaster-affected areas for hideouts, supplies, information, or recruitment. If the population is severely deprived by a disaster, it is less likely to have spare food, funds, or workforce that rebels can acquire via donation or appropriation. Rebels can respond to this situation either by temporarily downscaling their activities[74] or by escalating violence against civilians to enforce compliance.[75] Alternatively, rebels could be pushed by their constituencies, whose grievances have intensified due to an insufficient disaster response by the government, to scale up their military activities.

Apart from the political exclusion of ethnic groups, I include three further conditions in various robustness tests: the inflow of large amounts of international aid, perceptions of an unfair distribution of disaster-related relief and aid delivery, and the democratic nature of the political system. None of these conditions holds explanatory power in my analysis.[76]

QUALITATIVE COMPARATIVE ANALYSIS

This article uses QCA to analyze when and why disasters contribute to the (de-)escalation of armed conflicts. QCA is increasingly used in security studies and international relations and has several key advantages.[77] It can combine quantitative data (e.g., on poverty) and qualitative data (e.g., on disaster impacts on rebels) in a single analysis. Furthermore, QCA has been designed to deal with medium-N samples like the one used in this article. My analysis therefore responds to Lars-Erik Cederman and Manuel Vogt's call for "conflict scholars . . . to steer a middle course between overgeneralized macromodels and myopic microinvestigations."[78] Finally, QCA is well-suited to identify complex causal patterns,[79] three of which are particularly relevant for my analysis.

First, QCA can identify "conjunctural causation," or when various conditions interact to produce an outcome.[80] Previous research indicates that several conditions need to be present simultaneously for climate-related disasters to

74. Salehyan and Hendrix, "Climate Shocks and Political Violence."
75. Bagozzi, Koren, and Mukherjee, "Droughts, Land Appropriation."
76. See the online appendix for the respective tests and information on all coding decisions.
77. Tobias Ide and Patrick A. Mello, "QCA in International Relations: A Review of Strengths, Pitfalls, and Empirical Applications," *International Studies Review* 24, no. 1 (March 2022): viac008, https://doi.org/10.1093/isr/viac008.
78. Lars-Erik Cederman and Manuel Vogt, "Dynamics and Logics of Civil War," *Journal of Conflict Resolution* 61, no. 9 (2017): 1992–2016, esp. 2008, https://doi.org/10.1177/0022002717721385.
79. Carsten Q. Schneider and Claudius Wagemann, *Set-Theoretic Methods for the Social Sciences: A Guide to Qualitative Comparative Analysis* (Cambridge: Cambridge University Press, 2012).
80. The term "conjunctural causation" is commonly used by set-theoretic approaches and QCA research.

increase the risk of armed conflict onset or incidence.[81] Such conjunctural causation is also plausible for conflict intensity. For instance, conflicts might escalate only if the disaster weakens the government, and the rebels are simultaneously strong and can recruit from a poor population. Likewise, several factors discussed previously could facilitate conflict escalation or de-escalation.[82] QCA can recognize such conjunctural pathways where the same factors can facilitate different outcomes, depending on the context.

Second, QCA can uncover the existence of several parallel pathways leading to an outcome (e.g., conflict escalation), each of which may involve different causal conditions (equifinality). For instance, an armed conflict may escalate after a disaster either because government forces try to exploit rebel weakness, or because rebels intensify their military activities in response to disaster-induced grievances.

The third complex pattern that QCA can identify is causal asymmetry, or when different (combinations of) conditions explain the presence and absence of an outcome. The literature on armed conflicts points out that conflict escalation and de-escalation are distinct processes with different driving factors.[83] Instead of assuming that the absence of the factors that drive disaster-related conflict escalation will facilitate de-escalation, QCA identifies separate pathways to each outcome.

I used the crisp-set (i.e., binary) version of QCA to disentangle necessary and sufficient conditions for disaster-related armed conflict (de-)escalation. The analysis conceived all twenty-one cases to be members (= 1) or non-members (= 0) of different sets[84] during the so-called calibration process (which transforms raw data into binary values of either 0 or 1). Afterward, I built a truth table (which lists all possible combinations of conditions),[85] pop-

81. Busby, *States and Nature*; von Uexkull et al., "Civil Conflict Sensitivity."
82. For example, a high poverty level could escalate an armed conflict if it allows conflict parties to recruit more disaster-deprived survivors. But it can also facilitate conflict de-escalation if prevalent poverty impedes the rebels' efforts to raise resources from the affected population after the disaster.
83. Christopher Blattman and Edward Miguel, "Civil War," *Journal of Economic Literature* 48, no. 1 (March 2010): 3–57, https://www.doi.org/10.1257/jel.48.1.3; Cederman and Vogt, "Dynamics and Logics of Civil War."
84. An example of such a crisp-set is the set of cases where government forces were adversely Haffected by the disaster (in contrast to the set of cases where such adverse impacts were not present).
85. For instance, cases with high poverty rates, capable states, and weak rebels (row 1), cases with high poverty rates, capable states, and strong rebels (row 2), and cases with low poverty rates, no capable states, and weak rebels (row 3).

ulated it by the empirical evidence, and then minimized the truth table using the Quine-McCluskey algorithm.[86] Given that QCA is still an emerging method in the fields of security studies and international relations, I explain this procedure and how I employed it for my dataset in greater detail in the online appendix.

How Disasters Affect Armed Conflict Escalation and De-Escalation

Table 1 summarizes the results of my qualitative analysis for all twenty-one cases of disaster–armed conflict intersections discussed in this article.[87] After disasters, armed conflicts escalate in six of the twenty-one cases (29 percent), de-escalate in seven cases (33 percent), and in eight cases (38 percent) climate-related disasters have no relevant impact on armed conflict dynamics. Typically, a disaster-conflict intensity nexus was absent for two reasons. First, the disaster had no significant impact on the conflict parties (e.g., the 2008 cold spell in northwestern Afghanistan affected a region of very low strategic relevance for the government and the Taliban).[88] Second, other, strong drivers of conflict (de-)escalation were present (e.g., Maoist rebels decided to act on widespread grievances and intensified the conflict before the 1996 floods in Nepal).[89]

Overall, these findings provide some conditional support for both H1 and H2: disasters can facilitate both armed conflict escalation and de-escalation. These relations are by no means deterministic. In most cases, disasters did not lead to higher (71 percent) or lower (67 percent) armed conflict intensity, and disasters were never the only (and often not the most important) driver of conflict dynamics. Yet, major climate-related disasters also affected armed conflict dynamics in 62 percent of all cases analyzed.

In the next step, I conducted a QCA to study when and why disasters facilitate armed conflict escalation or de-escalation. Following established QCA practice, I started by analyzing necessary conditions.[90] Of all eight conditions

86. Patrick A. Mello, *Qualitative Comparative Analysis: An Introduction to Research Design and Application* (Washington, DC: Georgetown University Press, 2021); Schneider and Wagemann, *Set-Theoretic Methods for the Social Sciences*.
87. Table S3 in the online appendix includes short qualitative summaries of each case.
88. Antonio Giustozzi, *The Taliban at War: 2001–2018* (New York: Oxford University Press, 2019).
89. Sonali Deraniyagala, "The Political Economy of Civil Conflict in Nepal," *Oxford Development Studies* 33, no. 1 (2005): 47–62, https://doi.org/10.1080/13600810500099659.
90. Schneider and Wagemann, *Set-Theoretic Methods for the Social Sciences*.

Table 1. Disaster Impacts on Conflict Intensity

Case	Disaster	Conflict	Disaster-Conflict Link
Bangladesh 2007	cyclone	government vs. Purbo Banglar Communist Party–Janajuddha faction	de-escalation
Burundi 2005–2006	drought	government vs. Party for the Liberation of the Hutu People–National Liberation Forces	de-escalation
Indonesia 1997	drought	government vs. National Council of the Maubere Resistance	de-escalation
Myanmar 2008	cyclone	government vs. Karen National Union	de-escalation
Pakistan 2010	flood	government vs. Tehrik-i-Taliban Pakistan	de-escalation
Somalia 1997	flood	United Somali Congress (Mahdi faction) vs. United Somali Congress (Aideed faction)	de-escalation
Somalia 2010–2011	drought	government vs. Al-Shabaab	de-escalation
Bangladesh 1991	cyclone	government vs. People's Solidarity Association/ Peace Forces	escalation
Egypt 1994	flood	government vs. al-Gama'a al-Islamiyya	escalation
India (Andhra Pradesh, Orissa) 1999	cyclone	government vs. People's War Group	escalation
India (Assam) 1998	flood	government vs. United Liberation Front of Assam	escalation
Tajikistan 1992	flood	government vs. United Tajik Opposition	escalation
Uganda 1999–2001	drought	government vs. Lord's Resistance Army	escalation
Afghanistan 2008	cold spell	government vs. Taliban	none
India (Assam) 2007	flood	government vs. United Liberation Front of Assam	none
Nepal 1996	flood	government vs. Communist Party of Nepal (Maoist)	none

Table 1. *Continued*

Case	Disaster	Conflict	Disaster-Conflict Link
Pakistan 2015	heat wave	government vs. Tehrik-i-Taliban Pakistan	none
Philippines 1991	cyclone, flood	government vs. Communist Party of the Philippines–New People's Army	none
Philippines 2012	cyclone	government vs. Abu Sayyaf Group	none
Philippines 2013	cyclone	government vs. Communist Party of the Philippines–New People's Army	none
Russia 2010	heat wave	government vs. Forces of the Caucasus Emirate	none

NOTE: See the online appendix for more detailed descriptions of and quantitative data for each case.

in the main model and the four conditions explored in robustness checks, two pass the consistency threshold of 0.9 recommended for necessary conditions: agricultural dependence (1.00 for escalation and de-escalation) and poverty (also 1.00 for escalation and de-escalation). In other words, all cases where disasters affected armed conflict intensity (for good or for bad) featured economies that were strongly dependent on the agricultural sector and that had low levels of economic development.

This finding is in line with earlier studies that show how these two structural conditions are important predictors of both climate- and disaster-related conflict risks.[91] Consequently, climate-related disasters affect armed conflict dynamics only in countries that are already vulnerable to disaster impacts. This finding supports the notion that climate change is a threat multiplier,[92] and demonstrates again that disasters are by no means natural; they are contingent on socioeconomic vulnerabilities (and the political decisions that create

91. Busby, *States and Nature*; Ide et al., "Multi-Method Evidence"; von Uexkull et al., "Civil Conflict Sensitivity."

92. Daniel Abrahams, "Conflict in Abundance and Peacebuilding in Scarcity: Challenges and Opportunities in Addressing Climate Change and Conflict," *World Development* 132 (August 2020): 104998, https://doi.org/10.1016/j.worlddev.2020.104998.

such vulnerabilities). Moreover, my analysis demonstrates for the first time that these conditions can also facilitate an (at least temporary) reduction of armed conflict intensity, meaning that climate-related disasters can also have a threat-reducing effect.

Before explaining the results that appear in tables 2 and 3, I briefly introduce the key measures of fit for QCA results. The main results come in the form of a *solution* that identifies one or several *paths* (or combinations of conditions) that are sufficient for the outcome. Each solution (and each of the paths that it consists of) has a certain *coverage* indicating how much of the outcome it explains. For instance, in a sample with ten cases of conflict de-escalation, a coverage of 0.9 would mean that nine out of the ten cases are explained by the respective path or solution (for crisp-set QCA). Paths come with a *raw coverage* (the total percentage of cases explained by a path) and a *unique coverage* (the percentage of cases explained by only a certain path and no other path forming the solution). Each path and solution also have a *consistency* value indicating the degree to which empirical data are in line with the proposed set relations. If a path covers ten cases in total, for example, of which nine experienced disaster-related conflict escalation and one experienced de-escalation, the consistency would be 0.9 for escalation and 0.1 for de-escalation in a crisp-set QCA.

Table 2 summarizes the QCA solution for disaster-related armed conflict escalation. The solution has perfect consistency and coverage scores, indicating high explanatory power and a strong fit between the model and the empirical data. In fact, the solution explains all six cases with the conflict escalation outcome and is present in none of the fifteen cases where the escalation outcome is absent.

The solution consists of three separate paths. The first path is characterized by the rebels depending on the disaster-affected population, yet not being weakened by the disaster itself (*~impactrebel * rebeldepend*). In such a situation, the rebels could recruit more soldiers from populations that were either aggrieved because of insufficient government responses to the disaster (i.e., Egypt 1994, India [Assam] 1998) or affected by disaster-related impoverishment (i.e., India [Assam] 1998, India [Andhra Pradesh and Orissa] 1999, Tajikistan 1992). This recruitment resulted in a temporary change in the relative power distribution between the conflict parties. After the 1998 floods in Assam, for example, there was a "growing frustration and unrest in the youth from flood-affected families. There are instances of unemployment, impoverishment, and grievances against bad governance leading some youths to join

Table 2. Qualitative Comparative Analysis (QCA) Solution for Armed Conflict Escalation after Disasters

Path	*~impactrebel * rebeldepend*	*~impactrebel * ~weakrebel * overlap*	*rebeldepend * capablestate * overlap*
Consistency	1.00	1.00	1.00
Unique coverage	0.17	0.17	0.17
Raw coverage	0.67	0.5	0.5
Cases	Egypt 1994 India (Andhra Pradesh and Orissa 1999) India (Assam 1998) Tajikistan 1992	Bangladesh 1991 Egypt 1994 Tajikistan 1992	Egypt 1994 India (Assam) 1998 Uganda 1999–2001
Solution	*~impactrebel * (rebeldepend + ~weakrebel * overlap) + rebeldepend * capablestate * overlap -> escalation*		
Consistency	1.00		
Coverage	1.00		

NOTE: The solution highlights three paths to armed conflict escalation after disasters: (1) the absence of adverse disaster impacts on the rebels combined with a dependence of the rebels on the disaster-affected population for recruitment and support (left column); (2) the absence of adverse disaster impacts on the rebels in conjunction with strong rebels and an overlap between the disaster and conflict areas (central column); and (3) the rebels depending on the disaster-affected population in combination with a capable state and an overlap between the disaster and conflict areas (right column). The perfect consistency and coverage scores (1.00) of the solution (last three rows) indicate high explanatory power and a strong fit between the model and the empirical data.

* = and + = or -> = sufficient for underlined = case only covered by this path

Table 3. Qualitative Comparative Analysis (QCA) Solution for Armed Conflict De-escalation after Disasters

Path	*~capablestate * impactrebel*	*impactgov * ~overlap * agridep*	*impactgov * ~overlap * poverty*
Consistency	1.00	1.00	1.00
Unique coverage	0.71	0.00	0.00
Raw coverage	0.71	0.29	0.29
Cases	Bangladesh 2007 Indonesia 1997 Myanmar 2008 Pakistan 2010 Somalia 1997 Somalia 2010	Burundi 2005–2006 Bangladesh 2007	Burundi 2005–2006 Bangladesh 2007
Solution	~capablestate * impactrebel + impactgov * ~overlap * (agridep + poverty) -> de-escalation		
Consistency	1.00		
Coverage	1.00		

NOTE: The solution highlights three paths to armed conflict de-escalation after disasters: (1) the absence of a capable state in conjunction with the disaster having adverse impacts on the rebels (left column); (2) adverse disaster impacts on the government combined with no overlap between the disaster and conflict areas and a high agricultural dependence of the country (central column); and (3) adverse disaster impacts on the government in conjunction with no overlap between the disaster and conflict areas and widespread poverty (right column). The perfect consistency and coverage scores (1.00) of the solution (last three rows) indicate high explanatory power and a strong fit between the model and the empirical data.

* = and + = or -> = sufficient for underlined = case only covered by this path

insurgent groups," which the United Liberation Front of Assam rebels exploited to boost their fighting force.[93] This shift of power relations between the government and the rebels resulted in the latter scaling up their attacks, leading to a rise in conflict intensity.

In the second path, the rebels were neither weak nor negatively affected by the disaster, and the armed conflict zone overlapped significantly with the disaster-affected area (*~impactrebel * ~weakrebel * overlap*). As in the first path, such a situation allowed the rebels to gain power (relative to the government) by boosting their recruitment efforts, broadening their support bases (e.g., when delivering aid to the affected areas more efficiently than the government), and strengthening their capabilities (i.e., Egypt 1994, Tajikistan 1992). In the Bangladesh 1991 case, the government was concerned that the rebels could exploit anti-Bengal and anti-government sentiments in the disaster-affected Chittagong Hills Tracts after Cyclone Gorky. It therefore preemptively intensified repressive violence (often against civilians) to quell unrest.[94]

The third path covers three cases, but only Uganda 1999–2001 is not covered by any other path, and indeed, the third path disappears if Uganda 1999–2001 is not part of the sample. The third path thus only explains the Ugandan case and can be interpreted as follows: The Lord's Resistance Army depended on the local population (*rebeldepend*) for food and funds, and these resources were increasingly scarce because of government offensives and the 1999–2001 drought that affected this population (*overlap*). The Lord's Resistance Army thus increased violence against civilians to loot food from local villages and refugee camps in order to fight a relatively strong government (*capablestate*), resulting in higher conflict intensity.[95]

Table 3 displays the QCA solution for armed conflict de-escalation. Again, the solution has a perfect consistency (1.00), implying that it explains all seven outcome cases in the sample. The solution consists of three separate paths quasi-sufficient for the outcome.

The first path has the highest explanatory power, as it covers six out of seven

93. Partha Das, Dadul Chutiya, and Nirupam Hazarika, *Adjusting to Floods on the Brahmaputra Plains, Assam, India* (Kathmandu: International Centre for Integrated Mountain Development, 2009), 22.

94. Naomi Hossain, "The 1970 Bhola Cyclone, Nationalist Politics, and the Subsistence Crisis Contract in Bangladesh," *Disasters* 42, no. 1 (January 2018): 187–203, https://doi.org/10.1111/disa.12235.

95. Anthony Vinci, "Existential Motivations in the Lord's Resistance Army's Continuing Conflict," *Studies in Conflict & Terrorism* 30, no. 4 (2007): 337–352, https://doi.org/10.1080/10576100701200173.

de-escalation cases (five of them uniquely) and is straightforward to interpret: the rebels were adversely affected by the disaster (*impactrebel*), hence staging fewer attacks, and the rather weak state (*~capablestate*) was unable to exploit this situation, resulting in an overall decrease in armed conflict activity. For example, the 2010 floods in Pakistan inundated nearly 20 percent of the country's territory, posing severe logistic constraints to the Tehrik-i-Taliban (TTP) rebels. The TTP's taxes and voluntary contributions also declined in the affected areas, and the insurgents diverted resources and personnel to relief actions.[96] The Pakistani Army could not benefit from the weakening of the rebels because it was "overstretched with flood relief and military operations" in other areas and also faced mobility constraints in the flooded territory.[97]

In the second and third paths, the disaster strikes a vulnerable society characterized by either strong agricultural dependence (*agridep*) or high poverty rates (*poverty*). At the same time, the disaster does not overlap with the conflict zone (*~overlap*), yet it has significant adverse effects on the government (*impactgov*). For example, the path covers cases where the government had to deploy 40,000 security forces to the affected disaster area (Bangladesh 2007) or incurred a GDP loss of 3.8 percent (Burundi 2005–2006).[98] The rebels in both Bangladesh and Burundi were unable to exploit these situations because the disasters did not overlap with the conflict areas, and the rebels either were already very weak (the Purbo Banglar Communist Party–Janajuddha faction in Bangladesh) or were affected by the disasters (Party for the Liberation of the Hutu People–National Liberation Forces in Burundi, which had to cope with higher food prices and less material support from the drought-affected population). Just like the situation described in the first path, no conflict party gained in relative power, but both faced reduced capabilities to wage violence.

To summarize the QCA results, disasters facilitate armed conflict escalation only in countries that are already vulnerable to climate-related extreme events (i.e., because of strong economic dependence on agriculture and prevalent poverty). They mostly do so by enabling rebel groups to recruit more soldiers

96. Muhammad Feyyaz, "Political Economy of Tehrik-i-Taliban Swat," *Conflict and Peace Studies Journal* 4, no. 3 (2011): 1–22; Siddiqi, "Climatic Disasters and Radical Politics."
97. C. Christine Fair, "Pakistan in 2010: Flooding, Governmental Inefficiency, and Continued Insurgency," *Asian Survey* 51, no. 1 (February 2011): 97–110, esp. 104, https://doi.org/10.1525/as.2011 .51.1.97.
98. International Federation of Red Cross and Red Crescent Societies (IFRCRCS), *Bangladesh: Cyclone Sidr*, Information Bulletin no. 01/2007 (Geneva: IFRCRCS, 2007); World Bank, *Republic of Burundi: Addressing Fragility and Demographic Challenges to Reduce Poverty and Boost Sustainable Growth* (Washington, DC: World Bank Group Publications, 2018).

and broaden their support base, but only when the rebels are not negatively affected by the disaster and have sufficient capabilities. In such situations, the disaster facilitates an at least temporary shift of power toward the insurgents. This finding provides support for the power differential mechanism underlying H3: fighting will escalate if the disaster benefits one conflict party relative to the other. The sample revealed only one case where the rebels suffered adverse disaster impacts and the government did not (Somalia 2010, a de-escalation case). Therefore, testing whether governments and rebels exploit their respective opponents' disaster-related weaknesses with equal frequency remains a task for future research.

Disasters also facilitate armed conflict de-escalation only in highly vulnerable countries. A de-escalation happens when one conflict party is adversely affected by the disaster and the other conflict party cannot exploit this vulnerability, because it is either weak in general or temporarily affected by the disaster as well. This outcome provides qualified support for the power differential mechanism (and H3): armed conflicts de-escalate when both parties suffer significant adverse impact from disasters. But the more common de-escalation scenario is when just one party (usually the rebels) is affected by a disaster and its opponent (usually the government) is too weak to capitalize on this opportunity.

My findings make four contributions to the wider literature on climate change, disasters, and armed conflict. First, structural factors like ethnic exclusion and agricultural dependence feature prominently in existing studies on conflict onset and incidence. My results indicate that ethnic exclusion is less relevant for disaster-related changes in conflict intensity. While acknowledging the relevance of poverty and agricultural dependence as necessary conditions for these shifts, this article highlights the importance of more dynamic and local conditions. In particular, I show how disasters can shape armed conflict intensity by (temporarily) changing the distribution of relative power between the government and rebels (power differential mechanism). Future research should explore how climatic changes, disasters, and environmental stress in general influence power relations between conflict parties.[99]

Second, in contrast to mainstream debates about climate change, disasters, and increased conflict risks, this analysis shows that climate-related disas-

99. Scholars of civil war, by contrast, have written extensively on how power relations shape military and bargaining actions before, during, and after armed conflicts. See Blattman and Miguel, "Civil War"; Cederman and Vogt, "Dynamics and Logics of Civil War."

ters can also facilitate armed conflict de-escalation, at least in the first months after the disaster. In fact, decreased conflict risks are slightly more frequent in my sample. Climate-disaster-conflict linkages are therefore not just non-deterministic, but they can also lead to multiple outcomes. This finding provides important nuance to previous debates and suggests that disasters and climate change more generally can also be threat reducers. The results also highlight the importance of climate/disaster security analyses engaging more closely with disaster diplomacy and environmental peacebuilding research, which deal with reduced conflict risks in the face of environmental stress.[100]

Third, studies on both climate-conflict and disaster-conflict linkages discuss whether "grievances" or "opportunities" hold higher explanatory power. Proponents of the first position point toward strong anti-regime sentiments among people who feel neglected by the government and higher levels of intergroup hostility after disasters.[101] Other scholars argue that opportunities such as a weakened state and a larger recruitment pool of deprived disaster survivors better explain disaster-conflict interlinkages.[102] In practice, the two explanations are often deeply intertwined. For instance, armed groups may use intensified grievances as an opportunity to recruit more followers. That said, my results lend some support to the opportunity perspective. The conditions most strongly related to the grievances perspective, such as perceptions of unfair aid distribution, have no explanatory value in my results. Changes in power relations (in line with the power differential mechanism) and how they provide opportunities or constraints to armed conflict parties, by contrast, lie at the core of the QCA results.

Fourth, research on climate change and security mostly focuses on armed conflict onset, incidence, and (to a lesser degree) duration. Little attention has been paid to the dynamics of ongoing armed conflicts. Likewise, the emerging literature on armed conflict intensity has so far barely considered climate- and disaster-related factors.[103] My analysis demonstrates that integrating both fields of research can provide novel insights.

100. Tobias Ide et al., "The Past and Future(s) of Environmental Peacebuilding," *International Affairs* 97, no. 1 (January 2021): 1–16, https://doi.org/10.1093/ia/iiaa177; Kelman, "Connecting Theories of Cascading Disasters."
101. Apodaca, *State Repression in Post-Disaster Societies*; Chung and Rhee, "Disasters and Intergroup Peace."
102. Eastin and Zech, "Environmental Pressures and Pro-Government Militias"; Ide et al., "Multi-Method Evidence."
103. Stephen Chaudoin, Zachary Peskowitz, and Christopher Stanton, "Beyond Zeroes and Ones: The Intensity and Dynamics of Civil Conflict," *Journal of Conflict Resolution* 61, no. 1 (2017): 56–83,

Conclusion

Disasters play a key role in debates on climate change, environmental stress, and security. While most research focuses on armed conflict onset and incidence, little is known about how climate-related disasters shape the dynamics of ongoing armed conflicts. This shortcoming is crucial: the frequency and intensity of disasters is on the rise, the number of armed conflicts is at a historical high, and climate-related extreme events are increasingly striking armed conflict zones and vulnerable, war-ridden societies.

In this article, I integrated quantitative and in-depth qualitative data (using QCA) to analyze how climate-related disasters shaped armed conflict intensity in twenty-one cases from fourteen countries. Importantly, in contrast to most existing studies, I focused on both the higher and lower risks of armed conflicts and disentangled how and when disasters shape conflict intensity.

The results show that depending on the context, climate-related disasters increase (29 percent), decrease (33 percent), or do not shape (38 percent) armed conflict intensity. Particularly in countries highly vulnerable to disasters, climate-related disasters can be a relevant driver of armed conflict escalation and de-escalation. Thus, climate change can also be a threat reducer, at least in the short term. Armed conflicts tend to escalate if climate-related disasters induce relative power changes between the conflict parties, for instance by facilitating recruitment or decreasing income, which the benefiting party (usually the rebels) exploits to stage further attacks. By contrast, if at least one conflict party is weakened by a disaster and the other lacks the capability to exploit this vulnerability (because it is too weak or, less frequently, also negatively affected by the disaster), armed conflict intensity declines. These findings demonstrate the benefits of climate-disaster-conflict research that considers quickly changing post-disaster situational factors that may shift the relative distribution of power between the conflict parties.

My results are in line with other studies arguing that climate-related disasters shape armed conflict risks, although only under specific circumstances.[104] This finding reinforces claims that climatic changes alone do not affect armed

https://doi.org/10.1177/0022002715569773; Constantin Ruhe, "Impeding Fatal Violence through Third-Party Diplomacy: The Effect of Mediation on Conflict Intensity," *Journal of Peace Research* 58, no. 4 (2021): 687–701, https://doi.org/10.1177/0022343320930072.

104. Eastin and Zech, "Environmental Pressures and Pro-Government Militias"; Ide et al., "Multi-Method Evidence"; Nel and Righarts, "Natural Disasters"; von Uexkull et al., "Civil Conflict Sensitivity."

conflict risks but "interact with economic and political factors at different levels, putting vulnerable communities at higher risk."[105] Although existing work highlights that climate change is more likely to affect the risk of small-scale violence,[106] I have shown that climate-related disasters can also affect the dynamics of large-scale armed conflicts.

In light of the findings presented in this article, further research on climate change and security should analyze how extreme events affect the (relative) power of the conflict parties. This would also open up additional avenues to link work on climate security and on armed conflict intensity. Furthermore, scholars must focus on not only increased security risks but also the opportunities provided by climate-related disasters. Periods of low fighting intensity could, for instance, make negotiations easier to initiate.[107] Future work also needs to uncover exactly which disaster-related opportunities and constraints enable or limit armed conflict parties' activities. It is important to study other forms of political violence and their relationship to disasters, particularly given that double exposure to climate change and armed conflict can have severe human security implications such as state repression and gender- or race-based violence.[108] Although a certain amount of climate change is already locked into the earth's system, social systems can still react to these changes in resilient and peaceful rather than vulnerable and violent ways.

105. Marwa Daoudy, "Rethinking the Climate-Conflict Nexus: A Human-Environmental-Climate Security Approach," *Global Environmental Politics* 21, no. 3 (2021): 4–25, esp. 12, https://doi.org/10.1162/glep_a_00609.
106. Tobias Ide et al., "Pathways to Water Conflict during Drought in the MENA Region," *Journal of Peace Research* 58, no. 3 (2021): 568–582, https://doi.org/10.1177%2F0022343320910777; Ore Koren, Benamin E. Bagozzi, and Thomas Benson, "Food and Water Insecurity as Causes of Social Unrest: Evidence from Geolocated Twitter Data," *Journal of Peace Research* 58, no. 1 (2021), https://doi.org/10.1177/0022343320975091.
107. Ruhe, "Impeding Fatal Violence through Third-Party Diplomacy."
108. Daoudy, "Rethinking the Climate-Conflict Nexus"; Uche Eseosa Ekhator-Mobayode et al., "The Effect of Armed Conflict on Intimate Partner Violence: Evidence from the Boko Haram Insurgency in Nigeria," *World Development* 153 (May 2022): 105780, https://doi.org/10.1016/j.worlddev.2021.105780.