III. Climate Impacts on Conflict: The Role of Water

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The impacts of climate change—such as prolonged droughts, rising sea levels, extreme storms, and erratic weather patterns—are increasingly undermining livelihoods, destabilizing ecosystems, and heightening social and economic vulnerabilities [1] [2]. These changes are particularly acute in the context of water resources, as climate-driven disruptions degrade both the availability and quality of water in shared river basins. As a critical resource for agriculture, drinking, and sanitation, water becomes even more contested when climate impacts reduce supply or undermine equal access. In fragile regions, declining water availability can exacerbate tensions between communities or nations reliant on the same river systems, increasing the risks of conflict. Integrating climate risks into peacebuilding efforts, particularly those focusing on water management, is essential to mitigate these pressures. Encouraging equitable water sharing and cooperative river basin governance not only helps address immediate water security challenges but also fosters trust. This can reduce the likelihood of resource-driven disputes. By promoting collaborative water access strategies, these interventions strengthen resilience and contribute to long-term peace and stability, ensuring that climate adaptation aligns with conflict prevention.

Unless otherwise specified, the term "conflict" here refers specifically to two forms of violent conflict: civil conflict, where an organized armed group engages in combat with government forces; and non-state conflicts, involving clashes between non-state actors, such as disputes between pastoralist groups over shared resources like water [3]. Inter-state conflicts are excluded due to their limited number in relation to other conflicts. Other forms of non-violent political conflict—such as demonstrations, nonviolent resistance campaigns, or regime changes—fall outside the scope of this brief, although these phenomena can also lead to critical security concerns.

This chapter explores multiple linkages between climate-related events, violent conflict, and water resources. First, climate events, such as droughts or floods, can influence conflict dynamics, potentially escalating tensions over critical resources like water, altering the course of ongoing disputes, or even triggering the use of violence. Second, climate-related disruptions can exacerbate the vulnerabilities of populations already affected by armed conflict, further limiting access to essential resources like water and deepening their exposure to harm. Third, the paper examines how armed conflict itself disrupts access to water resources, both directly and indirectly. Damage to water infrastructure, contamination of supplies, and the neglect of water systems during prolonged conflict compound resource scarcity, undermining livelihoods, public health, and food security. These interconnections underscore the intricate interplay between environmental pressures, conflict scenarios, and water access, particularly in regions where water scarcity is a key factor.

It is important to acknowledge several limitations in this chapter. The focus is restricted to the phenomena described above, drawing primarily on cross-case evidence from quantitative studies. While these studies provide valuable insights, they often lack the contextual detail and reflexivity offered by qualitative research. Additionally, as a concise brief, this piece cannot delve into specific case studies in depth. Finally, peacebuilding measures, while critical to addressing the nexus of climate change, water resources, and conflict, are beyond the scope of this chapter.

Climate Risk, Water Resources, & Conflict

Climate risk arises from the interplay of hazards, exposure, vulnerability, and coping capacity, with impacts evolving over time [1]. Short-term hazards, such as a single year of insufficient rainfall, often differ significantly from the cumulative effects of gradual, persistent changes. For example, repeated droughts can deplete coping strategies—such as selling livestock or exhausting savings—leaving communities less able to recover when conditions improve and increasingly vulnerable to future hazards. These impacts are especially acute in regions dependent on shared water resources, such as river basins, where competing demands for limited supplies exacerbate tensions and strain governance systems.

Water sharing in transboundary river basins exemplifies both the challenges and opportunities presented by climate risks [4]. In water-scarce regions, effective management of shared resources requires coordination to ensure equitable access and mitigate conflict risks. Societies can adapt to gradual climate impacts through technological innovations, shifts in production practices, or institutional agreements. However, when adaptation fails, intensifying competition over water—essential for agriculture, energy, and livelihoods—can deepen socio-economic vulnerabilities and ignite disputes at local levels, often also reaching national levels. This risk is particularly pronounced in fragile governance contexts, where inadequate institutions may fail to mediate disputes, making violent conflict a more likely outcome. Strong water-sharing agreements and integrated basin management strategies are thus critical for reducing climate risks and fostering cooperation in regions vulnerable to water scarcity.

Water Scarcity

In water-stressed regions, water availability significantly shapes the impacts of climate change. Water scarcity arises not only from physical shortages but also through social and cultural factors, where perceptions of scarcity vary based on practices and norms. For instance, a similar reduction in water availability may severely impact farmers in one area while having minimal consequences elsewhere. Fundamentally, water scarcity occurs when available water sources cannot meet the actual needs of communities, highlighting a persistent gap between supply and demand.

Importantly, scarcity is influenced by both physical limitations and subjective factors, such as societal norms, usage behaviors, and attitudes toward water efficiency. Efficient resource management—addressing pollution, salination, and infrastructure issues—plays a critical role in mitigating scarcity. Water use for agriculture, sanitation, or household needs also determines vulnerability to shortages. Communities relying on groundwater for irrigation and livestock face greater risks compared to those using it solely for drinking and sanitation. Extreme water scarcity worsens conditions for farming, herding, and agriculture, threatening subsistence by restricting access to essential nutrition and sanitation, thereby compromising overall living conditions.

Ethiopia's Grand Renaissance Dam has led to tensions with Egypt and Sudan downstream. Source: Getty Images

The Impact of War on Water Resources

Understanding the impacts of war on water resources is critical for breaking vicious cycles of scarcity and conflict, enabling targeted interventions that can foster stability and support conflict prevention [5]. Water scarcity, when exacerbated by armed conflict, can fuel tensions over access and provision, making it a key factor in both humanitarian crises and prolonged instability. By addressing the destruction and disruption caused by war—such as damaged infrastructure, contamination, and reduced access—interventions can mitigate the risk of disputes, reduce vulnerabilities, and strengthen resilience in affected communities.

Armed conflict disrupts water resources both directly and indirectly, impacting water quality, availability, and access.

Deliberate targeting or destruction of water infrastructure—such as dams, reservoirs, and treatment facilities—is a common feature of war, despite international laws safeguarding water as a basic human right [6]. Damage to water systems often results in deteriorated quality, as broken pipes, fuel shortages, and untreated wastewater lead to contamination of surface and groundwater sources. Even outside combat zones, weakened infrastructure and power outages impair water delivery and treatment, exacerbating pollution and resource scarcity.

Conflict-induced water scarcity is further aggravated by long-term neglect of infrastructure maintenance and inefficient resource management. Prolonged conflicts can reduce institutional capacity, increase salination, and allow unregulated water extraction, leading to overuse and environmental degradation. Additionally, unmonitored informal water markets may emerge, exploiting resources and worsening pollution. Over time, such issues can cause desertification, deplete aquifers, and destabilize ecosystems, producing cascading effects on agricultural productivity and societal well-being.

Vulnerable populations suffer the most from these impacts. Displaced persons and refugee communities face extreme water shortages, with available supplies often falling far below daily minimum needs for drinking, sanitation, and hygiene (WASH) [5]. Women and girls bear a disproportionate burden, as they can be responsible for fetching water, sometimes exposing them to health risks and gender-based violence. Extended distances to water sources also contribute to mental stress, domestic disputes, and community tensions, creating a vicious cycle between water scarcity and conflict. Poor water access in conflict settings has severe health consequences, particularly in the WASH sector, where insufficient clean water increases the spread of preventable diseases and infections. This not only worsens public health outcomes but also places additional pressure on weakened healthcare systems. Meanwhile, the degradation of water quality and quantity diminishes agricultural yields, disrupts livelihoods, and threatens entire ecosystems, with long-term implications for food security and economic stability.

Efforts to rebuild water systems post-conflict are vital for recovery, yet the consequences of war on water infrastructure can persist for decades. Strengthening water access is essential for improving public health, reducing mortality, and supporting sustainable development. At the same time, safeguarding water resources during conflict and adopting cooperative management strategies can mitigate the devastating impacts of war, prevent further scarcity, and foster stability in affected regions. Despite these imperatives, systematic research on the long-term effects of conflict on water resources remains limited, highlighting the need for innovative tools, such as remote sensing and surveys, to assess and address water challenges in conflict settings.

The evidence base for understanding the connections between violence and climate factors has grown significantly in recent years, with much more robust evidence now available compared to a decade ago. Numerous comprehensive reviews and meta-analyses e.g. [7] - [10] have advanced our understanding of these complex interactions, with particular emphasis on water resources as a central element of climate-conflict dynamics. Studies examining the relationship between climate change and interstate armed conflict have generally found limited robust evidence directly linking climate-change impacts to violence between countries. However, water scarcity has emerged as a recurring factor in intrastate conflicts, such as civil wars, where organized groups challenge governments. Water scarcity often exacerbates tensions over shared resources, particularly in arid regions where access to water is critical for survival and economic stability. This is true for instance in disputes between pastoralists and farmers that frequently center on competition for water access, as well as violent protests driven by water-related grievances.

Conflict between herders over land and water in the Niger Delta. Source: Wetlands International

Insights into the dynamics of civil war and climate change reveal the disruptive effects of environmental variability, particularly on water availability, in exacerbating existing conflicts. Access to water resources often lies at the core of these disruptions, as changes in rainfall patterns directly impact agricultural productivity and livelihoods. Climate-conflict research has also investigated the role of resource extraction, particularly water, as a key driver of violence. Non-state violence, including social unrest and protests, has similarly been linked to water scarcity and other climate-related pressures. Research on the relationship between water scarcity and rioting has yielded varied results, largely due to differences in methodologies and definitions of unrest. Some studies indicate that local droughts during growing seasons do not significantly affect rioting [11] while others suggest that dry spells may increase riots, particularly in areas with pre-existing water shortages or ethnic tensions [12], [13]. Flooding has been associated with political unrest over water issues, especially in less democratic regimes and countries with politically excluded groups [14]. Protests related to hydro-dam construction further illustrate the tensions between climate adaptation efforts and water resource management. While dams can mitigate downstream climate impacts by regulating water flow, they often threaten the livelihoods of nearby communities [15]. Such projects not only alter water availability but also create long-term socio-economic challenges for affected populations. This emphasizes the dual role of water as both a critical physical resource and a powerful symbol, capable of driving collective action and unrest.

Communal conflict, characterized by violence between informal groups organized around collective identities, adds a crucial dimension to climate-conflict research. Unlike rebel warfare or political clashes, these conflicts often arise from competition over essential resources such as water, land, and livelihoods [3]. Environmental stress, such as water scarcity, intensifies intergroup competition, particularly in regions where access to water is critical for agriculture and survival. However, these relationships are mediated through socioeconomic factors rather than direct environmental impacts. Marginalization and socioeconomic exclusion exacerbate vulnerabilities to environmental shocks, particularly in communities where water access is already precarious.

Institutions play a pivotal role in determining the outcomes of water-related conflicts. Effective local governance can reduce conflict risks by ensuring equitable water distribution and sustainable management. Conversely, overlapping authorities or parallel judicial systems can heighten tensions by creating ambiguity over water rights. Traditional authorities and religious leaders may serve as critical mediators, resolving disputes over water access or other issues. These dynamics underscore the importance of institutional capacity, inclusive governance, and effective management systems in addressing the complex interconnections between water scarcity, climate change, and conflict.

Villagers protest against the rising water level of Omkareshwar Dam, India, forcing their displacement. Source: India Today

Pathway forward

Water scarcity lies at the heart of the complex relationship between climate change and conflict, serving as both a physical necessity and a source of socio-political tension. The evidence highlights that disruptions to water availability—whether through drought, flooding, or mismanaged infrastructure—are key drivers of vulnerability, particularly in fragile or resource-dependent regions. These dynamics exacerbate existing inequalities, intensify competition over shared resources, and fuel grievances that can escalate into violent conflict or collective unrest.

While climate adaptation measures, such as improved water-sharing agreements and technological innovations, offer pathways to mitigate these risks, the role of governance remains critical. Effective and inclusive institutions are essential to ensure equitable water access, manage disputes, and foster cooperation, particularly in transboundary river basins and areas with limited resources[16]. At the same time, inadequate governance, overlapping jurisdictions, and political exclusion often worsen the impacts of water scarcity, leaving communities more vulnerable to conflict and instability.

Understanding the dual role of water—as a critical resource and a driver of social tension—is essential for developing integrated approaches to climate resilience, environmental peacebuilding and conflict prevention[17]. Looking ahead, addressing climate change, water resources, and conflict in a combined way requires targeted actions informed by both research and policy innovation. First, research must go beyond generalized calls for more data by focusing on actionable insights—such as mapping the hotspots where climate-driven water scarcity poses the highest risks of conflict. Integrating tools like remote sensing, geospatial data, and field-based surveys can provide a clearer understanding of how water dynamics intersect with socio-political vulnerabilities at local and regional levels. Studies should also investigate the long-term impacts of climate shocks on water infrastructure and access, with an emphasis on identifying effective adaptation measures under various governance contexts.

For policy, prioritizing equitable and cooperative water governance remains key. New policies should focus on creating inclusive frameworks for transboundary water sharing, ensuring that all stakeholders—especially marginalized communities—have a voice in decision-making processes. Strengthening institutional capacity at both local and regional levels is crucial for managing water disputes, including building mechanisms for conflict resolution that prevent disputes from escalating into violence. Investments in infrastructure, such as resilient water storage and distribution systems, can further mitigate the risks posed by extreme weather events and reduce vulnerabilities in fragile regions. Moreover, climate adaptation policies must align with peacebuilding objectives. This means integrating water management into broader strategies for stabilizing conflict-affected areas, including addressing political exclusion and fostering intergroup cooperation over shared resources. By adopting these targeted approaches, we can mitigate the risks of water-related conflicts and promote stability, even in the face of intensifying climate pressures.

Chapter III References

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