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# Climate change, mobility and violent conflict: a typology of interlinked pathways

Despite increased attention toward the links between climate, human mobility and conflict, the pathways through which resulting human insecurity may lead to violence are poorly understood. Although there is no inherent link between climate-related mobility and conflict, a coherent understanding of the triple nexus is needed to address the impact of intersecting crises on millions of lives and livelihoods. To achieve this, an in-depth literature review is employed to identify and explore four pathways that connect climate, human mobility and violent conflict: conflict as a result of climate-related disaster displacement, conflict as a result of scarcity-related mobility, conflict as a result of abundance-related migration, and conflict as a result of pre-existing tensions and migratory patterns interacting with climate change and/or variability. Finally, recommendations are made to guide research, policies and programming aiming to sever the link between climate-related mobility and conflict, where it may exist.

**Keywords**: climate change, climate adaptation, climate security, climate migration, climate-related mobility, environmental peacebuilding, displacement, immobility, migration, peacebuilding

## Introduction

Although the relationship between a changing climate, human mobility and security is complex and indirect, it is clear that climate change and variability lead to a wide range of human security challenges (Adger et al., 2021). Climate-related displacement, food insecurity and health risks affect millions of people worldwide. The extent of these challenges varies across social groups and are influenced by myriad factors, including economic status, gender, age and ethnicity. Women, youth, minority groups and communities in the global South often bear the worst human security consequences of the climate crisis due to intersecting realms of discrimination and colonialism (Sultana, 2022).

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In some cases, climate-related insecurity can lead to violent conflict, with mobility playing a mediating role in the process. Research has associated flood displacement with increased conflict incidence, as for every 100,000 people displaced by floods, there is a 3 per cent increased chance that conflict will occur during that year (Ghimire et al., 2015).[1] Given that flooding internally displaced 10.1 million people globally from their homes in 2021 (accounting for 43 per cent of weather-related displacement and 27 per cent of all internal displacement) (IDMC, 2019), and that 51 per cent of all disaster-related displacements between 2008 and 2018 were flood-related, this threat is far from marginal (IDMC, 2022). However, climate-related mobility does not inevitably lead to conflict. Thus, identifying and understanding the linkages between climate, mobility and conflict is necessary for the design of evidence-based, locally contextual interventions to maintain human security.

Because mobility is multicausal, designating climate, or indeed any single driver as the principal influence of a specific instance is problematic (Borderon et al., 2019). However, the IPCC's Sixth Assessment Report (IPCC AR6) states with high confidence, high agreement among scientists, and robust evidence that 'climatic conditions, events and variability are important drivers of migration and displacement […] with migration responses to specific climate hazards being strongly influenced by economic, social, political and demographic processes' (Cissé et al., 2022, 1080). Nonetheless, when asked their reasons for migrating, individuals most often cite social or economic factors, with climate or environmental factors rarely mentioned (Black et al., 2011; Risi and Null, 2016). In many cases, mobility decisions proximately based on socioeconomic grounds may have underlying climatic drivers that are difficult to identify and articulate. In a recent survey of 6,000 people on the move in West and Central Africa, just 2 per cent initially cited natural disasters or environmental factors as a reason they left home (Mixed Migration Centre, 2022). However, when asked if environmental issues were a factor in their decision to leave – in other words, if they were an indirect driver rather than a primary reason – that number grew to 49 per cent.

Mobility resulting from environmental push factors can take many forms. Natural disasters are often the primary 'push' factor in disaster-related displacement (Curtis et al., 2015), which tends to be temporary, short distance and domestic, with those affected often returning home once the danger has receded (Borderon et al., 2019). Migration driven by slow-onset climate hazards tends to be influenced by ongoing development processes and social, economic and political drivers to a greater degree (Black et al., 2011; Brzoska and Fröhlich, 2016). Individuals may be more agentic in their choice of destination, often selected according to 'pull factors' related to one's expected wellbeing upon arrival. Pull factors often pertain to social networks

1 The authors note a correlation between flood-related displacement and increased conflict incidence, rather than a direct causal link between the two.

or economic opportunities (Detges et al., 2022), but are limited by financial barriers, geographic boundaries and border regimes (Czaika and De Haas, 2013). Migration resulting from slow-onset hazards can be short or long term, circular or seasonal, or 'large-scale movements that build slowly to gain momentum as adverse climatic conditions coincide with other adverse socio-economic conditions' (Naik, 2009, 267).

While the initial reaction of communities facing slow-onset climate hazards is often to adapt in place, deteriorating environmental conditions necessitate changes in resource use and livelihood strategies (McLeman, 2018). Thus, individual and/or household risk thresholds are an important means of assessing the likelihood of migration, and have been observed in relation to climate phenomena, psychological stress, economic productivity and levels of violence (Adams and Kay, 2019; Owen and Wesselbaum, 2020; Schon, 2021). Once a risk threshold is exceeded and *in situ* adaptation becomes unfeasible, out-migration will likely increase (McLeman et al., 2021). However, the relationship between environmental degradation and out-migration is non-linear; progressively deteriorating environmental conditions may initially drive out-migration but, past a certain point, cause migration flows to become sporadic, before trapping people in place (Jacobson et al., 2019). If conditions decline to the point that an environment becomes completely inhospitable, out-migration is likely to resume en masse (McLeman, 2018). Both environmental and non-environmental risk factors are further filtered through one's 'aspiration' and 'capability' (de Haas, 2021), or 'motivation' and 'opportunity' (Schon, 2021) to migrate outward. In other words, some that want to move lack the ability to do so, and some that can move choose to stay.

McLeman et al.'s (2021) framework (Figure 1) illustrates the factors, thresholds and non-linearities that interact to shape mobility outcomes. Climate and non-climate factors influence risk because a household's exposure, vulnerability to, and adaptive capacity to withstand climate hazards are determined by socioeconomic and political dynamics. As mobility outcomes further modulate risk levels, the framework is circular, with risk levels in destination areas influencing future movement. Risk is an ever-present variable that vulnerable households continuously factor into decisions about adaptation strategies.

Immobility is also possible, either through choice or powerlessness. Individuals facing environmental decline often choose to remain in place, anchored by various connections to their home despite the opportunity to migrate outward (Barcus and Shugatai, 2018). Vulnerable households can also become 'trapped', wherein those who would like to migrate lack the means or opportunity to do so. Means often depend on social and household factors such as financial resources, demographic factors and social networks, and opportunities by structural factors including political regimes, the architecture of formal migration systems, and international legal frameworks (IDMC, 2022).

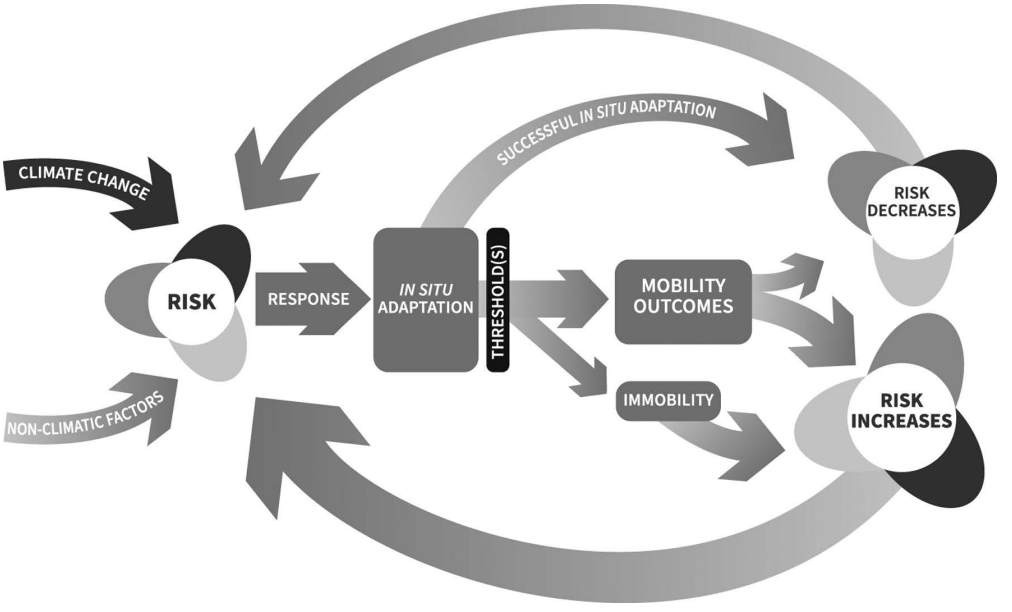


Figure 1 Risk-based framework linking climatic and non-climatic factors with mobility outcomes
*Source*: McLeman et al., 2021, 3

Due to its influence on how the resources required for mobility are distributed among demographic groups, gender, in conjunction with other social factors, is another crucial determinant of people's ability to migrate. Due to gendered norms and inequalities, women and girls – especially those living in rural areas – generally possess less financial and social capital than men, and therefore a lower capacity for mobility (Chindarkar, 2012). This connects with Schon's argument that the intent to migrate and the opportunity to migrate are separate variables, and that women often possess the former without the latter (2021). When adequate resources are available, women frequently face pressure to remain in place in order to fulfil socially prescribed reproductive, caregiving and domestic roles (Lama et al., 2020). Lacking the opportunity of mobility, women's adaptive capacity is reduced, which can lead to them becoming trapped within contexts of environmental decline and bearing a disproportionate burden of climate's negative impacts on human security.

Climate-related mobility is likely to fold into pre-existing migration flows and development processes while simultaneously stimulating new ones (Black et al., 2011; Ide, 2020; Thalheimer et al., 2021). Although formal and informal labour migration is ostensibly driven by the desire for employment, climate change and variability can indirectly contribute to these flows by eroding livelihoods in origin areas – particularly

those where smallholder agricultural production is common. Here, desirable traits in destination areas, 'pull factors' or network connections such as family links, higher wages, improved social services links or shared cultural values, play an important role in destination selection (de Sherbinin et al., 2022).

Similar to the influence of climate on mobility, the impact of climate on conflict is typically indirect and mediated through social, political and economic variables (Black et al., 2011; van Baalen and Mobjörk, 2018; Koubi, 2019; Thalheimer et al., 2021). Climate drivers of conflict are likely to be place-dependent, temporally bounded, and highly varied across space and time (Mach et al., 2019; Bowlsby et al., 2020). While caution against generalised conclusions should be heeded (O'Loughlin et al., 2012; von Uexkull and Buhaug, 2021), several meta-analyses have found that climate variability alone – regardless of whether it tends toward improved or degraded environmental conditions – is linked with a higher likelihood of conflict (Abel et al., 2019; von Uexkull and Buhaug, 2021). One study found the prospect of interpersonal violence increased by 14 per cent and group violence by 4 per cent per standard deviation of climate variable change (temperature and precipitation) (Hsiang et al., 2013).

Climate's impact on resource availability is often discussed as a link to conflict. In contexts experiencing climate-related scarcity, the natural or economic resources necessary for human security are depleted, at least in part, by climate hazards, leading to greater competition over what remains, thereby increasing the likelihood of conflict (see Pathway II) (Barnett and Adger, 2007). A meta-analysis in Kenya, for example, has shown that violence is most likely to occur in areas where natural resources have undergone climate-induced depletion (van Baalen and Mobjörk, 2018). The likelihood that scarcity will lead to conflict can be compounded by factors that inhibit the capacity of households to adapt, such as restrictions on movement that can 'trap' households in sedentary insecurity (Freeman, 2017). Conflict can also be triggered by abundance stemming from periods of favourable environmental conditions, high agricultural productivity or newly available resources (see Pathway III) (Rowhani et al., 2011; van Baalen and Mobjörk, 2018). Additionally, external demand can increase the market price of, and hence competition for, existing natural resources such as fishing locations, timber stores, or freshwater reserves or concentrate access points, potentially leading to rent-seeking behaviour and violence to control non-divisible resources (McLeman, 2011). This may also drive out-migration and displacement as violence related to highly valuable resources decreases local human security.

However, the spatial links between environmental change and conflict are indirect, with events and impacts often spanning large distances in time and geography. Abrahams (2020, 5) notes that 'at the scales typical of development practice, it is likely that climate change impacts are experienced in place A, conflict outcomes are experienced in place B, and, in some cases, key social, economic and political processes that translated climate impacts into conflict outcomes extend across and transcend both

the sites of climatic impact and conflict'. This complicates the drawing of direct links between climate impacts and conflict outcomes and accentuates the importance of intermediary systemic factors. It also clarifies the utility of a 'pathways' approach to understanding processes of climate security, which are inherently complex, diffuse and obscured from plain sight.

The impact that human mobility has on conflict is also indirect, and more dependent on local political, economic and social variables than on any inherent link between the two phenomena. Although the notion that inward migration can inflame socioeconomic and ethnic tensions by putting resources, services and infrastructure under pressure is well represented in the literature (Raleigh and Urdal, 2007; Reuveny, 2007), others note there is little empirical support for this conclusion (Abel et al., 2019). Overall, most migration occurs under peaceful circumstances and brings a myriad of benefits to migrant and host communities in origin and destination areas (IOM, 2021).

However, tensions between migrants and host communities in receiving areas may lead to conflict. Locals or authorities may subject migrants to processes of 'othering' that lead to socioeconomic tensions over ethnic or national identity, especially when there an increase in competition for jobs, economic resources and government services (Burrows and Kinney, 2016). This threat, whether real or imagined, may be amplified by political, economic or militant actors to catalyse support for their own ends. Yet, due to growing global mobility and the increasingly protracted nature of displacement, divisions between migrant and host communities are blurring. Many migrant groups have remained in destination areas long enough to permanently integrate with their host communities. In Lebanon's Baddawi refugee camp, Palestinian refugees have even hosted asylum seekers fleeing Syria's civil war (Fiddian-Qasmiyeh, 2016).

While rapid, large-scale displacement can destabilise social and political systems in destination areas, this risk is often exaggerated and may be defused with political interventions (Burrows and Kinney, 2016; Cattaneo and Bosetti, 2017; Abel et al., 2019). Though 'massive emigration sparked by environmental disasters has not led to widespread, sustained fighting' (Gleditsch et al., 2007, 6) – and natural disasters have been shown to *increase* social solidarity in some contexts – climate-related migrants may resort to crime in destination areas if their basic needs are not met (Burrows and Kinney, 2016). A similar effect has been observed with economic migrants, who often lack a political motive for armed conflict but may resort to crime out of desperation (Gleditsch et al., 2007). In Kenya, recent research indicates that migrants exposed to multiple, overlapping climate hazards were more likely to view themselves as victims, have difficulties adjusting to life in destination areas, and engage in social movements (and, potentially, violent conflict), as a result (Koubi et al., 2020). These risks can be mitigated when municipal, subnational and national governments possess the capacity (with or without international assistance) and willingness to support vulnerable communities, both host and migrant.

Formal and informal institutions play a key role in managing risk within the context of climate-related conflict and/or mobility. Governments, given their remit to legislate and allocate resources across sectors and scales, are key to managing complex and compounding societal risks (Black et al., 2022). To effectively discharge this duty, public institutions must be inclusive, by involving climate-vulnerable communities in decision-making processes, polycentric, by employing multi-level logic that decentres power across multiple scales, and adaptive, by adopting experimental, learning-based strategies that facilitate responsiveness to shifting socio-ecological dynamics. Additionally, formal governance institutions can help ensure that informal institutions and processes of knowledge generation (such as those associated with civil society, community-level organisations and indigenous peoples) are adequately linked with official decision-making processes (Pahl-Wostl et al., 2013). In the context of the triple nexus, public institutions that are inclusive, polycentric, adaptive and pluralistic are needed to ensure that responses are locally led, that the needs of affected communities are reflected in official policies and programming, and that interventions are rapid, nimble and implemented in concert with informal institutions.

Though conflict – or more specifically, the risk of physical or economic harm – can propel movement toward safer spaces, violence alone is not always sufficient to drive out-migration from conflict zones (Davenport et al., 2003; Moore and Shellman, 2004). While many of the twenty-first-century's largest refugee flows were conflict-related (IOM, 2021), the initial response of most is to attempt *in situ* adaptation (McLeman et al., 2021). Such strategies can include bribing forces to ensure safety, modifying daily movements to avoid detection, or temporarily changing location to avoid violence and returning once it has passed (Schon, 2021).

The relationship between violent conflict and mobility seems to be non-linear. A 'threshold effect' has been observed where low and moderate levels of violence encourage individuals to shelter in place, higher levels of violence lead to increased displacement as individuals decide to flee, and extremely high levels of violence trap people in place (Bohra-Mishra and Massey, 2011; Schon, 2021). Combined with poverty and stagnant or diminishing economic activity, the presence of violence can be a powerful push factor for migration. Rates of unaccompanied children from Guatemala, Honduras and El Salvador apprehended at the US border tend to spike in tandem with homicides in countries of origin; here, spikes in violence amidst long-term economic depression seem a greater driver of out-migration than persistent low-level violence combined with short-term economic shocks (Clemens, 2021). In sub-Saharan Africa, violence and political instability are independent drivers of mobility, but their impact is amplified by the simultaneous occurrence of economic (low GDP growth) and demographic (large populations between fifteen and twenty-four years of age) factors (Naudé, 2009). The geographic spread of violence is also a significant variable; as the percentage of territory within a country experiencing

violence increases, so do outward migration rates (Melander and Öberg, 2007). Further, the presence of violence in urban areas is more likely to act as a migration driver than violence in rural areas (Melander and Öberg, 2007). Knowledge of the migration environment (i.e. external political signals and legal mechanisms that facilitate or disincentivise migration in receiving countries) further interacts with violence and poverty to influence mobility decisions (Holland and Peters, 2020).

While parsing just two components of the climate–mobility–security nexus is a challenge, illuminating the multicausal, bidirectional and heterogeneous interplay between all three is even more difficult. Though some empirical analyses have demonstrated a link between climate-related mobility and the outbreak or escalation of violent conflict (Ghimire et al., 2015; Freeman, 2017; Abel et al., 2019; Koubi et al., 2020), others have argued the topic is too complex and nuanced to draw definitive links (Brzoska and Fröhlich, 2016; Burrows and Kinney, 2016; Cattaneo and Bosetti, 2017; Boas et al., 2019; Adger et al., 2021). Those that have not found a link generally argue that smaller-scale, context-specific analyses, rather than large meta-analyses, are a better means of understanding if, how, why and when climate-related mobility may trigger conflict.

Chapter 7 of IPCC AR6 notes that, although climate's impact on armed conflict 'has been small compared to socio-economic, political and cultural factors […] potential pathways linking climate and conflict include […] indirect impacts of climatic variability on increasing migration flows' (Cissé et al., 2022, 1087). More precisely, the report states with medium agreement and low evidence that 'climate-related internal migration has been associated with experiences of violence by migrants, the prolongation of conflicts in migrant receiving areas and civil unrest in urban areas', and that 'there is some evidence of an association between climate-related rural-to-urban migration and the risk of civil unrest' (Cissé et al., 2022, 1087–1088).

Building from our understanding that a single, all-encompassing characterisation of the climate–mobility–security nexus is impossible because its character and mechanics are inherently dependent on contextual variables, we have prioritised information saturation (obtaining a comprehensive understanding) over generalisability (ensuring information is universally applicable) in our research process (Palinkas et al., 2015; Benoot et al., 2016). This was achieved through a purposive sampling method, which is commonly used in theory-based cases 'to find manifestations of a theoretical construct so as to elaborate and examine the construct and its variations' (Palinkas et al., 2015, 18). Purposive sampling can also help bring forth new viewpoints with outsized relevance that might be lost in a more exhaustive sampling method (Benoot et al., 2016). Such an approach is especially important for emerging subjects, such as the climate–mobility–security nexus.

While the quantity of research dedicated to exploring the triple nexus has grown in recent years, there remains a lack of evidence surrounding the event trajectories,

relationships, variables and thresholds which animate the triple nexus; our review identified just four documents that conceptualise discrete pathways. The earliest we found – Gleditsch et al., 2007 – identifies simple pathways, direct and indirect, through which climate-related environmental stressors (not disaggregated) may drive conflict and/or migration. Brzoska and Fröhlich (2016) extensively assess the nexus's complexity and focus on how climate-related mobility can be filtered through a simple conflict model predicated on perceptions, interests and identities to drive violence. However, climate impacts are not disaggregated in their single pathway, which is mainly concerned with the cause of conflict rather than its form. Burrows and Kinney (2016) discuss rather than identify pathways. In lieu of mapping the nexus, they draw attention to its heterogeneity and call for additional 'place-based research'. Freeman (2017, 4) goes the furthest toward disaggregating complex event trajectories with four 'pathways by which migration operates as an intermediary, bidirectional, and coexisting variable between environmental change and conflict': in-migration during abundance, constrained migration during scarcity, environmental destruction as a method of conflict, and independently occurring climate change and migration lead(ing) to conflict. Despite a novel articulation of how environmentally favourable conditions may cause conflict, other notable climate phenomena, such as rapid-onset disasters, are absent.

We aim to contribute to this emerging discourse by integrating the existing literature into a series of narrative pathways that illustrate the ways in which climate, mobility and conflict are likely to interact. Through a process of synthesis and narrativisation – and with a focus on climate hazards and their impact – our intention is to make a complex, heterogeneous and nascent phenomenological concept more approachable for researchers, policy makers and humanitarian-development practitioners.

In the introduction, we've explored how the triple nexus's individual elements – climate, mobility and conflict – interact bilaterally, before examining how researchers have mapped the nexus as a whole. The second section describes our research methodology. The results are then synthesised into four pathways of the climate-mobility-security nexus, following which, these pathways are mapped onto McLeman et al.'s. (2021) framework linking risk with mobility outcomes, which is amended to include distinct forms of mobility and conflict. Finally, recommendations are made for future nexus-oriented research and interventions.

## Methodology

An in-depth literature review was employed to identify and explore pathways of the climate–mobility–conflict nexus. Boolean search combinations of relevant terms ('climate change' + 'climate variability' + 'migration' + 'mobility' + 'immobility' +

'displacement' + 'conflict' + 'peace' + 'violence' + 'security') were executed in Web of Science and Google Search to identify relevant peer-reviewed journal articles and grey literature. While empirical and theoretical peer-reviewed literature was prioritised, given the emergent field of research on the triple nexus, non-peer-reviewed documents authored by accredited researchers were also included. Documents examining at least two of the nexus's thematic components were selected for review. Additional documents were identified by reviewing the bibliographies of these texts and through consultation with specialists.

This strategy identified 123 documents for review. Of these, 100 were peer-reviewed scientific papers, twenty-three were grey literature and fifty-one were published during or after 2017. In total, forty primarily examine the relationship between climate and mobility, thirty-eight primarily examine the relationship between climate and security, sixteen primarily examine the linkages between mobility and conflict, and twenty-nine explore the relationship of all three elements. These categories are not strictly discrete as many documents primarily focused on two elements also discuss the third tangentially. Due to the pastoral nature of cattle production, all documents related to cattle raiding were coded with a mobility component, but only those with an explicit reference to climate in their abstract were coded with a climate component. Of those exploring all three components, four identified discrete pathways in their results.

Documents were reviewed with the aim of identifying noted pathways and articulating their characteristics: the relational dynamics between climate and other drivers of mobility and conflict; the animating political, social, economic, demographic and environmental variables that influence local mobility or conflict events, and; the risk thresholds that influence adaptation strategies and have been observed to animate the triple nexus across geographic contexts. This entailed manually reviewing each document selected for inclusion and recording the details of these relationships, variables and thresholds as they appear in the literature.

Pathways were first recorded as presented in the reviewed documents, alongside any directional relationships noting when a climate, mobility or conflict event may impact a subsequent climate, mobility or conflict event. Pathways related to the same case in different pieces of literature were recorded as a single case, provided the same pathway was identified in each piece of literature. While the number of times a pathway appeared in the literature was noted, its frequency was considered alongside other factors, including its potential for reproduction across geographic contexts, to determine its overall relevance. Second, political, social, economic, demographic and environmental variables identified as having an impact on mobility and conflict events were recorded, along with the expected impact. These variables were then used to add detail and complexity to the identified pathways by functioning as 'drivers' and 'mitigating factors' of mobility and conflict outcomes, helping to understand how

contextual factors shape event trajectories within the nexus. Third, specific thresholds that would likely require a change in adaptation strategy were recorded. These thresholds, or tipping points, could be quantitative indicators arrived at through econometric or statistical testing, or more qualitative, subjective tipping points sourced empirically and based on the lived experience of those concerned. Finally, building on the pathways sourced from literature, the research team compared, contrasted and expanded them by using drivers and mitigating factors of risk (political, social, economic, demographic, environmental variables) and adaptation thresholds to stitch together constituent links (directional relationships) between climate, mobility and security outcomes within the triple nexus as it manifests across each pathway.

Once pathways were developed, they were mapped onto McLeman et al.'s (2021) risk-based framework linking climatic and non-climatic factors with mobility outcomes, recently published in IPCC AR6 (Cissé et al., 2022). To achieve this, the framework has been amended to include discrete mobility outcomes (immobility, in-migration, out-migration), and conflict outcomes (in destination and in origin areas) inherent to each pathway.

## Results and discussion

Understanding that the outbreak of violent conflict is dependent on a variety of local variables rather than an inevitable result of climate-related mobility, we employ a risk-based approach in which contextual factors modulate the likelihood of violent conflict along 'pathways', or event trajectories through which climate-related mobility may interlink with violence. Our review identified four pathways that, given the right mix of contextual factors, can link climate change and/or variability, human mobility and violent conflict. While the pathways explored here do not represent the full spectrum of possible linkages between these phenomena, they have been singled out due to their prevalence in the identified literature and relationship with climate change and/or variability.

Before discussing the pathways, it is important to reflect on the potential for this work to uncritically reproduce the arguments and results present in the literature it is reviewing, along with any errors, biases or shortcomings therein. Notably, these can include methodological flaws that lead to inaccuracies, theoretical framings that privilege the viewpoints of researchers from the global North, and results that are skewed according to which data are most accessible. This latter phenomenon, known as the 'streetlight effect', is notable concerning research in the climate (Hendrix, 2017) and climate-conflict (Adams et al., 2018) spaces. While acknowledging the indirect role that climate drivers can play in short-distance internal migration flows, a paper recently authored by a group of influential migration scholars goes so far as to argue there is 'limited value in a continued significant research focus on identifying a climate

change signal in observed migration flows' (Cundill et al., 2021). They instead call for research into 'how multiple drivers interact with one another, in the context of intersecting social vulnerabilities, to render some people mobile and others immobile' (Cundill et al., 2021, 2).

We acknowledge the limitations of secondary research and that, in many cases – likely most – mobility and/or conflict can, do, and will continue to occur independent of climate drivers. Where climate does play an influential role in the nexus, it is likely to be an indirect one, with climate factors exacerbating the more primary social, political, economic, demographic or environmental drivers of mobility and/or conflict. But because we are principally interested in the role that climate plays in these interactions, we have focused on its influence while understanding that climate does not always, or even usually, play a central role in mobility and/or conflict outcomes. Knowing that our review has the potential to compound a disproportionate focus on climate as an influencing factor of mobility and/or conflict, we have worked to ensure that the more primary and often intersecting drivers within the triple nexus are consistently discussed in tandem with correlative climate hazards.

Rather than presenting our results as a remedy to the shortcomings of prior research, the pathways presented below are meant to serve as a macro-level overview of a middle-range theory to be tested in different geographical and political contexts through additional systematic review. Although the limitations of secondary research, the importance of context-specific variables, and intersecting drivers of mobility and conflict all serve to complicate an overarching, universal theory of how climate-related mobility can relate to conflict, such a theory may not be useful. On the contrary, a systematic review of cases related to each pathway may prove enough to further clarify thresholds, probabilities and tipping points that can be used to guide localised action in the climate security space.

## Pathway I: conflict as a result of climate-related disaster displacement

We use the UN definition of 'natural disaster' to refer to rapid-onset environmental hazards that cause tremendous destruction to critical infrastructure and housing while disrupting livelihoods and access to income (UN IASC, 2006). Importantly, a natural disaster is defined not only in terms of the environmental event itself, but in relation to the ability of authorities to effectively maintain human security and socioeconomic development in its wake. This conceptualisation complements the argument of many political ecologists that we cannot separate '"natural" disasters from the social frameworks that influence how hazards affect people [by] putting too much emphasis on the natural hazards themselves, and not nearly enough on the surrounding social environment' (Wisner et al., 2004, 4). In other words, there is nothing 'natural' or inevitable about disasters, or which groups are most impacted by them. We use the

term 'disaster' here because it is commonly understood across discourses, but also seek to highlight the political, economic and social factors that place a disproportionate risk burden on poor communities in the global South.

Climate change and variability are increasing the frequency and intensity of disasters and, as a result, disaster-related displacement is increasing (IDMC, 2022). Generally, disaster-related displacement is internal, short-term, and flows toward areas where humanitarian aid is available or migrant social networks already exist (Brzoska and Fröhlich, 2016). However, sustained out-migration in the aftermath of a natural disaster is more likely to occur in geographies with established migration patterns that pre-date the disaster, including labour migration or rural–urban flows (Mitchell and Pizzi, 2020). The extent to which a household has experienced asset loss is also likely to influence when and if its members return to their place of origin (Joarder and Miller, 2013). Natural disasters pose unique human security challenges for women and girls, who account for 80 per cent of people displaced by extreme weather events globally (Habtezion, 2013). Women face unequal access to emergency relief, and the disintegration of social networks amplifies pre-existing vulnerabilities while creating new ones, thereby intensifying poverty and socioeconomic inequalities (Brown, 2007).

The potential for disaster-related displacement to morph into large-scale conflict is typically low. Natural disasters do not necessarily engender a politically hostile response from impacted migrant groups, and host communities in destination areas are often sympathetic to the plight of those displaced. However, tensions can become inflamed if host communities find themselves competing with displaced communities for economic or natural resources (Freeman, 2017). Thus, pre-existing conditions of scarcity are a driver of conflict in receiving areas, as are worsening livelihood opportunities and economic conditions. This threat can be mitigated through the equitable distribution of humanitarian assistance and services to both host and migrant communities. Additionally, rapid reconstruction of and investment into disaster-affected areas that facilitates timely recovery migration can alleviate resource-related pressures in receiving areas (DeWaard et al., 2016).

While large-scale violence is uncommon, this does not preclude the potential for localised violence to stem from disaster-related displacement. As the definition of a natural disaster is linked with a society's response capacity, the state's ability to alleviate distress and provide emergency support in destination areas appears a crucial mitigating factor in preventing social conflict stemming from natural disasters from turning into violent conflict (Bohnet et al., 2014). A state that governs on the basis of inclusivity and accountability is likely to support affected populations in an effective and equitable manner, thus maintaining its legitimacy and mitigating the risk of conflict in the midst of a crisis. Conversely, state and social structures that are already under pressure from economic stagnation or conflict increase the risk of conflict in a disaster's wake. Such violence is likely to be of low intensity and generalised, charac-

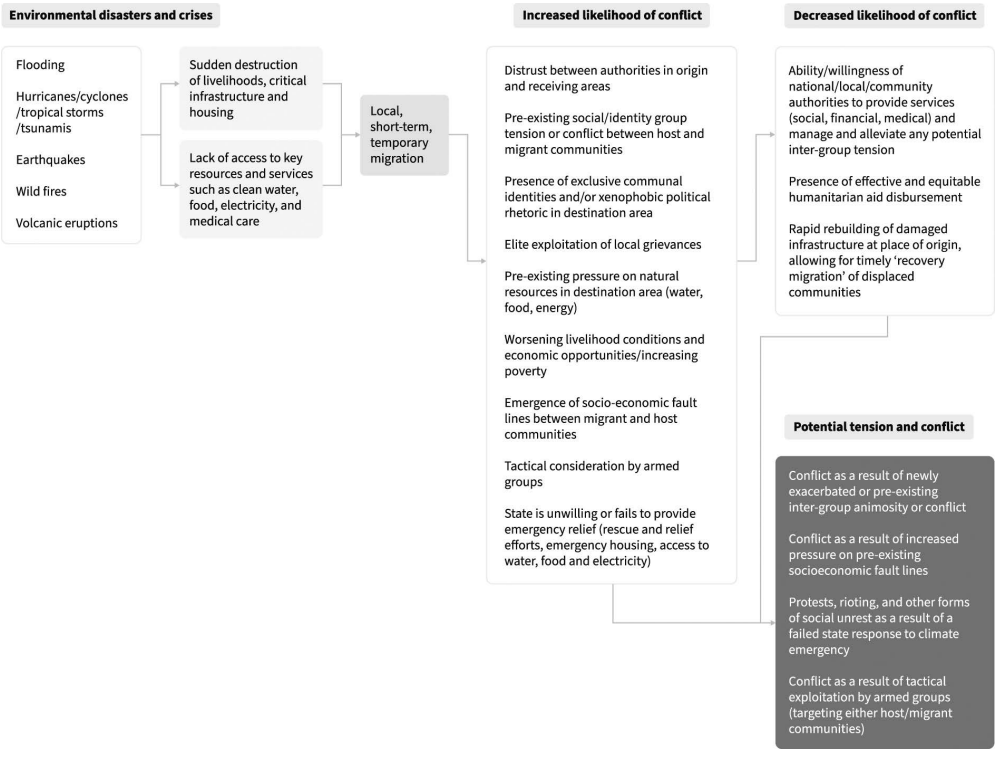


Figure 2 Visual representation of Pathway I: conflict as a result of climate-related disaster displacement

terised by crime, riots or protests, as opposed to organised armed conflict.

The risk of tensions and subsequent conflict increases when natural disasters occur in, or displaced populations flee to, areas that are already characterised by a scarcity of resources and fragility, or that have a distinct ethnic or political identity. In Haiti, which is prone to earthquakes, tsunamis and hurricanes, the state's inability to respond to these crises – due in part to a legacy of colonialism and centuries of economic marginalisation by the global North – has contributed to a situation of gang violence, generalised crime and extreme human insecurity. More than 10,000 households still lack decent shelter more than three years after Hurricane Matthew and, as of January 2019, nearly 35,000 people lived in displacement camps established after the 2010 earthquake (Human Rights Watch, 2020). As such, both natural disasters and extreme climate hazards disasters have exacerbated a situation of general state failure to prolong a period of instability and low-level violent conflict.

## Pathway II: conflict as a result of scarcity-related mobility

In this pathway, climate change and/or variability give rise to resource-constraining ecological phenomena that increase the spatial concentration of crop production, erode agricultural livelihoods, harm food security and increase the likelihood of conflict over the remaining productive resources (Vesco et al., 2021). The climate-related scarcity of natural and economic resources can cause some vulnerable households to migrate outward, and others to become 'trapped' in place. Conflict may arise amongst groups who are unable to migrate outward, amongst vulnerable populations in receiving areas, or between sedentary and pastoral agricultural communities in both (Freeman, 2017). Examining the specific conditions under which resource scarcity can lead to conflict, Ide (2015) splits out structural factors (static and largely invariant over time) from triggering conditions (the short-term dynamics that immediately precede instances of violence). While no single triggering condition or combination of structural factors consistently correlates with an outbreak of violence, the simultaneous presence of two structural factors and one triggering condition is often sufficient for violence to occur, with processes of negative othering,[2] low power differences between the parties involved and recent political changes being the most influential (Ide, 2015).

Through their potential to erode agricultural livelihoods by decreasing access to or returns from natural capital, climate hazards can increase the likelihood of conflict by lowering the opportunity costs for young men to join armed groups (Barnett and Adger, 2007; Fjelde, 2015). The relationship between poverty and conflict intersects with other drivers of opportunity, including access to education, resources, social mobility and individual psychology (Barnett and Adger, 2007). Decreased economic opportunity leads to reduced adaptive capacity, which has also been generally linked with conflict (Barnett and Adger, 2007).

While seasonal migration toward nearby urban areas is a common adaptation strategy for agricultural households under threat from climate hazards, its 'success' is far from guaranteed. Recent qualitative research in Burkina Faso showed that, despite seasonal migration being a popular adaptation strategy to mitigate declining agricultural incomes at home, zero of forty-eight individuals interviewed (migrant men and women from sending households) perceived seasonal migration as having 'improved [their] livelihood in the long term' (Vinke et al., 2022, 335). Indeed, 85 per cent indicated that seasonal migration had either proven 'corrosive' or 'failed' as an adaptation strategy. Gendered risks are also a key concern, both for the men who face exploitation away from home and the women who remain in place and alone shoulder increased domestic pressures. Although no individuals from this sample were involved in violence, it is notable that the climate hazards facing this community overlapped

2 Negative othering refers to collective identities that cause members of one group to view those of another as a threat to oneself or of lower value (Ide, 2015).

with increasing violence and conflict-related displacement in Burkina Faso as Islamic terrorism from Mali began spilling into Burkina Faso.

Immobile populations may engage in violence to ensure their well-being in a landscape depleted of resources. Those unable or unwilling to move are likely to have low–medium levels of social, economic and political capital, and medium–high levels of vulnerability to environmental change (Foresight: Migration and Global Environmental Change, 2011). Conflict dynamics, acting independently or alongside climate hazards, can also trap vulnerable households in place. Similarly, those who choose to remain in place voluntarily may resort to violence as a coping mechanism.

When households become 'split', with some members migrating and others remaining, women are more likely to stay behind (Antman, 2018). While there are also risks for the men who migrate, women are often compelled to adapt *in situ* amidst worsening circumstances. Due to sociocultural expectations, women and girls are more likely to become trapped in place tending domestic and economic burdens, placing them at greater risk of violence (Djoudi and Brockhaus, 2011). As a result, women's share of unpaid versus paid labour often increases in areas faced with resource scarcity (Bacud et al., 2019). Women and girls commonly engage in temporary, short-distance travel to collect water, firewood and other resources for domestic life, and climate-related scarcity can force women to journey longer distances, increasing their risk of gender-based violence, especially in conflict-affected settings, while performing gendered collection activities (Camey et al., 2020; Hegazi et al., 2021).

In destination areas experiencing increasing population density, conflict may occur among individuals and groups competing for economic, natural or spatial resources. Non-physical economic resources may also come under pressure as increasing labour availability drives down wages, or limited employment opportunities results in a lack of labour market absorption for in-migrants. Limited employment opportunities, particularly in urban areas, can lower the opportunity costs for engaging in criminal or gang activities (Freeman, 2017). Socioeconomic fault lines may also emerge between migrant and host populations over access to livelihood opportunities. Xenophobic political narratives can compound these risks.

Violence may also result as heat stress, drought and land degradation shift the geographic availability of resources, forcing pastoral communities onto land traditionally utilised by sedentary agriculturalists (Freeman, 2017). Changing precipitation patterns are disrupting regular crop cycles on which established pastoral migration routes, patterns and timings are based, jeopardising traditional resource sharing agreements. As agriculturalists are forced to plant crops at different times of the year, pastoralists are increasingly confronted with insufficient grazing land or water resources, which can give rise to low-level violence (Brzoska and Fröhlich, 2016). As a result, conflict between pastoralists and sedentary agriculturalists often occurs along livestock migration routes or near farmer villages, where livestock enter farmland

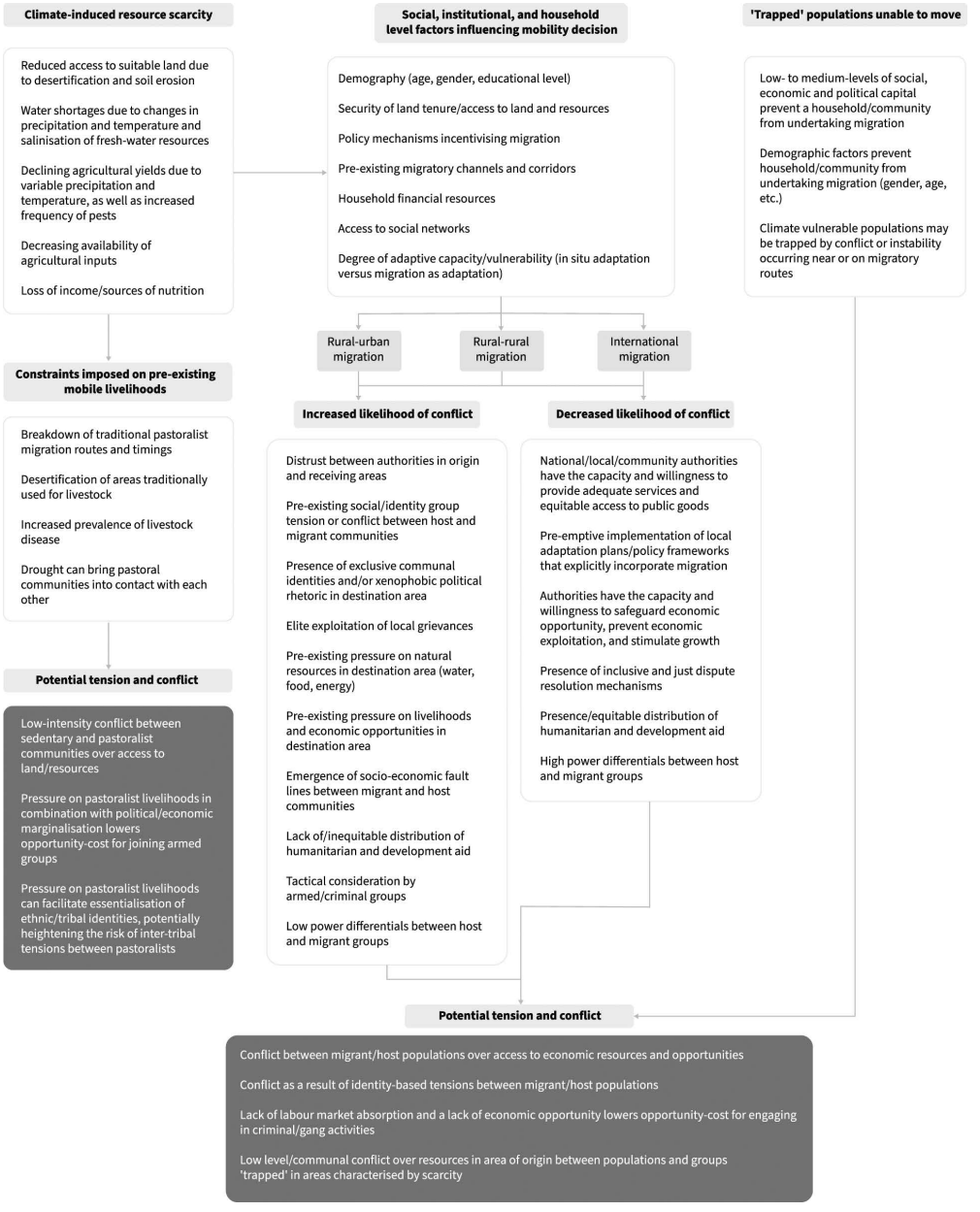


Figure 3 Visual representation of Pathway II: conflict as a result of scarcity-related mobility

or farmers cultivate land traditionally earmarked for pastoral grazing (Yanda and Salomé, 2011).

Resource scarcity has also been linked with intra-pastoral conflict in the form of livestock raiding,[3] conflict over pasture and water resources, or as drought forces foreign communities that lack conflict resolution mechanisms into closer contact by forcing them to travel further in search of resources (McCabe, 2004; Kennedy et al., 2010; Schilling et al., 2012). However, some pastoralist groups have (re)activated traditional resource governance and dispute resolution mechanisms, rendering scarcity-related violence less likely (Adano et al., 2012; Linke et al., 2015). State policies and business interests that promote agricultural mechanisation and extensification can exacerbate tensions by degrading the symbiosis between agricultural and pastoral modes of production, or by limiting the movement of pastoral groups across borders (Eaton, 2008; Jalali, 2013). Here, violence results from pastoral communities being unable to influence prevailing political and economic systems (Witsenburg and Adano, 2007).

Effective and inclusive governance can alleviate risk before and during conditions of scarcity. Governments that collaborate with local institutions to develop human capital in what are frequently peripheral areas – through education, infrastructure, healthcare and social equity interventions – are likely to reduce the vulnerability of populations affected by climate-related scarcity, thereby mitigating the potential for violence (Monsalve and Watsa, 2020).

### Pathway III: conflict as a result of abundance-related migration

Climate change and variability, whilst degrading landscapes and undermining land-based livelihoods in some locations, can lead to increasingly favourable conditions in others. In this pathway, urban–rural, rural-–rural, or circular in-migration increases in areas where local climatic shifts lead to preferable conditions for agricultural production, or expose new resources (Gleditsch, 2012; Schilling et al., 2014). Relative abundance may attract pastoralist communities in search of new pastures or water resources, sedentary agriculturalists attempting to access newly arable land, labourers searching for employment opportunities, or cause cyclical urban-rural migration (Scheffran et al., 2012). This may, in turn, lead to increased resource competition and morph into low-intensity violence, including cattle raiding and land seizure (Freeman, 2017). A meta-analysis of 165 countries showed a significant and positive correlation between increased rainfall and violent conflict, particularly in poorer, more agriculturally dependent contexts (Salehyan and Hendrix, 2014).

Abundance is defined in relation to both a historical climate baseline and to neighbouring areas that possess a smaller resource base or harsher environmental

3 Livestock raiding has also been associated with periods of abundance, pointing to a generalised link between climate variability and raiding (see Pathway III).

conditions in comparison. Abundance may emerge slowly or rapidly and have divergent effects across spatial scales; abundance may appear at a regional scale whilst certain local geographical areas within the region remain unaffected, or abundance be confined to a discrete area. Abundance that is geographically discrete and leads to a rapid increase in population density (of humans and livestock) within a small area is more likely to drive conflict than abundance that is geographically dispersed (McCabe, 2004; Freeman, 2017).

While abundance is the antithesis of scarcity, the pathways articulated here are more than opposite sides of the same coin. Both scarcity and abundance are defined as excesses in comparison to an area's climatic baseline. Thus, abundance can exist in contrast to 'normal' or adverse conditions, meaning those migrating toward areas of abundance may come from areas experiencing climate-related scarcity, or from areas experiencing baseline climatic conditions. In other words, inward migration flows to areas experiencing abundance are not necessarily out-flows from areas experiencing scarcity. Additional research is required to examine the social and economic profiles of those that migrate toward abundance. However, given the costs of travelling to and participating in competitive labour markets, their profiles are likely to differ from migrants fleeing scarcity, with those pursuing abundance likely to have higher adaptive capacity, greater access to information and more economic resources. The drivers of conflict in the climate-related abundance pathway also vary from those in the scarcity pathway; in abundance, state-led and private development processes, insecure land tenure, agricultural and agri-business encroachment, and elite capture are the primary drivers of violence (Selby and Hoffmann, 2014; Marc et al., 2015; Freeman, 2017).

A changing climate may also reveal new or previously inaccessible resources that lack institutional governance mechanisms to manage their distribution (McLeman, 2011). Communities in areas where resources are increasingly contested may experience decreasing security levels and outward migration. One example is the Arctic, where increasing temperatures are attracting multinational energy companies eager to exploit newly revealed hydrocarbon and mineral resources (McLeman, 2011). Global warming is already forcing indigenous communities to modify traditional hunting, fishing and gathering systems. Future in-migration and environmental pollution may further imperil tradition and increase international competition for resources (Koubi, 2019). Though this will not inevitably lead to conflict, evidence from other contexts shows the importance of pre-emptively implementing measures to preserve traditional ways of life by regulating corporate activities, preventing environmental pollution and ensuring profits are enjoyed locally (Yagenova and Garcia, 2009; Babatunde, 2020).

Migration toward increasingly valuable land can also affect traditional pastoral routes and access to resources. As land that is formally 'unoccupied' but traditionally used by pastoralists for pasture and water resources is diverted to commercial

farming operations, conflict has occurred between herders and agri-businesses (Yanda and Salomé, 2011). Similarly, water holes traditionally meant for livestock have, in some cases, been fenced-in by local farmers to support sedentary agricultural activities, or fail to sustain the growing populations that depend on them (Bradbury et al., 2006; Fatih and Siddig, 2007). Policy frameworks and natural resource management schemes that pre-emptively account for future migration flows can help mitigate these negative impacts.

While livestock raiding may be triggered by scarcity, in some contexts it is more likely to occur in wetter years due to the advantages offered by tall grass, stronger animals, dense bush to hide in, and the availability of surface water – conditions which facilitate launching raids and escaping with captured animals (Witsenburg and Adano, 2009). Schilling et al.'s (2014) resource abundance and scarcity threshold hypothesis posits that in years with sufficient rain, raiding is conducted mostly before and during rainfall. However, the absence of rain can lead to scarcity that, exceeding a certain threshold, drives raiding that is no longer launched due to favourable environmental conditions, but to compensate for drought-related livestock losses or control of pasture and water access points (Schilling et al., 2014). Extreme drought may dissuade violence as significant investments of capital, time and energy are required to simply keep livestock alive. Thus, the mechanisms linking climate variability and pastoralist conflict appear to be non-linear and determined by a variety of thresholds related to vulnerability and adaptive capacity (Buhaug et al., 2014).

Conflict arising from abundance-related migration is likely to be low intensity, local, and communal in nature, involving civilian participants organised around shared identities rather than professional soldiers (Raleigh and Kniveton, 2012). While such conflict is nominally resource-oriented, 'these struggles reflect broader social tensions (with ethnic dimensions) between and within social groups', and can be cyclical in nature due to retaliatory patterning (Raleigh and Kniveton, 2012, 53; Krätli and Swift, 2001).

### Pathway IV: conflict as a result of pre-existing tensions and migratory patterns interacting with climate change and/or variability

While none of the pathways described here are strictly linear, those previously described move sequentially from climatic shifts to mobility and conflict. However, it is important to note the influence of *pre-existing* tensions or conflict on the emergence of *future* conflicts that may be aggravated by climate changes or mobility flows. Hence, this pathway commences with conflict and tracks the potential for climate-related mobility to amplify violence or spur new conflicts.

Generally, climate-related migration is more likely to worsen violence in conflict-affected contexts than to catalyse new conflicts in peaceful ones (Reuveny, 2007). For

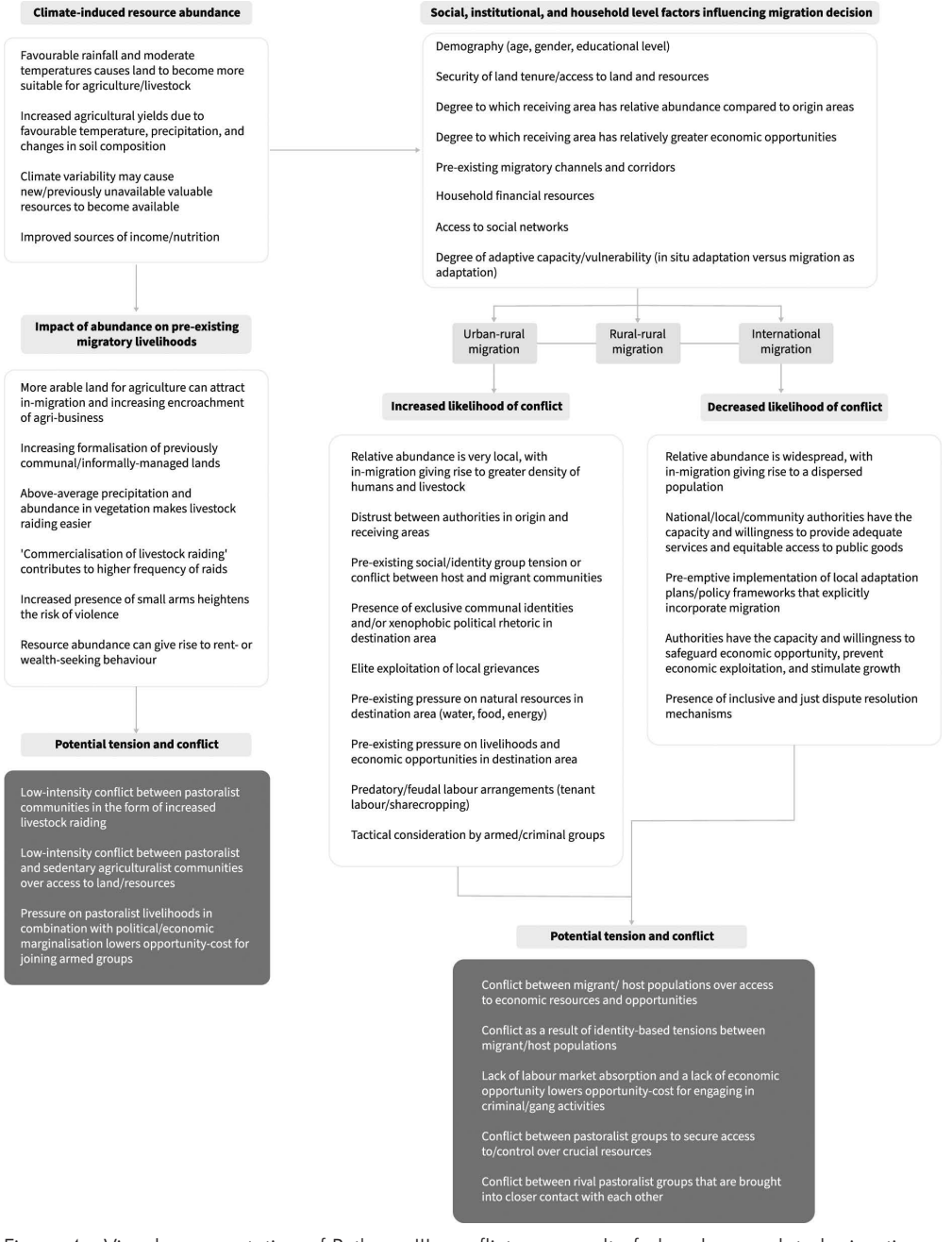


Figure 4 Visual representation of Pathway III: conflict as a result of abundance-related migration

example, flood-related mass displacement has been shown to increase 'the probability of continuation of existing conflicts, rather than [contributing] to the emergence of new conflicts' (Ghimire et al., 2015, 622). This is because areas already experiencing violence necessarily feature the local circumstances and primary socioeconomic and political drivers required for violence to occur.

In these contexts, low levels of violence that alone may not have spurred movement may, when combined with climate-related economic pressures, drive higher rates of out-migration or involuntary immobility. This is more likely where livelihoods are heavily dependent on access to, use, or extraction of natural resources, already under pressure from climatic hazards, at risk of disruption due to ongoing violence that disrupts agricultural activities, or where violence results in the intentional destruction of natural environments – ecocide – by burning land, poisoning or disrupting water resources, or planting landmines to prevent access to livelihood activities (Freeman, 2017). Here, conflict is an intermediary process that helps translate climate-related economic hardship into constrained mobility.

In areas characterised by low-to-medium severity violence, economic depression, or a combination of both, increasingly frequent and/or severe climate hazards may play an indirect role in driving outward migration. Climate risks in combination with political, social and economic factors may help exceed an individual's risk threshold, past which migration becomes a more attractive adaptation option than remaining in place. Moreover, there may be situations in which the compounding effects of conflict and climate force people to move as a survival strategy to overcome economic hardships. In this context, migration can reinforce pre-existing social vulnerabilities or create new ones. Climatic changes can exert indirect but prolonged negative pressure on economic activity that leads to poverty, especially in areas where livelihoods are largely dependent on agriculture. In combination with demographic factors, such as a large number of young males, climate change and variability can similarly act to reduce employment opportunities in a given place (Naudé, 2009).

The role of the international community is also notable, as international actors involved in 'local' conflicts can impact mobility and conflict dynamics. Refugee camps, generally established and maintained with the support of international organisations, can create the conditions for involuntary immobility and conflict. In Cox's Bazar, Bangladesh, for example, facilities housing the Rohingya are afflicted by widespread crime, including arson, gender-based violence, kidnapping, human trafficking for arranged marriages and drug abuse (Burma Human Rights Network, 2022). This situation illustrates the potential for well-meaning international interventions to inadvertently drive new conflict or mobility outcomes. Of a small but diverse sample (29) of refugees interviewed, 100 per cent indicate that violence is a major problem in the camps, and that they would rather return to Myanmar than remain in Cox's Bazar. Similarly, militant border regimes and restrictive migration policies


Figure 5 Visual representation of Pathway IV: conflict as a result of pre-existing tensions and migratory patterns interacting with climate change and/or variability

push mobile populations to turn to people smuggling networks – deeply embedded social institutions that function to shape and reshape communities at the transnational scale (Raineri, 2021) – while irregular migration circumstances lead to security risks for those on the move. Refugees and migrants often become stuck in transit countries, where they face victimisation while lacking legal protections and/or the right to work (Sanchez and Achilli, 2020). International arms sales also contribute to both the willingness and opportunity for states to engage in inter-state conflict (Dharia, 2019), significantly increase the probability of intrastate conflicts in areas already facing conditions of violence (Pamp et al., 2018) and increase the risk of human rights violations and crimes against civilians (Alwishewa, 2022).

## Situating the pathways within a risk-based climate mobility framework

In Figure 6, below, McLeman et al.'s (2021) risk-based framework linking climatic and non-climatic factors with mobility outcomes has been amended to include the pathways identified above, as well as the discrete mobility (out-migration, in-migration, immobility) and conflict outcomes in origin and destination areas that are

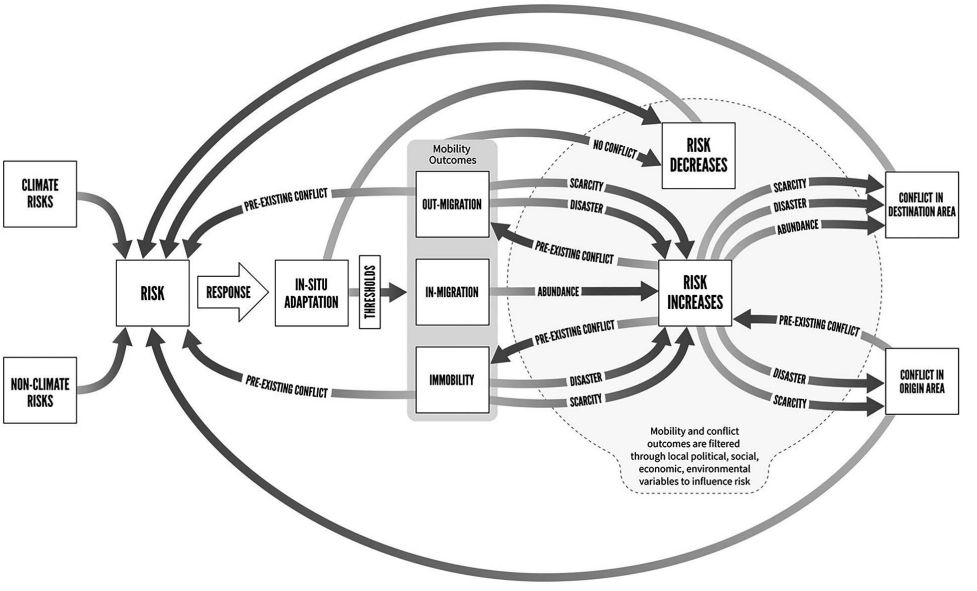


Figure 6 Risk-based framework of mobility outcomes, conflict outcomes and pathways of the climate-mobility-security nexus
*Source*: Adapted from McLeman et al. (2021)

inherent to each. In the circular framework, risk catalyses mobility decisions and conflict outcomes – both of which are again influenced by risk, in perpetuity.

Although the 'disaster, 'scarcity' and 'abundance' pathways are circular, they can be read in Figure 6 from left to right before beginning anew. The 'pre-existing conflict' pathway begins instead with conflict in origin areas, on the bottom right, and tracks leftward as conflict-related risk drives mobility outcomes. The potential for mobility outcomes to decrease risk and preserve peace is illustrated by the 'no conflict' pathway at the top and centre of the diagram. Similarly, successful *in situ* adaptation can decrease risk, pre-empting mobility and conflict outcomes. All pathways are filtered through local political, social, economic and environmental variables (indicated by the dotted circle) to increase or decrease the likelihood of conflict in origin and destination areas.

## Recommendations for nexus-oriented research and interventions

Mixed-methods research should be employed to unpack the multi-scalar complexity within the nexus, often characterised by thresholds. Locally defined thresholds are

an animating feature of these complex causal relationships and are likely to emerge through interactions between climatic processes, their resulting environmental impacts and the context-specific systems and institutions that govern access to resources. Understanding how thresholds can determine the difference between peace and conflict, or *in situ* adaptation and migration, is a prerequisite for impactful planning. Large empirical analyses can be used to establish macro-level precedents and trends and combined with small-scale qualitative analyses to draw out local variables and identify entry points for interventions. Ultimately, knowledge must be co-created with households, communities and public authorities to amplify the voices of those most affected by the climate–mobility–security nexus. Without the deep participation of affected communities, researchers will increase the vulnerability of communities they purport to help, while marginalising indigenous sources of adaptation, resource management and conflict resolution (Siddiqi, 2022).

Future research should be oriented toward current evidence gaps, including how the abundance pathway becomes operationalised, what the long-term impacts of climate-related conflict are, and the role that slow-onset climate hazards play within the nexus. More evidence is required on the drivers and mitigators of conflict, thresholds of the climate-related resource abundance pathway, and the impact that this pathway has on local systems in areas of origin and destination. Specifically, further examination and analysis is required to better understand the role that environmental pull factors play in driving in-migration, the profiles (economic, social) of those that migrate toward abundance, and the drivers of conflict in destination areas. Additionally, slow-onset risks such as sea-level rise, soil salinisation and decreased soil fertility are less frequently the focus of mobility and conflict-oriented research, but no less impactful to affected communities. Future efforts could work to identify the role that these and other diffuse climate impacts have on primary drivers of violence through long-term research activities.

Future policies and programming interventions should account for the inherent spatial and temporal diffusion of the nexus, with greater attention paid to modelling trans-local relationships and pre-emptively accounting for future migration flows and potential conflict dynamics. While focus is often placed on the push- and pull- factors of climate or conflict-related mobility, less is afforded to the multidirectional interactions between them. These variables are not discrete, and their further mapping would enable a shift from thinking about relationships of association to causal linkages – a powerful tool that is a prerequisite for forward-looking climate adaptation policies. Special emphasis should be placed on the potential for rural–urban flows to deplete the agricultural sector of human resources and the potential impacts this may have on food systems and security. Similarly, policies that acknowledge the role that both internal and international labour migration can play in improving climate resilience and human security through the transfer of remittances should be explored. Because

migration provides both risk and opportunities for communities in areas of origin and destination, trans-local analyses are required to fully parse the relationship between geographies that are linked by migration flows.

## Conclusion

The connections between climate, mobility and human insecurity are complex and heterogeneous. Although violence is never inevitable, the circumstances from which it may result are poorly understood, posing a challenge to interventions seeking to preserve peace. This research has used an in-depth literature review to synthesise the current thinking on the combination of events, relational dynamics and local variables that are likely to animate the climate–mobility–security nexus across contexts.

To render the nexus more approachable for researchers, policy makers and humanitarian-development practitioners, four pathways to violent conflict are identified: conflict as a result of climate-related disaster displacement, conflict as a result of scarcity-related mobility, conflict as a result of abundance-related migration, and conflict as a result of pre-existing tensions and migratory patterns interacting with climate change and/or variability. These pathways are not discrete. On the contrary, they are likely to interact with one another – and with other 'external' development processes – in a variety of place-dependent ways. They may also overlap by occurring in the same geography at the same time, potentially exacerbating one another. For example, displacement due to disaster or conflict may accelerate environmental degradation in climate-vulnerable host areas, potentially leading to scarcity-related mobility or conflict in turn. In areas with a history of conflict, markets that support livelihoods or the institutions traditionally tasked with boosting resilience, such as local and national government agencies, may be frayed, limiting opportunities for *in situ* adaptation and increasing the likelihood of climate-related mobility.

Recommendations for future research and interventions include combining large-scale empirical analyses with local-level qualitative approaches, further examination of individual and household risk thresholds, the deep co-development of knowledge with impacted communities, anticipatory interventions that account for future climate-related mobility, a greater focus on the causal links between migratory push- and pull factors, and the potential for rural-urban migration to negatively impact agricultural production.

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## References

Abel, G. J., Bottrager, M., Crespo Cuaresma, J. and Muttarak, R. (2019) 'Climate, conflict and forced migration', *Global Environmental Change*, 54(December 2018), 239–249.

Abrahams, D. (2020) 'Conflict in abundance and peacebuilding in scarcity: challenges and opportunities in addressing climate change and conflict', *World Development*, 132, 104998.

Adams, C., Ide, T., Barnett, J. and Detges, A. (2018) 'Sampling bias in climate–conflict research', *Nature Climate Change*, 8(3), 200–203.

Adams, H. and Kay, S. (2019) 'Migration as a human affair: integrating individual stress thresholds into quantitative models of climate migration', *Journal of Environmental Sciences*, 93, 129–138.

Adano, W. R., Dietz, T., Witsenburg, K. and Zaal, F. (2012) 'Climate change, violent conflict and local institutions in Kenya's drylands', *Journal of Peace Research*, 49(1), 65–80.

Adger, W. N., Safra de Campos, R., Siddiqui, T., Franco Gavonel, M., Szaboova, L., Rocky, M. H., Alam Bhuiyam, M. R. and Billah, T. (2021) 'Human security of urban migrant populations affected by length of residence and environmental hazards', *Journal of Peace Research*, 58(1), 50–66.

Alwishewa, H. (2022) 'Arms exports to conflict zones and the two hats of arms companies', *Transnational Legal Theory*, 12(4), 527–549.

Antman, F. M. (2018) 'Women and migration', in S. L. Averett, L. M. Argys and S. D. Hoffman (eds), *The Oxford Handbook of Women and the Economy*, Oxford, Oxford University Press, 731–747.

Babatunde, A. O. (2020) 'Oil pollution and water conflicts in the riverine communities in Nigeria's Niger Delta region: challenges for and elements of problem-solving strategies', *Journal of Contemporary African Studies*, 38(2), 274–293.

Bacud, E. S., Puskura, R., Lam Duyen, T. N., Sander, B. O. and Luis, J. (2019) 'Rural outmigration – feminization – agricultural production nexus: case of Vietnam', *Migration and Development*, 1–25, https://doi.org/10.1080/21632324.2019.1679962.

Barcus, H. R. and Shugatai, A. (2018) 'Immobile populations as anchors of rural ethnic identity: contemporary Kazakh narratives of place and migration in Mongolia', *Population, Space and Place*, 24(4), e2148.

Barnett, J. and Adger, W. N. (2007) 'Climate change, human security and violent conflict', *Political Geography*, 26(6), 639–655.

Benoot, C., Hannes, K. and Bilsen, J. (2016) 'The use of purposeful sampling in a qualitative evidence synthesis: a worked example on sexual adjustment to a cancer trajectory', *BMC Medical Research Methodology*, 16(1), 1–12.

Black, R., Adger, W. N., Arnell, N. W., Dercon, S., Geddes, A. and Thomas, D. (2011) 'The effect of environmental change on human migration', *Global Environmental Change*, 21(SUPPL. 1), S3–S11.

Boas, I., Farbotko, C., Adams, H., Sterly, H., Bush, S., van der Geest, K., Wiegel, H., Ashraf, H., Baldwin, A., Bettini, G., Blondin, S., de Bruijn, M., Durand-Delacre, D., Fröhlich, C., Gioli, G., Guaita, L., Hut, E., Jarawura, F. X., Lamers, M., Lietaer, S., Nash, S. L., Piguet, E., Rothe, D., Sakdapolrak, P., Smith, L., Tripathy Furlong, B., Turhan, E., Warner, J., Zickgraf, C., Black, R. and Hulme, M. (2019) 'Climate migration myths', *Nature Climate Change*, 9(12), 901–903.

Bohnet, H., Cottier, F. and Hug, S. (2014) 'Conflict versus disaster-induced migration: similar or distinct implications for security?' *Civil Wars*, 23(4), 493–519, https://doi.org/10.1080/13698249.2021.1963586.

Bohra-Mishra, P. and Massey, D. S. (2011) 'Individual decisions to migrate during civil conflict', *Demography*, 48(2), 401–424.

Borderon, M., Sakdapolrak, P., Muttarak, R., Kebede, E., Pagogna, R. and Sporer, E. (2019) 'Migration influenced by environmental change in Africa: a systematic review of empirical evidence', *Demographic Research*, 41(August), 491–544.

Bowlsby, D., Chenoweth, E., Hendrix, C. and Moyer, J. D. (2020) 'The future is a moving target: predicting political instability', *British Journal of Political Science*, 50(4), 1405–1417.

Bradbury, M., Ryle, J., Medley, M. and Sansculotte-Greenidge, K. (2006) 'Local peace processes in Sudan: a baseline study' (research report), Rift Valley Institute, http://riftvalley.net/publication/local-peace-processes-sudan (accessed 11 July 2021).

Brown, O. (2007) 'Climate change and forced migration: observations, projections and implications' (Human development report 2007/2008), UNDP, https://www.iisd.org./system/files/publications/climate_forced_migration.pdf (accessed 23 January 2023).

Brzoska, M. and Fröhlich, C. (2016) 'Climate change, migration and violent conflict: vulnerabilities, pathways and adaptation strategies', *Migration and Development*, 5(2), 190–210.

Buhaug, H., Nordkvelle, J., Bernauer, T., Böhmelt, T., Brzoska, M., Busby, J. W., Ciccone, A., Fjelde, H., Gartzke, E., Gleditsch, N. P., Goldstone, J. A., Hegre, H., Holtermann, H., Koubi, V., Link, J. S. A., Link, P. M., Lujala, P., O'Laughlin, J., Raleigh, C., Scheffran, J., Schilling, J., Smith, T. G., Theisen, O. M., Tol, R. S. J., Urdal, H. and von Uexkull, N. (2014) 'One effect to rule them all? A comment on climate and conflict', *Climatic Change*, 127(3), 391–397.

Burma Human Rights Network (2022) 'We also have dreams: ongoing safety and quality of life issues for Rohingya refugees in Bangladesh', (report), Burma Human Rights Network, https://www.bhrn.org.uk/en/report/1191-we-also-have-dreams.html (accessed 12 October 2022).

Burrows, K. and Kinney, P. L. (2016) 'Exploring the climate change, migration and conflict nexus', *International Journal of Environmental Research and Public Health*, 13(4), 443.

Castañeda Camey, I., Sabater, L., Owren, C. and Emmett Boyer, A. (2020) *Gender-Based Violence and Environment Linkages: The Violence of Inequality*, Gland, Switzerland, IUCN, https://portals.iucn.org/library/node/48969 (accessed 20 April 2022).

Cattaneo, C. and Bosetti, V. (2017) 'Climate-induced international migration and conflicts', *CESifo Economic Studies*, 63(4), 500–528.

Chindarkar, N. (2012) 'Gender and climate change-induced migration: proposing a framework for analysis', *Environmental Research Letters*, 7(2), 025601.

Cissé, G., McLeman, R., Adams, H., Aldunce, P., Bowen, K., Campbell-Lendrum, D., Clayton, S., Ebi, K. L., Hess, J., Huang, C., Liu, Q., McGregor, G., Semenza, J. and Tirado, M. C. (2022) 'Health, wellbeing, and the changing structure of communities', in *Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, https://www.ipcc.ch/report/ar6/wg2/ (accessed 15 April 2022).

Clemens, M. A. (2021) 'Violence, development, and migration waves: evidence from Central American child migrant apprehensions', *Journal of Urban Economics*, 124, 103355.

Cundill, G., Singh, C., Adger, W. N., Safra de Campos, R., Vincent, K., Tebboth, M. and Maharjan, A. (2021) 'Toward a climate mobilities research agenda: intersectionality, immobility, and policy responses', *Global Environmental Change*, 69, 102315.

Curtis, K. J., Fussell, E. and DeWaard, J. (2015) 'Recovery migration after hurricanes Katrina and Rita: spatial concentration and intensification in the migration system', *Demography*, 52(4), 1269–1293.

Czaika, M. and De Haas, H. (2013) 'The effectiveness of immigration policies', *Population and Development Review*, 39(3), 487–508.

Davenport, C. A., Moore, W. H. and Poe, S. C. (2003) 'Sometimes you just have to leave: domestic threats and forced migration, 1964–1989', *International Interactions*, 29(1), 27–55.

Detges, A., Wright, E. and Bernstein, T. (2022) *A Conceptual Model of Climate Change and Human Mobility Interactions*, Berlin, Habitable Project, https://habitableproject.org/publication/conceptual-model-of-climate-change-and-human-mobility-interactions/ (accessed 14 October 2022).

DeWaard, J., Curtis, K. J. and Fussell, E. (2016) 'Population recovery in New Orleans after Hurricane Katrina: exploring the potential role of stage migration in migration systems', *Population and Environment*, 37(4), 449–463.

Dharia, S. P. (2019) 'Dangerous weapons: arms transfer, interstate conflict, and dependence', PhD thesis, University of Missouri–Columbia, https://doi.org/10.32469/10355/72212.

Djoudi, H. and Brockhaus, M. (2011) 'Is adaptation to climate change gender neutral? Lessons from communities dependent on livestock and forests in northern Mali', *International Forestry Review*, 13(2), 123–135.

Eaton, D. (2008) 'The business of peace: raiding and peace work along the Kenya–Uganda border (part I)', *African Affairs*, 107(426), 89–110.

Fatih, E. and Siddig, A. (2007) 'Managing conflict over natural resources in Greater Kordofan, Sudan: some recurrent patterns and governance implications' (Discussion paper), IFPRI, https://www.ifpri.org/publication/managing-conflict-over-natural-resources-greater-kordofan-sudan (accessed 23 January 2023).

Fiddian-Qasmiyeh, E. (2016) 'Refugees hosting refugees', *Forced Migration Review (FMR Online)*, https://www.fmreview.org/community-protection/fiddianqasmiyeh (accessed 10 April 2021).

Fjelde, H. (2015) 'Farming or fighting? Agricultural price shocks and civil war in Africa', *World Development*, 67, 525–534.

Foresight: Migration and Global Environmental Change (2011) *Migration and Global Environmental Change: Final Project Report*, London, Government Office for Science, https://www.gov.uk/government/publications/migration-and-global-environmental-change-future-challenges-and-opportunities (accessed 12 June 2022).

Freeman, L. (2017) 'Environmental change, migration, and conflict in Africa: a critical examination of the interconnections', *Journal of Environment and Development*, 26(4), 351–374.

Ghimire, R., Ferreira, S. and Dorfman, J. H. (2015) 'Flood-induced displacement and civil conflict', *World Development*, 66, 614–628.

Gleditsch, N. P. (2012) 'Whither the weather? Climate change and conflict', *Journal of Peace Research*, 49(1), 3–9.

Gleditsch, N. P., Nordås, R. and Salehyan, I. (2007) *Climate Change and Conflict: The Migration Link* (Coping with Crisis Working Paper Series, May), https://www.ipinst.org/wp-content/uploads/2007/05/cwc_working_paper_climate_change.pdf (accessed 2 April 2021).

de Haas, H. (2021) 'A theory of migration: the aspirations-capabilities framework', *Comparative Migration Studies*, 9(1), 1–35.

Habtezion, S. (2013) 'Gender and climate change: overview of linkages between gender and climate change' (Report), New York, United Nations Development Programme, https://www.undp.org/sites/g/files/zskgke326/files/publications/UNDP%20Linkages%20Gender%20and%20CC%20Policy%20Brief%201-WEB.pdf (accessed 23 January 2023).

Hegazi, F., Krampe, F. and Smith, E. S. (2021) 'Climate-related security risks and peacebuilding in Mali' (SIPRI Policy Paper 60, April), https://www.sipri.org/sites/default/files/2021-04/sipripp60.pdf (accessed 23 January 2023).

Hendrix, C. S. (2017) 'The streetlight effect in climate change research on Africa', *Global Environmental Change*, 43, 137–147.

Holland, A. and Peters, M. (2020) 'Explaining migration timing: political information and opportunities', *International Organization*, 74(3), 560–583.

Hsiang, S. M., Burke, M. and Miguel, E. (2013) 'Quantifying the influence of climate on human conflict', *Science*, 341(6151).

Human Rights Watch (2020) 'Haiti: Events of 2019', *Human Rights Watch*, https://www.hrw.org/world-report/2020/country-chapters/haiti (accessed 23 January 2023).

Ide, T. (2015) 'Why do conflicts over scarce renewable resources turn violent? A qualitative comparative analysis', *Global Environmental Change*, 33, 61–70.

Ide, T. (2020) 'Renewable resource scarcity, conflicts and migration', in T. Krieger, D. Panke and M. Pregernig (eds), *Environmental Conflicts, Migration and Governance*, Bristol, Policy Press, 17–36.

IDMC (International Displacement Monitoring Centre) (2019) 'Global report on internal displacement' (GRID 2019 report), Geneva, IDMC and NRC, https://www.internal-displacement.org/publications/documents/2019-global-report-on-internal-displacement (accessed 23 January 2023).

IDMC (International Displacement Monitoring Centre) (2022) 'Global report on internal displacement', (GRID 2022 report), Geneva, IDMC and NRC, https://www.internal-displacement.org/global-report/grid2022/ (accessed 4 June 2022).

IOM (International Organisation for Migration) (2021) *World Migration Report 2022*, Geneva, IOM, https://publications.iom.int/books/world-migration-report-2022 (accessed 4 June 2022).

Jacobson, C., Crevello, S., Chea, C. and Jarihani, B. (2019) 'When is migration a maladaptive response to climate change?', *Regional Environmental Change*, 19(1), 101–112.

Jalali, M. (2013) 'Tuareg migration: a critical component of crisis in the Sahel', Migration Information Source, 30 May, *Migration Policy Institute*, https://www.migrationpolicy.org/article/tuareg-migration-critical-component-crisis-sahel (accessed 23 January 2023).

Joarder, M. A. M. and Miller, P. W. (2013) 'Factors affecting whether environmental migration is temporary or permanent: evidence from Bangladesh', *Global Environmental Change*, 23(6), 1511–1524.

Kennedy, W. G., Gulden, T., Hailegiorgis, A. B., Bassett, J. K., Coletti, M., Balan, G. C., Clark, M. and Cioffi-Revilla, C. (2010) 'An agent-based model of conflict in East Africa and the effect of the privatization of land', Proceedings of the 3rd World Congress on Social Simulation, Kassel, Germany, 6–9 September 2010, http://krasnow.gmu.edu/socialcomplexity/files/2015/08/Kennedy-etal-2010-WCSS223-final.pdf (accessed 23 January 2023).

Koubi, V. (2019) 'Climate change and conflict', *Annual Review of Political Science*, 22, 343–360.

Koubi, V., Nguyen, Q., Spilker, G. and Böhmelt, T. (2020) 'Environmental migrants and social-movement participation', *Journal of Peace Research*, 58(1), 18–32.

Krätli, S. and Swift, J. (2001) 'Understanding and managing pastoral conflict in Kenya: a literature review', Brighton, Institute of Development Studies, https://www.researchgate.net/publication/255572234_UNDERSTANDING_AND_MANAGING_PASTORAL_CONFLICT_IN_KENYA (accessed 24 April 2021).

Lama, P., Hamza, M. and Wester, M. (2020) 'Gendered dimensions of migration in relation to climate change', *Climate and Development*, 13(4), 326–336.

Linke, A. M., O'Loughlin, J., McCabe, J. T., Tir, J. and Witmer, F. D. W. (2015) 'Rainfall variability and violence in rural Kenya: investigating the effects of drought and the role of local institutions with survey data', *Global Environmental Change*, 34, 35–47.

Mach, K. J., Kraan, C. M., Adger, W. N., Buhaug, H., Burke, M., Fearon, J. D., Field, C. B., Hendrix, C. S., Maystadt, J.-F., O'Loughlin, J., Roessler, P., Scheffran, J., Schultz, K. A. and von Uexkull, N. (2019) 'Climate as a risk factor for armed conflict', *Nature*, 571(7764), 193–197.

Marc, A., Verjee, N. and Mogaka, S. (2015) *The Challenge of Stability and Security in West Africa*, Washington, DC, AFD and World Bank.

McCabe, T. (2004) *Cattle Bring Us to Our Enemies: Turkana Ecology, Politics, and Raiding in a Disequilibrium System*, Ann Arbor, University of Michigan Press.

McLeman, R. (2011) 'Climate change, migration and critical international security considerations' (IOM Migration Research Series), Geneva, IOM, https://publications.iom.int/system/files/pdf/mrs42.pdf (accessed 23 April 2021).

McLeman, R. (2018) 'Thresholds in climate migration', *Population and Environment*, 39(4), 319–338.

McLeman, R., Wrathall, D., Gilmore, E., Thornton, P., Adams, H. and Gemenne, F. (2021) 'Conceptual framing to link climate risk assessments and climate-migration scholarship', *Climatic Change*, 165(1–2).

Melander, E. and Öberg, M. (2007) 'The threat of violence and forced migration: geographical scope trumps intensity of fighting', *Civil Wars*, 9(2), 156–173.

Michel, D., Black, R., Busby, J., Dabelko, G., De Coning, C., Maalim, H., McAllister, C., Ndiloseh, M., Smith, D., Alvarado, J., Barnhoorn, A., Bell, N., Bell-Moran, D., Broek, E., Eberlein, A., Eklow, K., Faller, J., Gadnert, A., Hegazi, F. and Staudenmann, J. (2022) *Environment of Peace: Security in a New Era of Risk*, Stockholm, Stockholm International Peace Research Institute.

Mitchell, S. M. and Pizzi, E. (2020) 'Natural disasters, forced migration, and conflict: the importance of government policy responses', *International Studies Review*, https://doi.org/10.1093/isr/viaa058.

Mixed Migration Centre (2022) 'Climate-related events and environmental stressors' roles in driving migration in West and North Africa' (MMC briefing paper, January), Geneva, MMC / Danish Refugee Council, https://www.rabat-process.org/en/activities/publications/migration-climate-change-paper (accessed 14 October 2022).

Monsalve, C. and Watsa, K. (2020) 'Human capital and climate action: outcomes that deliver for people and planet', *World Bank Blogs: Development and a Changing Climate*, 12 May, https://blogs.worldbank.org/climatechange/human-capital-and-climate-action-outcomes-deliver-people-and-planet (accessed 28 October 2022).

Moore, W. H. and Shellman, S. M. (2004) 'Fear of persecution', *Journal of Conflict Resolution*, 48(5), 723–745.

Naik, A. (2009) 'Migration and natural disasters', in F. Laczko and C. Aghazarm (eds), *Migration, Environment and Climate Change*, Geneva, IOM International Organization for Migration, 245–318, https://publications.iom.int/system/files/pdf/migration_and_environment.pdf (accessed 23 January 2023).

Naudé, W. (2009) 'Conflict, disasters and no jobs: reasons for international migration from sub-Saharan Africa' (WIDER Working Paper 85/2008), Helsinki, UNU-Wider, https://www.wider.unu.edu/publication/conflict-disasters-and-no-jobs (accessed 2 April 2021).

O'Loughlin, J., Witmer, F. D. W., Linke, A. M., Laing, A., Gettelman, A. and Dudhia, J. (2012) 'Climate variability and conflict risk in East Africa, 1990–2009', *Proceedings of the National Academy of Sciences*, 109(45), 18344–18349.

Owen, P. D. and Wesselbaum, D. (2020) 'On thresholds in the climate–migration relationship', *International Review of Applied Economics*, 34(3), 400–412.

Pahl-Wostl, C., Conca, K., Kramer, A., Maestu, J. and Schmidt, F. (2013) 'Missing links in global water governance: a processes-oriented analysis', *Ecology and Society*, 18(2), 33.

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N. and Hoagwood, K. (2015) 'Purposeful sampling for qualitative data collection and analysis in mixed method implementation research', *Administration and Policy in Mental Health*, 42(5), 533–544.

Pamp, O., Rudolph, L., Thurner, P. W., Mehltretter, A. and Primus, S. (2018) 'The build-up of coercive capacities: arms imports and the outbreak of violent intrastate conflicts', *Journal of Peace Research*, 55(4), 430–444.

Raineri, L. (2021) 'Migrant smuggling and the social organisation of cross-border mobility', in M. Gallien and F. Weigand (eds), *The Routledge Handbook of Smuggling*, London, Routledge, 313–325.

Raleigh, C. and Kniveton, D. (2012) 'Come rain or shine: an analysis of conflict and climate variability in East Africa', *Journal of Peace Research*, 49(1), 51–64.

Raleigh, C. and Urdal, H. (2007) 'Climate change, environmental degradation and armed conflict', *Political Geography*, 26(6), 674–694.

Reuveny, R. (2007) 'Climate change-induced migration and violent conflict', *Political Geography*, 26(6), 656–673.

Risi, L. H. and Null, S. (2016) 'Navigating complexity: climate, migration, and conflict in a changing world', (Office of Conflict Management and Mitigation Discussion Paper), Washington, DC, USAID and Wilson Centre, https://www.wilsoncenter.org/publication/navigating-complexity-climate-migration-and-conflict-changing-world (accessed 23 January 2023).

Rowhani, P., Degomme, O., Guha-Sapir, D. and Lambin, E. F. (2011) 'Malnutrition and conflict in East Africa: the impacts of resource variability on human security', *Climatic Change*, 105, 207–222.

Salehyan, I. and Hendrix, C. S. (2014) 'Climate shocks and political violence', *Global Environmental Change*, 28(1), 239–250.

Sanchez, G. and Achilli, L. (2020) 'Stranded : the impacts of COVID-19 on irregular migration and migrant smuggling' (Policy Briefs, 2020/20, May), Florence, Migration Policy Centre, https://doi.org/10.2870/42411.

Scheffran, J., Brzoska, M., Kominek, J., Link, P. M. and Schilling, J. (2012) 'Climate change and violent conflict', *Science*, 336(6083), 869–871.

Schilling, J., Akuno, M. H., Scheffran, J. and Weinzierl, T. (2014) 'On raids and relations: climate change, pastoral conflict and adaptation in north-western Kenya', in S. Bronkhorst and U. Bob (eds), *Climate Change and Conflict: Where to for Conflict Sensitive Climate Adaptation in Africa?* Berlin: Berliner Wissenschaftsverlag, 241–268. https://www.researchgate.net/publication/270450174_On_raids_and_relations_Climate_change_and_pastoral_conflict_in_Northern_Kenya.

Schilling, J., Opiyo, F. E. O. and Scheffran, J. (2012) 'Raiding pastoral livelihoods: motives and effects of violent conflict in north-western Kenya', *Pastoralism*, 2(1), 25.

Schon, J. (2021) 'Violent encounters and social status shape the conditions for migrants fleeing civil war', Migration Information Source, 4 March, *Migration Policy Institute*, https://www.migrationpolicy.org/article/conditions-migrants-flee-civil-war-syria (accessed 23 January 2023).

Selby, J. and Hoffmann, C. (2014) 'Beyond scarcity: rethinking water, climate change and conflict in the Sudans', *Global Environmental Change*, 29, 360–370.

de Sherbinin, A., Grace, K., McDermid, S., van der Geest, K., Puma, M. J. and Bell, A. (2022) 'Migration theory in climate mobility research', *Frontiers in Climate*, 10 May, https://doi.org/10.3389/fclim.2022.882343.

Siddiqi, A. (2022) 'The missing subject: enabling a postcolonial future for climate conflict research', *Geography Compass*, 16(5), e12622.

Sultana, F. (2022) 'The unbearable heaviness of climate coloniality', *Political Geography*, 99, 102638.

Thalheimer, L., Otto, F. and Abele, S. (2021) 'Deciphering impacts and human responses to a changing climate in East Africa', *Frontiers in Climate*, 3 August, https://doi.org/10.3389/fclim.2021.692114.

van Baalen, S. and Mobjörk, M. (2018) 'Climate change and violent conflict in East Africa: integrating qualitative and quantitative research to probe the mechanisms', *International Studies Review*, 20(4), 547–575.

von Uexkull, N. and Buhaug, H. (2021) 'Security implications of climate change: a decade of scientific progress', *Journal of Peace Research*, 3–17.

UN IASC (United Nations Inter-Agency Standing Committee) (2006) 'Guidelines: protecting persons affected by natural disasters. Human rights and natural disasters', (Operational guidelines), Geneva, IASC, https://interagencystandingcommittee.org/working-group/iasc-operational-guidelines-human-rights-and-natural-disasters-protecting-persons-affected-natural (accessed 23 January 2023).

Vesco, P., Kovacic, M., Mistry, M. and Croicu, M. (2021) 'Climate variability, crop and conflict: exploring the impacts of spatial concentration in agricultural production', *Journal of Peace Research*, 58(1), 98–113.

Vinke, K., Rottmann, S., Gornott, C., Zabre, P., Schwerdtle, P. N. and Sauerborn, R. (2022) 'Is migration an effective adaptation to climate-related agricultural distress in sub-Saharan Africa?', *Population and Environment*, 43(3), 319–345.

Wisner, B., Blaikie, P., Cannon, T. and Davis, I. (2004) *At Risk: Natural Hazards, People's Vulnerability and Disasters*, London, Routledge.

Witsenburg, K. and Adano, R. (2007) 'The use and management of water sources in Kenya's drylands: is there a link between scarcity and violent conflicts?', in B. Derman, R. Odgaard and E. Sjaastad (eds), *Conflicts over Land and Water in Africa*, Oxford, Currey, 215–238.

Witsenburg, K. M. and Adano, W. R. (2009) 'Of rain and raids: violent livestock raiding in Northern Kenya', *Civil Wars*, 11(4), 514–538.

Yagenova, S. V. and Garcia, R. (2009) 'Indigenous people's struggles against transnational mining companies in Guatemala: the Sipakapa people vs GoldCorp Mining Company', *Socialism and Democracy*, 23(3), 157–166.

Yanda, P. and Salomé, B. (2011) 'Climate change and conflict: conflict-sensitive climate change adaptation in Africa' (Policy and Practice Brief, Issue 14, November), Umhlanga, South Africa, ACCORD, https://www.accord.org.za/publication/climate-change-conflict/ (accessed 23 January 2023).