Conflict versus disaster-induced migration: Similar or distinct implications for security?*

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Abstract

Recent conflict research has found evidence for a linkage between conflict induced-migration and the diffusion of violence. Yet, displacement does not solely results from conflict and violence, but also because of environmental factors such as natural disasters. Although natural disasters like floods and earthquakes drive each year millions out of their home, causing a significant burden for the state and the hosting population, their implication for security has until now not received much attention. Moreover, prior expectations from the literature regarding the effects of disaster-induced migration on security seem to be contradictory. While some argue that violence is likely as a result of the cost to hosting communities, others have stressed the reverse since disaster-induced migrants are frequently powerless. Drawing on novel spatial data on natural disasters and displacement in Africa at the administrative level from 1991-2011, we investigate more closely the impact of migration caused by the sudden onset of natural disasters for social conflict. We show that disaster-induced differs from conflict-induced migration and as a result raises distinct security and policy implications. Refining further our analysis, we examine in a next step if areas simultaneously affected by conflict and disaster-induced migration are particularly at risk of conflict.

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1 Introduction

Each year thousands of people are displaced because of conflict. However, in 2013 almost three times more people were forced to leave their homes due to floods or other types of natural disasters (IDMC and NRC, 2014, 18). IDMC and NRC (2014, 18, 36) state that in 2013 about 21.9 million people in at least 119 countries have been newly displaced by disasters and 94 percent of these alone were triggered by weather-related hazards, mainly floods and storms.[1] The countries most strongly affected by floods in 2013 were China, India and Niger. Some countries face even the particular prospect of having to respond to both conflict- and disaster-induced displacement. South Sudan in 2012 suffered first from conflict and then also from floods (Anglican News Service, 2012) and both events led to displacement. This year South Sudan has again been hit by floods and as many as 42'000 persons have been displaced (Davies, 2014*b*). Such situations present important challenges to the international community and national governments.

When natural disasters and conflict strike together, high levels of insecurity can arise as they limit access to communities in need, reduce the ability to rapidly distribute aid and undermine social cohesion (Walch, 2013). Populations displaced due to a disaster alone are, in general, at "increased risk of being neglected unprotected and left without durable solutions the longer they are displaced," warn IDMC and NRC (2013, 6). In many countries like Colombia, people displaced by natural disasters are not included in the definition of "internally displaced persons" and, thus, do not receive the same protection as those displaced because of conflict (Thomas, 2014, 64). Many countries, furthermore, do not at all recognize internally displaced persons as a special category and, therefore, also not as a vulnerable group of population with particular needs (Bohnet, Cottier and Hug, 2014, 6).

Although disaster-hit countries, and respective displaced population benefit from international aid, negative externalities still might appear when tensions between the displaced and host communities arise, for example, because of resource competition (UNDP, 2011). However, although a large literature on environmental change, resource

[1]The remaining 6 percent are attributable to geophysical disasters such as earthquakes and volcanic eruptions. This percentage varies, however, considerably over time.

scarcity and its link to conflict exists, how disaster-induced migration fits into the picture has been largely ignored until now, and the few findings are far from clear-cut.

Since the mid-2000s, conflict researchers have investigated the role of displaced persons within the conflict dynamic more closely (Lischer, 2005; Salehyan and Gleditsch, 2006; Bohnet, 2013), but these have been mainly restricted to displacement caused by conflict (Bohnet, Cottier and Hug, 2014) and to refugees, leaving out the aspect of disaster-induced displacement and the internally displaced.[2] We aim to fill this gap and, thus, try to answer the following research questions:

> *Does disaster-induced migration play a significant role in social conflict dynamics? And, how does this role differ comapred to conflict-induced displacement?*

Although the prediction of 50 million displaced persons due to environmental degradation by 2010 has been proven wrong and fears propagated in media have at least somewhat subsided (Bojanowski, 2011), disaster-induced migration is still expected to increase in line with global trends that foresee a rise in disasters (IDMC and NRC, 2013, 8). "The best current estimates suggest that environmentally induced migration either alone or in concert with social and political conflict is responsible for between 10 to 25 percent of migratory movement" (Clark, 2007, 1).[3] Therefore, it is essential to investigate more in detail what effects these displacement movements might have.

Thus, in the following, we carry out an analysis of the effects of flood-induced displacement on social conflict, in general, relying on data on flood-affected administrative regions in Africa from 1991 to 2011.We focus on flood-induced migration as "water related hazards account for 90 percent of all natural hazards and their frequency and intensity is generally rising" (UNESCO, 2012, 23). Between 2008 and 2013 floods caused 67% of the weather-related displacement, while storms were responsible for only another 32% (IDMC and NRC, 2014, 37). Floods, thus, occur more frequently than any

[2]It is acknowledged that divergent factors for displacement can be the cause, and that one cannot always disentangle them. Nevertheless, for sudden-onset disasters, such as floods, which are under investigation here, this is possible in contrast to slow-onset disasters such as droughts.

[3]Also, Koubi et al. (2013) underline that sudden-onset environmental events are a driving force of migration in contrast to slow-onset events where people respond rather with adaptation than migration.

other type of natural disaster (see also Thomas, 2014). Moreover, despite the fact that "seasonal floods are vital to agricultural production and livelihoods [...] those that cause distress, loss of assets and unexpected or prolonged displacement are a higly significant source of risk to millions of people a year" (IDMC and NRC, 2014, 37).

In line with Laczko and Aghazaram (2009, 295), we consider flood-induced migration to be more of a forced nature than voluntary migration. Moreover, although Asian countries are the most affected by disasters, many African countries, such as Chad, Niger and Sudan, also experience floods and should not be neglected in the analysis of disaster studies. In this regard, Eastern and Western Africa are predicted to experience an increase in precipitation (Parry et al., 2007, 444-5). In addition, arid countries are not unaffected by floods and are particularly vulnerable to extreme events. For instance, in 2004 a flash flood in Djibouti killed about 300 people and affected an estimated 100'000 persons (World Health Organization, 2004).

In the next section we discuss the state of the art in the literature on disaster-induced as well as conflict-induced migration and conflict. Based on this we present in section three our theoretical underpinnings for our empirical study. Section four is devoted to our data and methods of analysis, before we present in section five our results. We conclude in section six by putting our results in a broader context and sketching avenues for future research.

2 State of the Art

Recent years have seen an explosion of literature on climate change (for a review, see Bernauer, Böhmelt and Koubi, 2012), particularly since it is acknowledged that climate change can intensify natural disasters, increase drought, rise sea levels and create competition over natural resources (Laczko and Aghazaram, 2009, 15). However, despite the increased interest in climate change and its consequences, how these environmental factors are linked to security and conflict is still widely debated. Although the United Nations (UN) Security Council has taken up the topic, and the UN General Secretary Ban Ki-moon did explicitly warn about the effects of climate change for security (UN News Centre, 2011), academic research about the effects of environmental change on

conflict does not show a clear picture. Moreover, while natural disasters are seen as causes of mass displacement, what role disaster-induced migration plays is often not taken into account (Laczko and Aghazaram, 2009, 14).

In the following, we will first outline the state of the art of the general environmental change and conflict literature before focusing in a next step on the more specific link between disasters and conflict. Although most of the literature on environmental change lacks a specific focus on disasters and disaster-induced displacement, it includes the effects of resource scarcity on conflict, and, as Nel and Righarts (2008, 161) point out, "...natural disasters per definition lead to conditions of concentrated resource scarcity." Like Nel and Righarts (2008, 161), we consider natural disasters as an "extreme form of environmental change." Consequently, the general literature on environmental change can be referred to help to understand how disasters and the possibly ensuing displacement may lead to conflict.

2.1 Environmental Change, Forced Migration and Conflict

Since the mid-1990s there has been an increased interest in understanding the relationship between environmental change and conflict (Hendrix and Salehyan, 2012; Fjelde and von Uexkull, 2012, 2). The arguments, as Salehyan (2008) explains, boil down to the issue of "... resource scarcity and competition over the means to sustain livelihoods" (Salehyan, 2008, 316). Although, most of these studies do not specifically take disaster-induced migration into account, they do refer to forced migration as an important element. Homer-Dixon (1999), one of the most cited authors in this area, argues that different types of conflict can arise from resource scarcity. For example, because of resource scarcity, large scale movements of populations can occur, which then might trigger group identity conflicts (Homer-Dixon, 1999, 141), when these populations move to new areas.

> "Migrations, productivity losses and the rent-seeking of elites produce social segmentation that deepens groups-identity conflict. They also weaken local and national institutions, which decreases central control over ethnic rivalries and increases opportunities for insurgents and elites challenging state authority"(Homer-Dixon, 1999, 133).

Kahl (2006)'s argument goes in a similar direction stating that demographic and environmental stress together, which he calls in short *DES*, can create violence through state failure and state exploitation by increasing incentives and opportunities to engage in violence. *DES* comprises rapid population growth, environmental degradation and unequal distribution of resources. Hereby, Kahl (2006) underlines that groupness and institutional exclusivity are decisive factors for determining the risk of conflict (Kahl, 2006). Thus, Kahl (2006) does not only consider migration to be a crucial factor for determining the risk of conflict, but also emphasizes the role of the state. In general, both Homer-Dixon and Kahl do not suggest a direct link between environmental change and conflict, but rather indicate that intervening factors such as migration, ethnic linkages and the state can play decisive roles. Thus, they point to the fact that displacement after environmental change, such as natural disasters, need to be considered as the displaced might create situations of vulnerabilities and violence.

Goldstone (2001), furthermore, argues that environment-induced displacement can lead to conflict, particularly, when forced migrants move to areas that have a distinct ethnic or political identity, change imbalances among populations and when the absorption capacity of societies are reached (Goldstone, 2001, 100). Suhrke (1997, 255) also underlines that migration produced by environmental change can provoke conflict, and that this is dependent on the role of the state. In contrast to the other authors she also points out, however, that persons displaced by natural disasters, such as floods, are often powerless and marginalized and, because of this, are probably "unable to make effective demands" (Suhrke, 1997, 263) or engage in conflict. Only if the displacement situation becomes long-term and the displaced find "powerful allies" (Suhrke, 1997, 263) they might create security risks. Therefore, disaster-induced migration might only lead to conflict under specific circumstances. Nevertheless, she, as well as others before her, argue that migration should not be neglected in conflict dynamics.

In sum, most authors who investigate the link between environmental change and conflict acknowledge displacement as an important intervening variable. They do not, however, specifically test its impact on social conflict. In general, the environmental change literature has been criticized for not having taken into account variables, such as migration or the role of the state. As Gleditsch (2001, 260) writes, much literature

on environmental conflict ignores political, economic and cultural variables (see also Raleigh, 2010, 69). Evans (2010, 6), as well, underlines that resource scarcity on its own does not evolve into conflict, but rather needs to be understood as a threat multiplier that interacts with other risk drivers.

Salehyan (2008) also stresses that forced migration may lead to conflict, but ignores disaster-induced migration. Nevertheless, he writes that natural disasters such as flooding can generate mass migration and create competition between "have and have nots" (Salehyan, 2008, 316). Reuveny (2007) also argues that forced migrants have the potential to create security risks. Bernauer, Böhmelt and Koubi (2012, 6), moreover, stress that migration is an important factor besides economic and political ones. Yet, they warn against drawing general conclusions. They indicate that although qualitative case studies[4] have partly shown that environmental change can contribute to conflict, quantitative large-N studies show divergent results. One reason for this might be that these studies have looked at different forms of environmental change or have taken all forms together. However, as Bernauer, Böhmelt and Koubi (2012) indicate "[s]ocial and political implications of environmental changes are likely to vary considerably between different types of environmental changes (e.g. water scarcity, floods, soil degradation etc.)" (Bernauer, Böhmelt and Koubi, 2012, 3). Therefore, we analyze here only one type of environmental changen namely natural disasters, and among them one type of disaster, namely floods. On the whole, not many systemic studies on environmental change exist.

2.2 Disasters and Social Conflict

Studies specifically focusing on the impact of disasters on conflict are rare, although Pelling and Dill (2006) alert us that natural disasters can be seen as "catalysts of political action" (Pelling and Dill, 2006, 1) and trigger social processes. As Nel and Righarts (2008, 160) write, "[f]ew studies [...] systematically explore how natural disasters affect the patterns of politics and/or conflict." Moreover, these come to contradictory results.

[4]See, for example, Baechler (1998) or others of the Toronto Group's Environmental Change and Acute Conflict Project (ECAP) or the Environmental Conflicts Project (ENCOP) at ETH Zurich.

Slettebak and Theisen (2011), focusing on Indonesia, find support for the claim that climatic disasters such as floods, in contrast to geological disasters, increase the risk of violence, as disasters enlarge inequalities between groups (Slettebak and Theisen, 2011, 21). Already Olson and Drury (1997) showed that political mobilization and unrest can increase after disasters. The most thorough study in this area is from Nel and Righarts (2008). The authors demonstrate that natural disasters can increase grievances, create motives as well as incentives and opportunities for conflict. Also, Besley and Persson (2011, 1433) find that disasters are positively associated with violence.

In contrast, Slettebak (2012) and Bergholt and Lujala (2012) do not find support for the argument that natural disasters increase the risk of conflict. Despite the fact that Bergholt and Lujala (2012) detect that natural disasters can have negative effects on growth, they do not find evidence that disasters heighten the risk of conflict (147).

The reason for finding no robust results could be the fact that these authors focus mainly on armed conflict and do not take into account lower levels of violence, such as communal conflict. Although Nel and Righarts (2008) point out that different dynamics between minor and major conflicts might apply, most disaster studies do not consider lower levels of violence. However, as Suhrke (1997) has indicated, disaster-induced migrants are often powerless, making forms of protest or riots more likely than armed conflict, as they do not require the high level of organization necessary for insurgency (Hendrix and Salehyan, 2012, 37). Blocker, Rochford and Sherkat (1991) also underline that natural disasters need to be regarded within the social movement framework.

Most of these studies focus on the country level, and only recently have some studies taken a more disaggregated approach and focused on social conflict. They do not, however, address forced migration directly. Hendrix and Salehyan (2012, 38) indicate that migration can lead to more competition, shifts in ethnic settlement patterns and consequently, lead to communal conflict, but do not specifically add disaster-induced displacement as an explanatory variable in their model. Nevertheless, they argue in an earlier version of their paper that floods may lead to riots as they can increase prices because of crop damage (Hendrix and Salehyan, 2010). However, they do not find statistically significant results for floods.[5] In the later version of the paper, they only

[5]The data on floods used by Hendrix and Salehyan (2012) is drawn from the *Centre for Research on*

look at rainfall variability, in general, but not specifically at floods, for which they find a positive and significant relationship (Hendrix and Salehyan, 2012). Using as a units of analysis administrative units instead of countries, Fjelde and von Uexkull (2012) find similar results. They confirm that large negative deviations in rainfall might be related to a greater risk of communal conflict. The question remains, however, what role floods play in this context. Do large rainfall anomalies include floods? And, how do displaced persons due to floods fit into social conflict dynamics?

Clark (2007) is one of the few who directly addresses environment-induced migration and its link to conflict. His study, as well as most others in this area, however, is limited to a theoretical discussion without empirical analysis. In general, the literature focusing on environment- or disaster-induced migration more specifically is, surprisingly, restricted to reports and studies done by international organizations or national governments. On the one hand, this seems to underline the concern within the international community that disaster- induced migration may have adverse effect. On the other hand, it also stresses the fact that disaster-induced migration until now has been mostly approached through the humanitarian lens and has not yet been sufficiently considered by conflict researchers. Clark (2007, 2), nevertheless, shows that tensions between the displaced and the locals over declining resources might arise because of disasters. Also, Walch (2010) in a report on Libera for CARE points out that natural disasters have a "number of *direct* negative effects on the economic livelihoods and food security of the communities and *indirect* negative effects on social cohesion and on the relationship between the state and its citizens [and] [...] could act as a threat multipliers that increase the volatility of existing causes of conflict and may generate new insecurities", especially in a peace-building process (Walch, 2010, 3).

This is further underlined in a recent study by UNDP (2011), which attempts to list the potential impacts of disaster events. Notably, negative consequences of disaster-induced migration might arise through "pressure of sharing resources (land, water etc.), unplanned settlements; land-tenure disputes, ethnic/tribal tensions and loss of livelihoods" (UNDP, 2011, 8). This, for example, can be seen in Sudan and Kenya. Moreover, poorly planned resettlement, culturally and politically inappropriate responses

the Epidemiology of Disasters EM-DAT data on disasters, (for more information CRED, 2009).

could heighten the risk of conflict as well. Examples herefore are Bolivia, Kenya, Haiti and Indonesia (UNDP, 2011, 8). Nevertheless, the report pinpoints that disasters can also have positive consequences. The effects, in general, vary widely between countries.

In conclusion, no study has yet been brought forward so far that investigates systematically the effect of disaster-induced migration on social conflict. While earlier work has focused on resource scarcity and its link to conflict, it has left out intervening variables such as migration. In addition, studies until now have mainly been limited to large-scale violence and country-level analysis. We want to fill this gap and present for the very first time a study that looks at both disaster- and conflict-induced displacement and its role in the social conflict dynamic. We focus on one type of disaster only, as earlier work has been criticized for looking at disaster types together that differ considerably. As Bernauer, Böhmelt and Koubi (2012, 1) state, "[i]t would be very helpful to know what kinds of environmental changes have what kinds of influences on what kinds of conflict." Furthermore, ignoring the link between disasters and conflict might worsen tensions and increase the risk of conflict (UNDP, 2011, 7). Hence, we investigate, in the following, the mechanism linking disasters and disaster-induced migration to conflict more thoroughly.

3 Theory

No explicit theory on disaster-induced displacement exists. As Nel and Righarts (2008, 162) point out: "The theoretical literature on the specific impact of natural disasters on violent civil conflict is limited and so [...] theoretical exposition has to rely on general explanations of violent conflict." However, as pointed out earlier, the resource scarcity literature provides some theoretical background on how disaster-induced migration might evolve into social conflict. Moreover, to some extent the studies on the migration-conflict nexus provide also insights into when forced migrants might produce negative externalities, as does some recent work on social conflict.

3.1 Disaster-Induced Migration as a driver of conflict

While recent research has emphasized that a causal relationship between environmental factors and conflict exists, the mechanisms behind it are still unclear (Hsiang, Burke and Miguel, 2013, 11). Nevertheless, Hsiang, Burke and Miguel (2013, 11) suggest that climate-induced displacement could be a plausible mechanism. Also Nel and Righarts (2008, 180) point out that disaster-induced migration is an important factor that needs to be considered in the conflict dynamic. Disasters, in general, may cause large movements of people. A study by the World Bank on the Middle East and North Africa (MENA) region, for example, shows that extreme weather events lead to a higher probability of migration (Piguet and Laczko, 2014, 11-12). Piguet and Laczko (2014, 16) also argue that "[]tropical storms, hurricanes and floods are typical examples of phenomena that appear with very little warning and can result in the displacement of populations in search of shelter, care or food" The question remains what role these disaster-induced displacement may play.

Clark (2007, 10) outlines three potential outcomes for disaster-induced migration: acceptance, return or conflict. In general, disaster-induced migrants can self-settle in spontaneous camps or settle with families and friends or be located by aid organizations into organized camps. The newcomers can then either be accepted at the new location to which they migrate to or be rejected. Often those who have family ties or who receive assistance by aid agencies can make a smooth transition to a new, even if temporary,[6] life in their new surroundings (Clark, 2007, 10). When the number of migrants reaches the absorption capacity of the new setting or different cultures clash, however, resource competition might arise, and conflict could be the result (Clark, 2007, 10). Already Homer-Dixon (1999, 134) has indicated in his core model of the causal links between environmental scarcity and violence that environment-induced migration could lead to group-identity conflicts via social segmentation or weakened institutions. UNDP (2011, 8) also underlines that "demographic changes and migration [...] can reinforce vulnerabilities and increase tension between communities," as has been seen in Kenya,

[6]Disaster-induced migration is mainly regarded as temporary and not permanently. Although it can become permanent, it is often less permanent than in conflict-induced migration settings.

Haiti or Sri Lanka.

Generally, Pelling and Dill (2006, 2) emphasize that disasters might "put in motion potentially provocative social processes." As "disasters are by definition a mismatch between a natural event's impacts and the response resources and efficiency of the affected society, we expect, first, that virtually without exception, no matter how well a government handels a disaster, public dissatisfaction increases" (Olson and Drury, 1997, 227). Nel and Righarts (2008, 163) further demonstrate that disasters can create motives, incentives, as well as opportunities for conflict to occur. This is in line with the general conflict literature that considers motivational and opportunity factors as drivers for conflict outbreak. Following partly Nel and Righarts (2008), we assume that disasters and its product, disaster-induced migration, can lead to motivation and opportunities for violence.

Instead of expecting full-scale violence as others have done before, however, we argue that disaster-induced migration rather leads to lower-level violence, such as riots. Although we assume that full-scale violence might be possible, we believe that this is less likely in the case of disaster-induced migration scenarios because "riots do not require the high levels of organizations or funding typical of rebellion" (Hendrix and Salehyan, 2010, 5, see also Fjelde and von Uexkull, 2012). Moreover, "rebellion is costly" and often needs long term leadership (Hendrix and Salehyan, 2010, 5). In the case of disasters this is unlikely, as those displaced by disasters are often the poorest of the society, often living on land that is not necessarily laid out for housing (IDMC and NRC, 2013, 12). In addition Suhrke (1997) and Homer-Dixon (1999) point out that those displaced by floods are often powerless and marginalized. Their living space has been destroyed, assets have been lost (Nel and Righarts, 2008; UNDP, 2011) and, thus, full-scale violence in this case, is implausible.

In addition, disaster-induced migrants who compete for resources with other communities "may fight directly rather than engage the government which is often far riskier given the states preponderance of coercive force" (Hendrix and Salehyan, 2012, 5). Thus, inter-communal violence is more likely. Although a few authors also indicate that disasters can have positive consequences (see for example UNDP, 2011; Kreutz, 2012), and not all disaster-induced migration results in conflict, conflict still might arise

if grievances of the disaster-induced migrants are not properly addressed.

3.2 State Failure as Opportunity Structure for Mobilization

Typically, it is the state's responsibility to provide help when disasters have hit (Bhavnani, 2006). However, when the state fails to perform, exploits external aid delivered or privileges one group over the other, violence might occur (Kahl, 2006). Goldstone (2001) also highlights that the response of regimes to disasters is key in predicting conflict outbreak (Goldstone, 2001, 93f): "Natural disasters provide an opportunity for the regime to display its flaws or to demonstrate its competence. Where the latter is shown, natural disasters can be a cause of increased support of the government; but where the flaws come to the fore, political unrest and violence is a widely observed response." Harris, Keen and Mitchell (2013), furthermore, underline that poor responses by governments to natural disasters may lead to conflict. For example, in Morocco after the earthquake in February 2004, people protested because of the lack of action by the government (Pelling and Dill, 2006). Also, after the flood in Pakistan, August 2010, the Pakistan government faced "highly determined militants who often try to capitalize on a lack of civil services to recruit disillusioned Pakistanis to take up arms against the state" (Georgy, 2010). In addition, recent floods in Côte d'Ivoire demonstrate how the displaced lament over the failure of the state to adequately respond to the flooding. One displaced exclaims that "[e]very year, at the same time, it is the same thing that we witness. Rains kill people and the authorities still do not have any solution to save us" (IRIN, 2014). Another flood-affected person also states that: "[e]very year the government promises to find us a safer location, but it does not tell us who is going to pay the rent" (IRIN, 2014).

Consequently, disasters can generate opportunity structures for disaster-induced, rebel groups or other opposition parties. Walch (2010, 15) underlines as well that "natural disaster affect the relations between the population and the state [...] Farmers and rural communities affected by disaster are angry at the government because they feel they are left alone when disaster happens; they never receive any help or compensation." Thus, the motivation for these flood-affected people to engage in violence against the

governement might be heightened, and they might be more susceptible to recruitment efforts by rebel groups. While the government is occupied with providing relief and assistance, opposition groups could, therefore, take advantage of the opportunity to mobilize, challenge the state and legitimize themselves (Bhavnani, 2006, 17). Harris, Keen and Mitchell (2013) also emphasize that disaster settings can present economic opportunities for criminal activity. Aid deliveries, in addition, can be captured by insurgents (Nel and Righarts, 2008). Furthermore, Homer-Dixon (1999, 144) indicates that the scarcity created through disasters opens up structural opportunities for aggrieved groups, such as the disaster-induced displaced persons, to challenge the state. Bhavnani (2006, 16) as well speaks of "a window of opportunity" when disasters strike. Often conflict evolves around the distribution of the remaining resources or the aid delivered. The distribution of aid involves usually various different actors who need to agree when, where and how services are provided. As Bhavnani (2006, 17) explains: "There may be conflict in authority over disaster-recovery priorities and plans, with politically aligned organizations uniting together to provide services to the victim communities, seriously altering political structures". This happened, for example, after the Tsunami in 2004 in Sri Lanka where local organizations competed in being service providers to the disaster-affected.

3.3 Unequal Distribution and Competition over Resources as Motivational Drivers for Conflict

As disasters destroy livelihoods and resources become scarcer, competition over resources between have and have-nots might increase and grievance levels heightened, particularly where populations concentrate or where different ethnic groups come together (Hsiang, Burke and Miguel, 2013; Clark, 2007; Salehyan, 2008). In addition, flooding can cause price disputes as crop is damaged, and scarcity is created (Hendrix and Salehyan, 2010, 6). Floods might ". . . reduce the size of arable lands and on the long term increase the issue of land tenure . . ." (Walch, 2010, 16) and those who lack secure land tenure are especially vulnerable to discrimination (Thomas, 2014, 62). In addition, competition over resources, housing and jobs can be the result of disasters when disaster-induced

migrants move to new areas where they need to share these resources with others (Hendrix and Salehyan, 2010, 7). In general, the pressure of sharing scarce resources is heightened after disasters (UNDP, 2011). (Walch, 2010, 16) notes that ". . . water resources can be contaminated by mud following disaster, which has led in [sic] tension over access to water." Harris, Keen and Mitchell (2013) also underline that grievance levels rise after disasters as they increase resource scarcity and create imbalances between areas of scarcity and abundance. This could be intensified if aid by governments or international agencies is unequally distributed. Slettebak and Theisen (2011, 8) surmise that "[p]rivileged groups may be tempted to use their position to get an unfair share of what is left, thereby worsening existing inequalities." Consequently, incentives for the left-out to riot may be created. Harris, Keen and Mitchell (2013, 14) and Pelling and Dill (2006, 3) also assert that unequal distribution of resources can exacerbate inequalities and increase the likelihood for the disaster-induced to go against these grievances.

When disaster-induced migrants move to new areas, these new locations could be inhabited by different distinct groups which do not share ethnic kinship with the migrants and, thus, this could lead to ethnic tension between them (Goldstone, 2001, 100). Also both Reuveny (2007) and Hendrix and Salehyan (2010, 7) write about shifts of ethnic settlement patterns and communal conflict that might arise because of the influx of disaster-induced displaced persons into a new region. This argument has, moreover, been used in the general displacement-conflict literature (see for example Rüegger, 2013). Consequently, we postulate that:

> *H1: Administrative regions affected by flood-induced migration face an increased risk of social conflict.*

Displacements resulting from floods are likely to alter opportunity structures and cause resentment due to unequal access to scarce resources within hosting areas. Therefore violence and social conflict is likely to emerge. In Kyrgyzstan, for example, populations displaced by floods were unable to migrate away. They were therefore trapped within the areas hit by disaster, because of a "lack of alternative livelihood options and resources," (UNDP, 2011, 8) which created grievances against domestic authorities (UNDP, 2011, 8). Although, we focus here on floods, we assume that findings would be

similar for other hydro-meteorological disasters.

Until now, we concentrated on the effects of disaster-induced migration on conflict. However, how does conflict-induced migration fit into the picture? Does it differ?

3.4 Disaster- versus Conflict-Induced Migration

Conflict-induced migration affects hosting areas in a similar way to disaster-induced migration by generating motivational and opportunity factors for violence. Opportunity factors, for example, include supply to rebel groups, while motivational factors comprise loss of land and marginalization.[7] Ferris (2008) also outlines that both types of migration, conflict- and disaster-induced, are comparable as both types of migrants have the same protection needs. However, she emphasizes that appropriate responses to both types of migration may differ. First, those displaced by disaster might be able to return more rapidly than those displaced by conflict. Second, disaster-induced displaced persons often receive more assistance as governments accept international aid, while they tend to restrict international assistance to internally displaced persons in a context of conflict (Ferris, 2008). Third, conflict-induced migrants are often not formally recognized as persons of concerns in contrast to disaster-induced ones, and their displacement may possibly be a direct consequence of the state's actions. Consequently, conflict-induced migrants might have particularly strong grievances. Similar to disaster-induced, conflict-induced migrants have often to cope with unequal aid, discrimination, forced relocation, sexual and gender-based violence, loss of documentation, recruitment and issues of property (Ferris, 2008) which might lead to tensions and new conflict. Hence, we hypothesize that:

> *H2: Administrative regions affected by conflict-induced migration face an increased risk of social conflict.*

Bohnet, Cottier and Hug (2014) also find evidence that regions affected by conflict-induced displacement face a heightened risk of violent conflict. The Darfur region, for example, demonstrates that conflict-induced migrants can cause negative externalities if

[7] For a complete discussion on the effects of conflict-induced displacement on violence, see Bohnet, Cottier and Hug (2014).

their needs are not properly addressed. The question remains: What if an administrative region is struck by both conflict and disaster?

While the literature on disaster-induced migration is already scarce, studies investigating the interaction between disasters and conflict are even more rare and, hence, also a thorough theory of the interaction between the two is missing. This is surprising as Harris, Keen and Mitchell (2013, vii) point out that from 2005 to 2009 more than 50 percent of people displaced were affected by both natural disasters and conflict. The authors indicate that this convergence puts particular challenges for governments and agencies (Harris, Keen and Mitchell, 2013, vii). Despite the fact that ". . . the picture is far from clear, [it remains that] the balance of evidence suggests that natural disasters exacerbate pre-existing conflicts" (Harris, Keen and Mitchell, 2013, vii). Grievances can be heightened through disasters, present economic opportunities for criminal activity and their impact on livelihoods can increase the motivation for individuals to join armed groups (Harris, Keen and Mitchell, 2013, viii). At the same time, however, ". . . good access to reconstruction aid can also increase the opportunity cost of conflict" (Harris, Keen and Mitchell, 2013, viii). In addition, Kreutz (2012) argues that disasters might produce a ripe moment for conflict resolution and, thus, rather than causing new conflict, might make peace agreements more likely. However, his results do not show a statistical significant effect and, he admits that although "the aftermath of disasters may temporarily stop hostilities", it does not "lead to a formalized settlement of the conflict issues" (Kreutz, 2012, 484). In this regard, it should be stressed that both studies did not specifically discuss displacement and its impact.

Although, we acknowledge that people affected by both disaster and conflict might "just try to survive" and therefore be particularly vulnerable and not necessarily have the capacity to riot, they still might hold strong grievances. (Davies, 2014*a*, for example in South Sudan, see). Walch (2013) outlines five ways in which conflict might aggrieve disaster-hit regions. First, early-warning systems might be neglected in cases of conflict settings. Second, national and international financial and human resources could be diverted. Third, infrastructure could be disrupted, reducing the ability to quickly reach those in need. Fourth, disaster and conflict striking together can undermine social cohesion and fifth, create insecurity as humanitarian actors could become targets of

violence by rebel groups (Walch, 2013). We, consequently, hypothesize that:

> *H3: Administrative regions affected by both flood- and conflict-induced migration face an increased risk of social conflict. The risk is higher than in those administrative regions that are affected by flood- or conflict-induced migration alone.*

For instance in Colombia, three months after floods had struck in December 2010, a significant number of victims had still not received any basic aid. Despite the fact that the Colombian government had received ample funding to provide aid, this required a new funding scheme which took time to set up and had to involve new actors that the government had to identify and coordinate. This led to a slowed down response to the flood-induced displaced persons (Refugees International, 2011). "The new scheme also largely ignored existing institutions responsible for responding to conflict-induced humanitarian emergencies that may have safeguarded the rights of those affected by the floods" (Refugees International, 2011, ii). This situation created grievances among the disaster-induced displaced persons, who were frequently already conflict-IDPs themselves and had been forced to settle "otherwise undesirable land in high risk areas" (Refugees International, 2011, 9). Social conflict, because of this, might be the consequence as happened, for example, in Pakistan after the 2010 flood. Therefore, if disaster- and conflict-induced displacements are not addressed effectively, new conflict situations might arise.

4 Data and Methods

In this section we present the source of our data for flood-induced displacement, the dependent variable *social conflict*, and relevant control variables, as well as the empirical approach we choose for our analyses

4.1 Independent variables

To assess the effect of natural disaster-induced displacement, we would ideally have spatial data on the location of people affected by natural disasters. Unfortunately, the only data

available on the precise location of displaced populations, the *IOM Displacement Matrix* is only available for a small number of disasters and conflict-induced displacements (e.g. Haiti, Sudan, etc., see IOM, 2011). Databases on disasters, on the other hand, often provide estimates of the scale of displacement, but do so with less accuracy. The reliance on such data should not be a major concern, since conventional wisdom in the literature on displacement caused by sudden-onset natural disasters generally holds that displacement normally occurs over a short distance, as people above all attempt to flee from destructions and risk of injuries linked to natural disasters (Zaman and Weist, 1991; Findley and Geddes, 2011, 143; see also Raleigh, Jordan and Salehyan, 2009, 23). Systematic data on disaster-induced displacement remains nonetheless limited, particularly when it comes to spatial information on the location of natural disasters and displaced persons. The most obvious source of data when it comes to environmental disasters would seem to be the *EM-DAT International Disaster Database* hosted by the *Center for the Research on the Epidemiology of disasters* at the Catholic University of Louvain, Belgium (CRED, 2009). Unfortunately, the data only provides information on the number of affected persons and those made homeless. The latter category has been shown to substantially under-estimate the scale of displacement, while over-estimating it for the former (IDMC and OCHA, 2009, 8). In addition, the data provided is aggregated at the country-level and therefore does not allow for the spatial localization of disasters.

The *UN High Commissioner for Refugees* appears to have been collecting data as well, but the coverage has remained restricted to countries having been affected by massive emergencies (such as the Haiti earthquakes or the 2010 floods in Pakistan), for which UNHCR was asked to provide assistance (UNHCR, 2013).[8] In this regard, the *Internal Displacement Monitoring Center*, an offshoot of the Norwegian Refugee Council, has lately started to collect high quality data on disaster-induced displacement for all sudden-onset disasters, which have affected at least 100'000 persons. This data, however, is only available from 2008 onwards and does not explicitly map these disasters within countries (IDMC and OCHA, 2009).

[8]In addition, as UNHCR does not differentiate between conflict and disaster IDPs, but rather pools both categories together within an "IDP-like" category, this data would be problematic to investigate the distinct effects of the two types of displacement.

When it comes to displacement induced by floods specifically (excluding thereby earthquakes, storms, and other natural disasters), accurate data is, nevertheless, available. The *Darmouth Flood Observatory* has been collecting data on flood events since 1985, as part of its Global Archive of Large Flood Events (Brakenridge, 2014).[9] In particular, the dataset provides estimations of displaced persons and, more importantly, geo-references each disaster on a GIS-based map. In light of the extent and systematic coverage of floods and estimation of the number of displaced persons, we chose to construct our measure of displacement on the basis of this data. The *Darmouth Flood Observatory* Global Archive of Large Flood Events records every instance of floods reported by news or governmental agencies that are perceived by coders as "large" (Darmouth Flood Observatory, 2014).[10] Estimates of the number of displaced persons are then computed on the basis of media reports, or, if not available, by relying on the number of houses destroyed or damaged.[11] In addition, the dataset also geo-references the extent of the area affected by floods.

To compute our independent variables on flood-induced displacement, we rely on an indirect strategy by overlaying the *Darmouth Flood Observatory* Global Archive of Large Flood Events with the Global Administrative Unit Layer (GAUL) (FAO, 2008),[12] which maps the first-order administrative units of every country throughout the world. In a

[9]The root causes of the floods included in the *Darmouth Flood Observatory* Global Archives of Large Flood Events may however belong to any of the following categories of events: heavy rain, tropical cyclone, extra-tropical cyclone, monsoon rain, snowmelt, ice-jam/break-up, dam/levy break or release, brief torrential rain, tidal surge or avalanche related (Darmouth Flood Observatory, 2014).

[10]By "large" flood event, the Darmouth Flood Observatory (2014) refers to episodes, which did cause "significant damage, to structures or agriculture, long (decades) reported intervals since the last similar event, and/or fatalities."

[11]It should be mentioned that the *Darmouth Flood Observatory* estimates of displaced persons are probably conservative, as it evaluates that for each house destroyed or damaged only four persons are displaced (Darmouth Flood Observatory, 2014).

[12]"The Global Administrative Unit Layers (GAUL) is an initiative implemented by FAO within the EC-FAO Food Security Programme funded by the European Commission. The GAUL aims at compiling and disseminating the most reliable spatial information on administrative units for all the countries in the world, providing a contribution to the standardization of the spatial dataset representing administrative units [...] The GAUL keeps track of administrative units that have been changed, added or dismissed in the past for political causes" (FAO, 2008). Currently, we use the GAUL version for 2008. However, we are planning to introduce a time-varying dataset of first-order administrative units in future versions of the paper for the period 1990-2011.

first step, we coded all administrative unit-years for whether they had been affected by a flood event. Accordingly, we generate three dichotomous variables, which respectively indicate if an administrative unit has been a) fully or b) partially affected by a large flood event recorded in the Global Archive of Large Flood Events dataset, or c) is located in its direct vicinity ($\leq$ 25 km).[13] These three variables are mutually exclusive. The decision to build on three indicators as opposed to pool them together stems from the fact thatthe effect of a flood event, and by extension any related displacement, may differ depending on the extent to which administrative units have been affected by floods.

In a second step, we then disaggregated our indicators further by generating three additional dichotomous indicators that record if any of these administrative units have been affected by a flood event that led to a displacement of at least 1'000 persons during the corresponding year.[14] As before, these variables are mutually exclusive and code if an administrative unit has been fully or partially affected by a flood or is located within a distance of 25 kilometers from a flood event, which displaced at least 1'000 persons.[15] By interacting these displacement variables with their respective flood variables, we hope to separate and isolate the impact on social conflict caused by displacement from distinct effects resulting from the destruction and damage brought about by floods. All six resulting variables are lagged by one year.[16] Figure 1 plots the annual frequencies of all three displacement variables. Despite the high variability of the data, there is some

[13]We decided to code administrative units in the direct vicinity of a flood event as administrative areas close to such natural hazard may also suffer from the impact of the event, due to resource scarcity caused by the disaster, and breakdown of public infrastructure and transports system. Moreover, evidence from Bangladesh has shown that displaced persons by floods seek shelter within just a few kilometers from the disasters (Zaman and Weist, 1991).

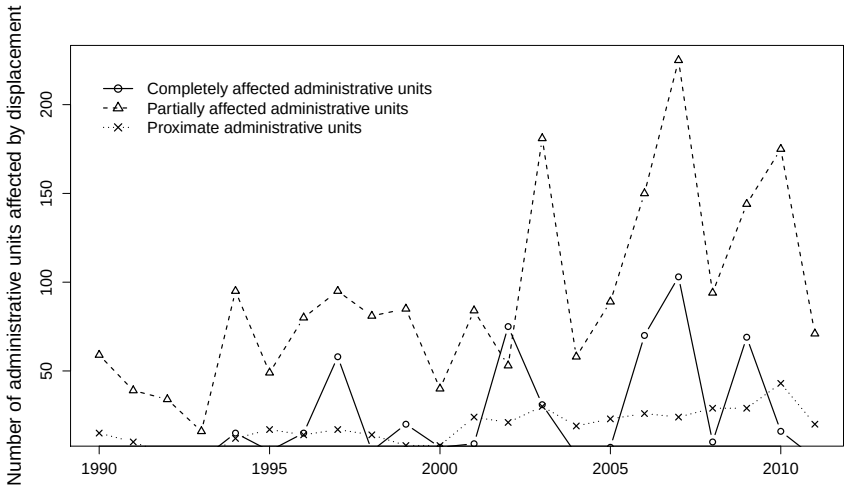
[14]We chose 1'000 persons as a threshold to exclude floods that might have led to population displacement but the scale of which is unlikely to have caused a significant burden for the state and regional authorities.

[15]These three variables for flood-induced displacement are by definition a subset of the corresponding flood variable. In other words, if an administrative unit is completely affected by a a flood-indued displacement, this administative unit will also receive a value of "1" on the the variable for administrative zone fully affected by flood.

[16]The spatial analysis to compute the independent variables was carried out in ArcGIS 10.1. To minimize distortion due to earth curvature, a "world sinusoidal" projection was used for the source maps.

evidence for an increase of the frequency of disaster-induced displacement over-time, a fact which would appear consistent with current predictions (Parry et al., 2007, 187). Nevertheless, the lack of uniformity in the size of administrative units calls for prudence, when interpreting such a graph.

Figure 1: Frequency of flood-induced displacement (1990-2011)



To investigate the interaction between conflict and flood-induced displacement we draw on the *Global Internal Displacement Patterns* (GIDP) dataset (Bohnet, Cottier and Hug, 2014). The GIDP dataset is a geo-referenced dataset, which systematically records if a first-order administrative-year did host conflict-induced IDPs in the period 2008-2011. The dataset is based on maps drawn by the *Internal Displacement Monitoring Centre*.[17] The variable, *Conflict IDPs*, takes the value of 1, whenever an administrative unit-year is hosting conflict IDPs.

[17]For more information about the content and variables of the GIDP dataset, see Bohnet, Cottier and Hug (2014).

4.2 Dependent variable

To compute the dependent variable, *social conflict incidence*, we draw on the *Social Conflict in Africa Dataset* (SCAD v. 3.0) (Hendrix and Salehyan, 2012) and code individual administrative units as affected by social conflict if they experience at least one social conflict event in the corresponding year.[18] It should be recalled, though, that this variable encompasses a broad range of contentious behavior, violent or not, that falls short of the level of organization necessary for a civil war conflict and covers events as disparate as protests, strikes, riots or communal violence. It is therefore not implausible that pooling together these events may hide distinct dynamics affecting each of these specific types of conflict.[19]

4.3 Control variables

To control for confounding factors, we add a vector of control variables. To begin with, the frequency with which an administrative units is exposed to floods may affect its ability to react to future displacements-induced by floods, as damage wrought by floods might negatively impact infrastructure. Consequently, we control for the number of past occurrences of floods that have either affected the administrative units or have occurred in its direct vicinity (within a distance of 25 kilometers) since 1990. In addition, we add a square term for the expectation that inhabitants of administrative zones, which regularly experience floods, may have adapted coping mechanisms to limit the impact of floods, thereby resulting in an expected inverted u-shaped relation between the frequency

[18]It should be mentioned, however, that we did not consider social conflict events whose issues were revolving exclusively around any of the four following issues: Elections, foreign affairs/relations, domestic wars, violence, terrorism, pro-government (Salehyan and Hendrix, 2012). We decided to exclude all events linked to these issues, as they are unlikely to be related to disaster-induced displacement. Some of the events were nevertheless included if they were linked to multiple issues and at least one issue was not part of the excluded categories. In addition, events which could not be geo-located at a level of precision equal or higher to the administrative unit have also been excluded in order to reduce systematic measurement errors (i.e. these events are assigned by SCAD to the country centroid point as coordinates).

[19]Table 3 in the appendix shows the results for Model 1, when the dependent variable only comprises events that did involve the use of violence, while Table 4 shows the same model when the dependent variable is computed only on the basis of events that led to riots. While the coefficients for our main independent variables differ slightly, we cannot detect a particular pattern.

of floods and the risk of social conflict (Findley and Geddes, 2011)).[20] In addition, we control for the population per administrative unit as previous research has shown that larger population sizes are associated with a higher likelihood of conflict and violence (Fearon and Laitin, 2003). We draw on the *Gridded Population of the Word* (GPW v.3) dataset (CIESIN, 2005), which provides disaggregated data on population sizes at a 2.5 arc-minute resolution. The GPW data is available at five year intervals between 1990 and 2000. We extrapolate the missing information for the entire time period 1990-2011. The variable is included in the model transformed by taking its natural logarithm. Next, we add a control for the level of development per administrative unit as it has been robustly associated with the likelihood of armed conflict (Fearon and Laitin, 2003; Collier and Hoeffler, 2004). We derive this indicator from the G-Econ dataset (Nordhaus, 2006; Nordhaus et al., 2006).[21] The G-Econ data is available for the period 1990 to 2005 at five year intervals, and we extrapolate the missing data for the entire period 1990-2011. The resulting variable is then divided by the population per administrative unit to obtain a local measure of economic development per capita. We include the variable in the analysis based on a natural logarithm transformation.

In order to control for diffusion effects, we add a dummy variable which takes the values of 1 whenever a contiguous administrative unit located in the same country was affected by social conflict. This variable is lagged by one year. In addition, we also include as independent variable the lag of the dependent variable by one year to account for possible temporal effects within the same administrative unit. Finally, to control for a possible multi-year temporal diffusion, we introduce in the analysis a variable which counts the number of years since the last conflict in the same administrative unit, as well as two polynomials with orders two and three (Carter and Signorino, 2010).

At the country level, we first control for the level of democracy as extant research has provided evidence that the degree of openness and political inclusion of a regime

[20]We also replaced the flood count variable by a variable counting the number of flood events having caused a displacement of at least a 1'000 persons, but the results are similar to those we report on Table 1.

[21]The 1 degree cell resolution of the G-Econ dataset is, however, problematic as the G-Econ cell frequently overlap administrative boundaries. Therefore, we generate a population-weighted dataset with a resolution equal to a 2.5 arc-minute (for more details on the procedure, see Cederman, Weidmann and Gleditsch, 2011, fn 20).

is associated with the likelihood of conflict, in particular political violence (Fearon and Laitin, 2003). To control for the level of democracy, we use the Polity IV data (Gurr, Jaggers and Moore, 1989; Marshall, Jaggers and Gurr, 2011). We recode the variable to attenuate possible concerns regarding endogeneity (see Vreeland, 2008*a*). The resulting variable, *xpolity*, varies between -6 and + 7. Prior theory leads us also to expect that institutionally incoherent regimes that are "partly open, yet somewhat repressive [presents] a combination that invites protests, rebellions and other forms of civil violence" (Hegre et al., 2001, 33). We therefore add a dichotomous variable, *anocracy*, that is coded positively, whenever a country's democracy score falls in the interval between -2 and +3, inclusive.[22]

We also control for the level of economic development and economic growth, at the country level.[23] Indeed, evidence has been found for a negative association between economic development and civil conflict (Fearon and Laitin, 2003). In addition, some researchers have found a linkage between conflict and economic recession (Collier and Hoeffler, 2004, see also Hendrix and Salehyan, 2012). In this regard, protests and strikes may be a likely response to economic downturn. As country demographics are likely to affect the likelihood of social conflict, the models also control for the country's overall population size and population growth. Indeed, the population level has been found to be associated with civil conflict (Fearon and Laitin, 2003). In addition, Hendrix and Salehyan (2012) find some evidence for a negative association between country population growth and the likelihood of social conflict. The data for these four variables come from the *World Development Indicators* (World Bank, 2013). In addition, these variables are lagged by one year, while GDP per capita and total population are included in the model transformed by taking their natural logarithm. Finally, we add a control for the incidence of civil war-years at the country level, as armed conflict could have an impact on social conflict, either by restricting media reports on social conflict events that did not involve the use of violence, or by heightening the costs for actions, such as protests or strikes to potential participants (Hendrix and Salehyan, 2012, 42). The data on civil war years is obtained from the UCDP Onset of Intrastate Conflict Dataset,

[22]The coding of the anocracy variable is also based on Vreeland (2008*b*)'s suggestion.
[23]The indicator for the former is based on GDP per capita at PPP constant.

v4-2012 (Gleditsch et al., 2002; Themnér and Wallensteen, 2013).

4.4 Methodology

The empirical analysis is carried out using binary cross-sectional times series logistic regressions with robust standards errors for the whole continent of Africa.[24,25] The unit of analysis is the first order administrative unit-year. In the first model, we test hypothesis H1 by running a model with all three variables for flood disasters and the respective three variables for displacement. Econometrically, it should be stated that each variable for flood events is interacted with the corresponding variable for disaster-induced displacement.[26] Such a strategy allows to separate the impact of displacement from the impact of floods, that would not related to displacement. The regression frame covers the whole period 1991-2011 or a total of 8'959 observations, structured around 44 African countries. During this period, the dataset records a total of 1'293 cases of social conflict incidence. Table 2 in the appendix presents descriptive statistics for the variables used in Model 1.

Model 2 tests hypothesis 2, which states that conflict-induced displacement increases the risk of social conflict. Due to the the sparser data for conflict-induced displacement, this model restricts the analysis to the period 2008-2011. A total of 1'800 observations in 43 countries are included in the models, with 299 instance of social conflict. Next, Model 3 replicates Model 1 for the period 2008-2011. Finally, in Model 4, we test hypothesis H3, which postulates that administrative units jointly affected by flood- and conflict-induced displacement are particularly likely to witness the incidence of social conflict. We therefore interact the conflict-induced IDPs variable, with each variable for flood events and flood-induced disaster displacement.

[24]The current coverage of the SCAD dataset restricts the current analysis to Africa.

[25]The analysis is carried out using Zelig 3.5.5 (see Imai, King and Lau, 2007, 2008).

[26]As the variable for displacement constitutes a subset of the variable for floods, the interaction term is automatically dropped, because of perfect multi-collinearity.

5 Results

Table 1 presents our main results. Our first hypothesis finds partial support. Administrative zones either directly affected by disaster or nearby such zones are more likely to experience social conflict if displacement has occurred. The uncertainty associated with the three estimated coefficients is, however, so large that the latter fail to reach statistical significance. This is illustrated in figure 2, where we depict average predictive differences in the probabilities of conflict, following Gelman and Hill (2006) (see also Hanmer and Kalkan, 2013). The three point estimates and the confidence intervals depict by how much the conflict probability would increase in our sample if all disaster affected zones had displaced persons. As the figure shows, for each type of our three administrative zones we find on average a positive effect, but the confidence intervals comprise zero. These results for Model 1 might suggest that an important intervening variable need to be taken into account when studying the association between flood displacement and conflict: the role of the state in providing or denying relief to disaster-induced displaced population (see also Raleigh, 2010, 76).

Regarding the control variables, as expected, we find an inverted U-shaped relationship between the number of past floods events and the risk of social conflict. This suggests that, while past flood events may increase the risk of social conflict, administrative units exposed to recurrent flooding have been able to devise adaptation strategies to reduce the negative impacts of floods.[27] Contrary to our expectation, we find a positive association between the level of development of an administrative unit and the risk of social conflict. In line with our expectations we find, however, that demographically larger administrative units are more at risk of social conflict. Without surprise, the temporal and spatial lag variables are positively and significantly related with the dependent variable, highlighting the importance of diffusion effects.

At the country level, while the coefficient for *anocracy* is positive, albeit not reaching statistical significance, the coefficient for democracy does not behave as expected, as the estimated coefficients suggest that democratic regimes experience more social conflict.

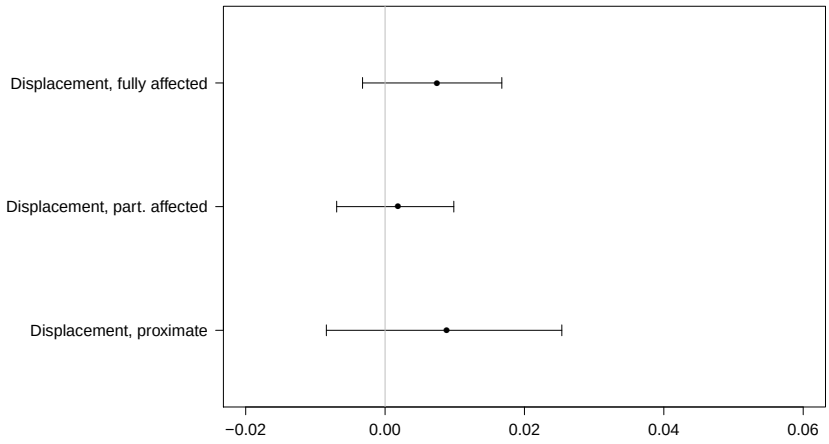
[27] We provide further illustration in Figure 5 in the appendix, which depicts average simulated probabilities at varying levels of past occurrence of floods

Table 1: Logistic Regression - social conflict incidence

	social conflict incidence			
	(Model 1)	(Model 2)	(Model 3)	(Model 4)
Admin level				
disaster displ. (full overlap) t-1	0.552	0.111		−0.027
	(0.392)	(0.529)		(0.560)
* conflict IDPs				12.506***
				(1.043)
flood (full overlap) t-1	−0.227	0.381		0.594
	(0.364)	(0.448)		(0.463)
* conflict IDPs				−12.737***
				(0.713)
disaster displ. (part. overlap) t-1	0.067	0.001		−0.074
	(0.149)	(0.278)		(0.307)
* conflict IDPs				0.491
				(0.766)
flood (partial overlap) t-1	−0.027	0.075		0.193
	(0.132)	(0.253)		(0.280)
* conflict IDPs				−0.627
				(0.712)
disaster displ. (near area) t-1	0.278	1.668***		1.737***
	(0.301)	(0.547)		(0.671)
* conflict IDPs				−0.308
				(0.941)
flood (near area) t-1	0.130	−1.584***		−1.746**
	(0.263)	(0.586)		(0.743)
* conflict IDPs				0.517
				(0.979)
Past floods	0.108***	0.053		0.062
	(0.030)	(0.061)		(0.062)
Past floods ^{2}	−0.010***	−0.004		−0.005
	(0.003)	(0.004)		(0.004)
conflict IDPs			0.318*	0.444**
			(0.164)	(0.210)
income pc (log)	0.675***	0.506***	0.529***	0.532***
	(0.095)	(0.156)	(0.147)	(0.153)
population (log)	0.413***	0.152*	0.160*	0.166*
	(0.047)	(0.085)	(0.083)	(0.088)
temporal lag	0.339***	0.309*	0.313**	0.331**
	(0.078)	(0.159)	(0.157)	(0.160)
spatial lag t-1	1.162***	1.071***	1.070***	1.061***
	(0.067)	(0.145)	(0.146)	(0.148)
Country level				
xpolity t-1	0.018*	0.014	0.011	0.011
	(0.010)	(0.022)	(0.022)	(0.022)
anocracy t-1	0.031	0.042	0.032	0.038
	(0.068)	(0.175)	(0.172)	(0.177)
GDP pc (log) t-1	−0.458***	−0.386***	−0.384***	−0.365**
	(0.070)	(0.144)	(0.137)	(0.143)
GDP growth t-1	0.0001	−0.027	−0.029*	−0.025
	(0.004)	(0.018)	(0.017)	(0.018)
population (log) t-1	−0.161***	−0.022	−0.022	−0.035
	(0.038)	(0.079)	(0.078)	(0.081)
pop growth t-1	−0.110***	−0.209	−0.177	−0.196
	(0.029)	(0.132)	(0.130)	(0.134)
civil war incidence	−0.044	0.213	0.127	0.106
	(0.074)	(0.157)	(0.168)	(0.170)
peace years	Yes	Yes	Yes	Yes
Intercept	−1.320**	0.075	−0.064	−0.252
	(0.671)	(1.519)	(1.470)	(1.528)
Observations	13,179	2,663	2,663	2,663
Log Likelihood	−3,752.403	−847.187	−852.198	−843.302
Akaike Inf. Crit.	7,550.805	1,740.373	1,736.396	1,746.604

Note: *p<0.1; **p<0.05; ***p<0.01

Figure 2: Average predictive differences in conflict probability due to disaster displacement (1991-2011)



However, this may be the consequence of democracies tolerating, and indeed, welcoming demonstrations, while non-democracies might repress them. In addition, the results show that GDP per capita at the country level is associated with a lower risk of social conflict, although no such association is found for economic growth. Unexpectedly, we find that countries with a larger population face a smaller risk of social conflict incidence. A similar relation is also found for the country annual population growth. Finally, despite a negative coefficient, ongoing civil wars do not appear to have any statistically significant effect over the likelihood of disruptive actions.

To assess our other hypotheses, we draw on our data on conflict IDPs, which cover, however, only the period 2008-2011. Consequently, we report in Table 1 first the results of an identical specification as Model 1 estimated, however, on the basis of the reduced time period (2008-2011: Model 2). As in our first model, we find systematically an increased likelihood of conflict in disaster-affected administrative zones provided

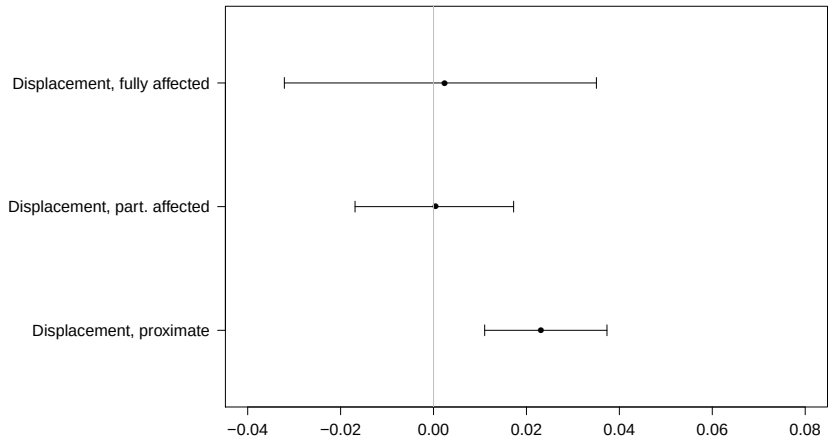
displacement has occurred. This effect, in addition, becomes even statistically significant for those administrative zones nearby a disaster. It appears thus that administrative units located in the direct vicinity of a flood event which has caused displacement, have higher risk of social conflict. This effect, nevertheless, has to be put in relation with the significant decrease in the probability of conflict in zones nearby floods that did not cause significant displacement.

We depict in figure 3 these effects with respect to their impact on average predictive differences in conflict probabilities. Again, we find a positive effects for all three variables, but the distribution of predicted probabilities is only substantially different from zero for nearby areas. On average, if all zones in vicinity to floods had seen displacements, the average probability of social conflict would increase by 0.023. As figure 1 shows, a corollary of the higher frequency of administrative units affected by flood-induced displacement over time, has been that over time administrative zones in the direct vicinity of flood events causing displacement have also become more numerous. Our results might therefore also point to temporal dynamics linked to climate change. This finding has been echoed in a recent study of the Sahel, showing that the scale and frequency of floods has increased over the last quarter of a century (UNEP et al., 2011, 46). The estimates we find for administrative units in the direct vicinity of displacement-inducing flood may point to the fact that larger flood events are likely to cause larger movements of people. Hosting areas may therefore have a higher risk of conflict due to increased competition over resources, such as jobs or housing, and this competition might be linked to ethnicity.

Taking this into account, we next present with the results of model 3 a direct test of whether conflict IDPs increase the likelihood of conflict. As in our previous analysis (Bohnet, Cottier and Hug, 2014), we find that conflict IDPs increase the risk of conflict diffusion, here measured as the incidence of social conflict. This result supports our second hypothesis. The average predicted difference shows that if all administrative units were to host conflict IDPs the average probability of social conflict would increase by 0.026.[28] This finding lends support to the argument developed in section three, regarding the motivational and opportunity structures faced by conflict IDPs.

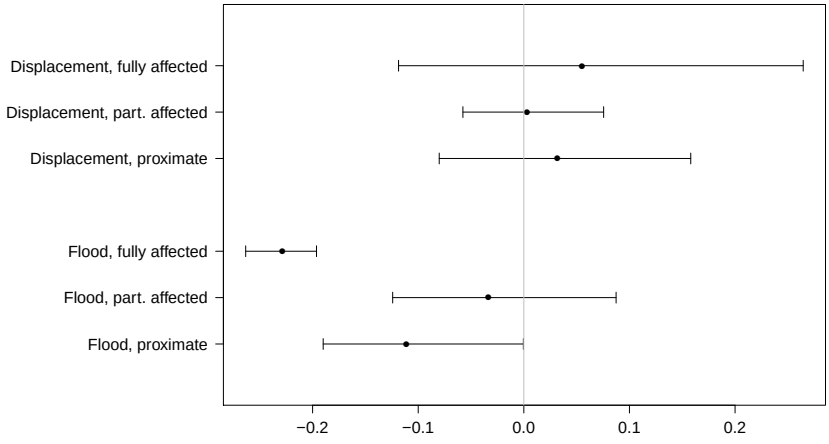
[28]The 95% confidence interval varies between 0.0008 and .0521.

Figure 3: Average predictive differences in conflict probability due to disaster displacements (2008-2011)



Finally, combining the specifications of models 2 and 3, we assess in model 4 our third hypothesis by adding an interaction between the variable for conflict IDPs and our disaster related variables. The estimated effects for the interaction between zones affected by displacement and conflict IDPs are all positive, except for administrative zones in the direct vicinity of a flood event. As model 4 comprises many interaction terms, predictive probabilities are more intuitive to interpret, than the statistical significance of coefficients. Thus, in figure 4 we depict again average predictive differences in the probability of conflict, if administrative units hosting conflict IDPs were affected by floods and flood- induced displacement. Contrary to our third hypothesis, we do not find any evidence that displacement caused by natural disasters in administrative areas hosting population displaced by conflict face an increased risk of conflict. Surprisingly, if floods struck administrative zones hosting displaced persons due to conflict and did not cause displacement, we find an unexpected negative effect for fully affected and nearby

Figure 4: Average predictive differences in conflict probabilities due to disaster and conflict displacement



zones, while no such association is found for areas partially affected by a disaster. This may be suggestive of two distinct causal stories. First, it may interpreted as evidence for the argument that disaster may lead to peace (Kreutz, 2012). Alternatively, it also indicates that an effective state's response to a flood event may prevent population displacement and ultimately bolster support for the state and reduce opportunities (Goldstone, 2001). Yet, the fact that no similar effect has been observed for partially affected administrative units precludes any conclusion.

Comparing these two sets of average predictive differences in conflict probabilities also suggests that the reduced probability of conflict in administrative zones hosting IDPs and fully affected by floods disappears if the flood events also cause renewed displacement. Nevertheless, the results for Model 4 should be seen in light of the estimates for the *conflict IDPs* coefficient, which indicates that administrative units in which conflict IDPs have sought refugee already face an elevated risk of conflict.

In addition, the width of the confidence intervals for the flood-induced displacement variables suggests that omitted variables may affect the joint impact of conflict and flood displacement. We interpret this as further evidence that the state's response to this challenge may have a crucial impact on the likelihood of social conflict. Taken together, Model 4 paints a rather complex picture, which would warrant further analyses.

6 Conclusion

This paper has attempted to contribute to the debate on climate change and conflict by focusing on a specific causal mechanism, namely disaster-induced migration. Despite recent research on the linkage between refugee flows and conflict (Lischer, 2005; Salehyan, 2007) and warnings that the frequency of floods, and other extreme events, will most likely increase (Parry et al., 2007), scholars and policy-makers alike have primarily approached disaster-induced migration through a humanitarian lens, disregarding potential security implications. Drawing on recent research (Hendrix and Salehyan, 2012), this paper has argued that displacement resulting from natural disasters is likely to have an effect on political protest and violence by increasing competition for resources, jobs and housing between displaced and hosting populations, as well as unequal access to aid, a mechanism possibly strengthened by ethnic cleavages. In addition, by disrupting a state's provision of public goods, natural disasters may also provide opportunities for rebel groups and opposition parties.

Paying particular attention to the challenges posed by situations where people have been jointly displaced by conflict and natural disaster, this paper has also attempted to shed light on the distinct implications for security generated by the two types of displacement. In particular, it has raised the possibility that "double displacement" may raise particular challenges to states, by altering the motivations and opportunities to engage in violence.

Our empirical results suggest that contrary to conflict IDPs, disaster-induced displacement does not significantly increase the likelihood of social conflict. Only in one specification did we find that administrative zones in vicinity to floods had a significantly higher probability of conflict if the flood generated displacement. This effect, however,

only materialized for the 2008-2011 period. This might be cautiously interpreted as evidence for an effect linked to climate change, as research has shown that the frequency and scale of floods has increased over time (UNEP et al., 2011). Yet, in the same period, administrative zones in vicinity to floods that did not generate displacement were also much less affected by social conflict.

Conflict displacement, however, clearly increases the likelihood of conflict, as our second hypothesis suggests. Contrary to our third hypothesis conflict IDPs do not heighten conflict risks in administrative zones affected by disaster induced displacement. Nevertheless, the fact that the coefficients for floods were generally negative may be evidence that these are crude proxies for a state's response to a flood event, as better disaster planning, early-warning systems and timely response may dramatically reduce the scale of any displacement. As such, it is our belief that the models suggest that the state's reaction and support to populations affected by natural disasters, such as floods, might have a crucial impact on the likelihood of social conflict. Although the empirical evidence presented in this paper points to a complex relation between migration and conflict, we hope to have shown that disaster-induced migration should not be neglected by researchers and policy-makers alike.

In future versions of the paper, our aim is to investigate further the relationship between disaster-induced displacement and conflict. In particular, we aim at studying if distinct ethnic identities between displaced and host populations may explain conflict. In addition, we would also like to inquire how political inclusion and/or exclusion of either the local or the displaced population might mediate the impact of displacement over conflict, as it has been postulated that the state's response to a disaster is dependent on the state's prior relationship with the area (Raleigh, 2010).

7 Appendix

Table 2 reports the descriptive statistics of the variables used in the analyses presented in the main text. In addition, Table 3 and Table 4 report results for Model 1, when the dependent variable is the incidence of non-state violence and riot only, respectively.

Table 2: Descriptive statistics

Statistic	N	Mean	St. Dev.	Min	Max
Administrative level					
social conflict inc	13,179	0.135	0.342	0	1
social conflict count	13,179	0.318	1.315	0	45
violence inc (non gov)	13,179	0.085	0.279	0	1
violence count (non gov)	13,179	0.154	0.772	0	29
riot inc	13,179	0.054	0.226	0	1
riot count	13,179	0.077	0.400	0	11
disaster displ (full overlap)	13,179	0.037	0.189	0	1
disaster displ (partial overlap)	13,179	0.128	0.334	0	1
disaster displ (near)	13,179	0.026	0.159	0	1
flood (full overlap)	13,179	0.046	0.210	0	1
flood (partial overlap)	13,179	0.178	0.382	0	1
flood (near)	13,179	0.035	0.183	0	1
Past flood count	13,179	2.268	2.501	0	19
admin gdppc (ln)	13,179	1.093	0.678	0.138	5.557
admin pop (ln)	13,179	13.150	1.306	7.497	17.135
spatial lag (social conflict)	13,179	0.307	0.461	0	1
Country level					
xpolity (lag)	13,179	0.078	3.280	−6	7
anocracy (lag)	13,179	0.553	0.497	0	1
country gdppc (ln lag)	13,179	7.431	0.948	5.331	10.216
country gdp growth (lag)	13,179	4.992	6.764	−50.248	106.280
country pop (ln lag)	13,179	16.401	1.234	12.832	18.889
country pop growth (lag)	13,179	2.559	1.070	−7.597	10.258
civil war	13,179	0.367	0.482	0	1
peace years (social conflict)	13,179	7.205	6.209	0	21

Note: summary statistics for model 1

Figure 5: Average simulated probabilities of social conflict - past exposure to floods

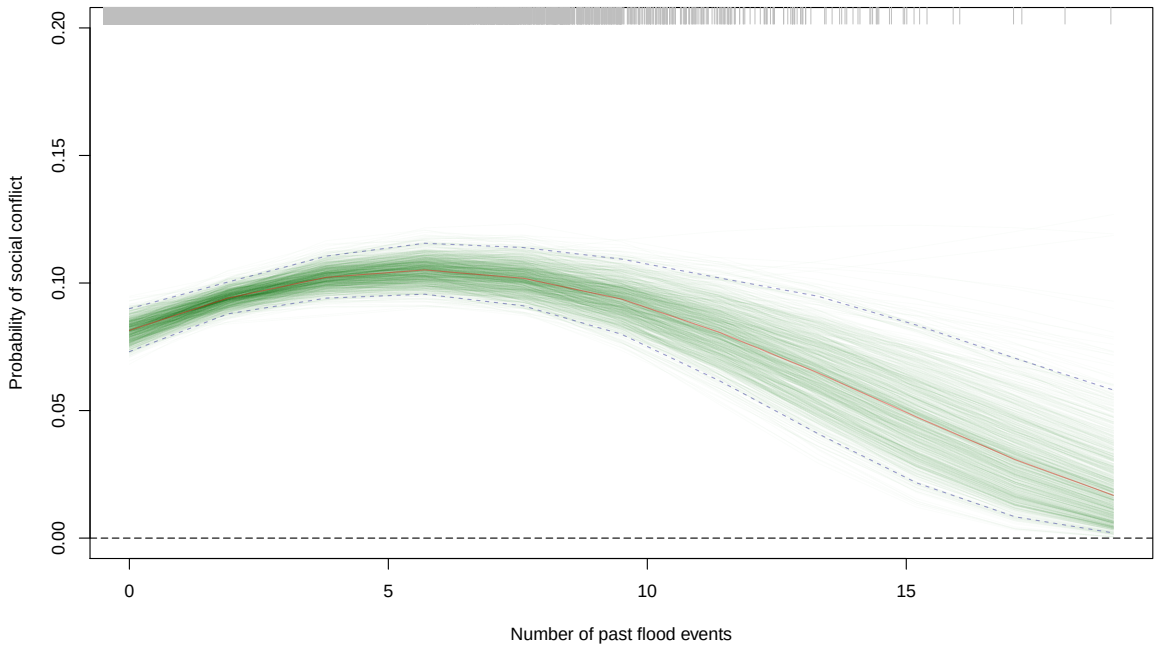


Table 3: Logistic regression - non-state violence incidence

	non-state violence incidence
	Model 5
Admin level	
disaster displ. (full overlap) t-1	0.542
	(0.406)
flood (full overlap) t-1	−0.028
	(0.378)
disaster displ. (part. overlap) t-1	−0.001
	(0.170)
flood (partial overlap) t-1	0.073
	(0.154)
disaster displ. (near area) t-1	0.167
	(0.351)
flood (near area) t-1	0.038
	(0.317)
Past floods	0.123***
	(0.036)
Past floods ^{2}	−0.009***
	(0.003)
income pc (log)	0.468***
	(0.118)
population (log)	0.427***
	(0.053)
temporal lag	0.193
	(0.124)
spatial lag t-1	1.038***
	(0.084)
Country level	
xpolity t-1	0.031**
	(0.012)
anocracy t-1	0.034
	(0.081)
GDP pc (log) t-1	−0.368***
	(0.085)
GDP growth t-1	0.001
	(0.006)
population (log) t-1	−0.068
	(0.045)
pop growth t-1	−0.139***
	(0.035)
civil war incidence	0.005
	(0.085)
peace years	Yes
Intercept	−3.859***
	(0.812)
Observations	13,179
Log Likelihood	−3,021.378
Akaike Inf. Crit.	6,088.757
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 4: Logistic regression - riot incidence

	riot incidence
	Model 6
Admin level	
disaster displ. (full overlap) t-1	0.260
	(0.527)
flood (full overlap) t-1	0.036
	(0.495)
disaster displ. (part. overlap) t-1	−0.296
	(0.202)
flood (partial overlap) t-1	0.128
	(0.180)
disaster displ. (near area) t-1	−0.134
	(0.476)
flood (near area) t-1	0.050
	(0.413)
Past floods	0.059
	(0.044)
Past floods ^{2}	−0.006
	(0.004)
income pc (log)	0.647***
	(0.122)
population (log)	0.595***
	(0.069)
temporal lag	0.233*
	(0.139)
spatial lag t-1	1.325***
	(0.105)
Country level	
xpolity t-1	0.008
	(0.014)
anocracy t-1	−0.132
	(0.099)
GDP pc (log) t-1	−0.443***
	(0.093)
GDP growth t-1	0.008
	(0.008)
population (log) t-1	−0.116**
	(0.059)
pop growth t-1	−0.133***
	(0.040)
civil war incidence	−0.075
	(0.107)
peace years	Yes
Intercept	−5.616***
	(1.006)
Observations	13,179
Log Likelihood	−2,136.730
Akaike Inf. Crit.	4,319.459
Note:	*p<0.1; **p<0.05; ***p<0.01

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