

JSRP Paper 8

CLIMATE CHANGE AND CONFLICT: a systematic evidence review

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Introduction

This paper aims to analyse the evidence for the connections between climate change and violent conflict. This is not an easy undertaking.

For many analysts and journalists, these connections have already been proven. In 2007, United Nations Secretary-General Ban Ki-Moon announced that the conflict in Darfur was the world's first 'climate war'¹ and popular attention is increasing. According to our research, sixteen new books have been listed on Amazon.co.uk since 2009 on the themes of climate change, security, and conflict. Yet, connections between climate change and violent conflict are—at least for now—largely counterfactual; they have not been proven yet. Connecting climate change and conflict depends on how people *assume* environmental change impacts on violent conflict and what people *assume* inevitably drives violent conflict. These underlying assumptions are not always made clear when argument linking violence and climate change are presented.

This paper therefore presents two main levels of analysis. The first level reports what academic research *says* is happening about climate change and violent conflict. The second level then considers *how* these studies make their arguments for linking climate change and conflict. Together, these two stages of analysis allow us to *evaluate the evidence* for whether climate change will accelerate violent conflict, and the likely ways these connections will occur.

The specific questions addressed by this paper are therefore:

- How will climate change impact upon violent conflict, especially in developing countries?
- What are the obvious assumptions in how analysts connect climate change and conflict?

These questions consequently allow us to say what evidence exists, but also comment on the quality of the evidence *by looking at what the alleged evidence aims to prove*. Indeed, our findings suggest that there are strong disagreements in the literature, which reflect different means of explaining the origins of conflict. We argue these models of conflict need to be examined critically, with a detailed understanding of all the elements that cause violent conflict and its continuation, before believing some of the more catastrophic predictions about climate change and conflict.

Method

The research for this paper was conducted using:

- A comprehensive search of academic literature, books, newspaper articles and blogs.
- An evaluation of the nature and quality of evidence presented for linking climate change and violent conflict, and a note of how these links were made
- A critical evaluation of what these writings say about climate change and violent conflict; and how different analysts make these links.

The paper further draws on additional material to provide context for the debate reflected in the systematic literature search. Where additional material is cited that is not drawn from the systematic literature search, this is marked in the text. To use additional material was necessary since the systematic literature mapping as a research method reflected many of the

¹ Ban Ki Moon (2007) 'A climate culprit in Darfur,' *The Washington Post*, 16 June 2007.
<http://www.washingtonpost.com/wp-dyn/content/article/2007/06/15/AR2007061501857.html>

same problems that we debate in this paper: rather than producing a bibliography that comprehensively covers the breadth of issues connected to climate change and violent conflict, the results from the literature survey alone would not allow a more in-depth understanding of the underlying conceptual issues, as most of the literature fails critically to evaluate the models presented, or indeed to engage critically with what kind of evidence is used to present the case for the connection between climate change and conflict.

Evaluating Evidence

Before starting the analysis, this survey thus wanted to acknowledge that evidence itself is a contested notion. Webster's dictionary² defines 'evidence' as 'something that furnishes proof.' But there are two important questions: proof of what? And, when is something proven?

Much writing on climate change and conflict presents some form of evidence. But the evidence provided is based on an underlying model of how climate change causes conflict that might not be explained much less proven. It is therefore important to consider how different authors explain the origin of conflict before looking only at the apparent 'facts' they present as evidence. The risks of assessing evidence without considering what it represents is to get in the habit of assuming a causal link before that link is proven. Another risk is to confuse correlation with causation.

The philosopher of science, Nancy Cartwright (2007) described this challenge in a book called *Hunting Causes and Using Them*. In a later paper specifically about 'evidence' she wrote:

'Nothing can count as evidence for anything except relative to a host of auxiliary assumptions; and the strength with which a body of evidence supports a hypothesis can never be higher than the credibility of these auxiliaries' (Cartwright et al, 2008: 15).³

There is obviously a need to assess the credibility of assumptions that make 'evidence' appear logical. Sometimes, however, it is also necessary to ask whether evidence is furnished to *justify* assumptions, and whether evidence is also *interpreted* according to political agendas. The Harvard professor, Sheila Jasanoff, has written:

'When knowledge is uncertain or ambiguous, as is often the case in science bearing on policy, facts alone are inadequate to compel a choice. Any selection inevitably blends scientific with policy considerations, and policymakers accordingly are forced to look beyond science to legitimate their preferred reading of the evidence' (Jasanoff, 1991: 29).⁴

Simply presenting 'evidence', such as data, is therefore insufficient unless the causal model and manners of interpretation are also assessed. There is a large academic literature about how public policy can influence, and be influenced by, the generation of evidence—and how different actors try to make evidence salient or legitimate (e.g. Turner, 2003).⁵ The case of

² "evidence" Merriam-Webster.com 2011, <http://www.merriam-webster.com> (31 August 2011)

³ Cartwright's work was not found through the literature survey.

⁴ Jasanoff was not found through the literature survey.

⁵ Turner's work was not part of the literature survey.

climate change and conflict seems to be another arena where different analysts present evidence for various models of climate change impact, or origins of conflict, that need to be assessed alongside whichever evidence is presented.

Database searches

With above concerns in mind, systematic database searches of peer-reviewed literature dating from 2001 to the present produced a list of approximately 40 papers that were most relevant.

The following search terms led to this list: “climate change”, “conflict”, “violen*” and “war*”.⁶ The search strategy combined “climate change” with one or more of the terms ‘conflict’, ‘violen*’ and ‘war*’, in order to search for papers which dealt with the claim that climate change causes violent conflict.

We narrowed the search by limiting the results to a group of conflict and climate change affected states: Bangladesh, India, Maldives, Vietnam, Afghanistan, Pakistan, Somalia, Ethiopia, Eritrea, Sudan, Democratic Republic of Congo, Central African Republic, Egypt, Libya and Kenya. These countries are the focus of most of the literature on conflict and climate change. We also took into account expertise within our team and the potential research focus of the JSRP. Table 3 shows the distribution of papers across countries, and how they conceptualise reasons for violent conflict.

At the last stage of the systematic search, we asked a specific inclusion question about each paper: ‘What is the evidence to support claims that climate change will cause violent conflict, with implications for policies and interventions affecting actors at the local (sub-state) level?’ Papers that failed to provide information helpful to answering this question were then eliminated.

Discussion

Compared to other evidence papers written by the JSRP, this team’s search was narrower. The search terms were fewer in number and the inclusion criteria were reasonably strict.

Firstly, the limited amount of search terms meant that most databases allowed us to search in a consistent manner.⁷ Limiting the search terms to “climate change” as opposed to other phrases such as “environmental change” or “global warming” was a conscious decision that prevented the search from returning a high number of irrelevant results. The term “climate change” is relatively comprehensive; the term, “global warming” generally predates “climate change” and is now generally considered a more popular term. “Climate change” also offers a broader range of potential climatic events than temperature rise alone.

One downside of this approach is that some relevant literature that utilised these alternative terms and not “climate change” will have been excluded from our search. Our results suggest, however, that this was not a problem: for example, there were several papers on pastoralist conflicts based on weather patterns.⁸ One may think simply searching via “climate change”

⁶ “*” operates to allow different variations of the ending of a word when searching. Where this was not possible (due to search engine limitations) the terms ‘conflict’, ‘violence’ and ‘war’ were used.

⁷ Other JSRP groups undertaking systematic reviews experienced technical difficulties when attempting to insert complex search strings into search engines, resulting in rather *ad hoc* decision-making. .

⁸ See Omolo (2011) and Blackwell (2010) in the Annotated Bibliography.

and the other search terms these may have been excluded such articles, but this was not the case.

Second, a further concern is that our searches for papers containing the terms “climate change” and “conflict” might miss research that shows how people *avoid* conflict. There is a long-standing literature using terms such as ‘institutions’, ‘adaptation,’ and ‘adaptive capacity’ that focuses on the means by which communities adjust to resource scarcity or use everyday forms of governance that allow people to live with potentially threatening changes. We refer to some examples of this literature in our discussion of ‘adaptation’ below. But it is worth considering how far the debate about climate change and conflict might be informed by papers that assume they are linked—and mention this explicitly in their titles—rather than on other papers that focus instead on life without violence.

Figure 1: Table of country cases and general conceptualisation of violent conflict

	Linear: CC → Conflict (Malthusian)	Regression Analysis	Climate Models	Resource Capture and Economic Marginalization	Exacerbating Existing Risks	Social Differentiation and Vulnerability	Fragile States	Adaptive Behavior to Reduce Conflict	De-emphasize Other Causes of Conflict	Weakening Development Assistance	Critique of CC -> Conflict Link	Other	TOTAL
Afghanistan													
Bangladesh						1	1						2
CAR													
DRC													
Egypt													
Eritrea													
Ethiopia				1	1								2
India													
Kenya				1	1	2		1					6
Libya													
Maldives													
Pakistan													
Somalia													
Sudan										1			1
Vietnam													
Cross Country		4	1		4		1	1	1		1		13
Other	1	1		3			1					1	7
Total	1	5	1	5	6	3	3	2	1	1	1	1	

Third, this method also focused on sources that specifically mentioned these terms, rather than other important conceptual books or writings that have shaped the debate about environmental scarcity and conflict. As we discuss below, some of the studies that link climate change and conflict in linear ways reflect earlier writings that do not specifically focus on climate change alone, but which present a model of conflict that is used by these earlier studies (e.g. Diamond, 2005).

And fourthly, focusing on the local level (sub-state) approach that prioritises the end-user meant that some macro-level empirical evidence was excluded from this search and therefore not assessed. If material failed to engage with what this project has termed ‘end-users’, then we did not attempt to assess its relevance. In practice, this meant that papers that dealt exclusively with macro-level evidence, such as state-level statistics, without analysing its implications for the local level, were excluded.

The impact of this approach is clear when considering the numbers yielded by our search strategy. In many cases, whilst a large number of papers remained after our country-level inclusion criteria, they were cut down dramatically on the basis of whether they were relevant to our research question and end-user focus.

For example, the database ‘Scirus’ produced 621 apparently relevant results, which were then manually reduced to ten results on the basis of these inclusion criteria. Among the 212 potentially relevant articles yielded by the database Columbia International Affairs Online (CIAO), there were no articles that were deemed helpful in answering our question. In this case, the search results were found to offer much macro-level policy analysis but very little engagement on the impact of those policies on end-users. This means that while there may well be much more nuanced debate about the link of conflict and climate change in the literature, little work has been done to collect local-level empirical data to view these arguments from the perspective of the people who are affected by what the researchers identify as either climate change or violent conflict.

The benefit of the research method is its attempt to be systematic by trying to avoid researcher bias. Yet database searches of this type have limitations too. Broadly speaking, such methods have the potential to: neglect grey literature not included in peer-reviewed journals; give a false impression of scientific method whilst leaving considerable room for researcher subjectivity; exclude certain forms of literature whilst encouraging others; and privilege literature that has been filed in a database-friendly way. As discussed above, the methods also fails to find papers that engage with broader underlying, yet crucial questions about the nature of evidence and how it is used.

Widening the search

On the basis of such criticisms, it was necessary to supplement any systematic database led search with alternative search methods.

Books

We conducted a literature search on the online site Amazon.co.uk. Given that this site is not designed for structured literature searches, we restructured and further simplified our methods. This involved using single phrases (e.g. “climate change”) and then manually searching for connections with conflict, violence, and warfare and the focus countries via the title and abstract (if available).

Periodicals

A periodical search was undertaken on LexisNexis, which produced 69 results that linked climate change and conflict. Whilst these articles are not peer-reviewed and therefore are unlikely to demonstrate a substantive evidence base, they remain important for helping to frame the wider debate on the connection between these phenomena.

Key Journal Searches

We supplemented the database searches with a search of key journals in the field (see Appendices). These were compiled on the basis of the team expert's knowledge of the field. These searches were largely conducted manually, going through key journal publications since 2001 and retrieving those papers within our inclusion criteria. In one instance, with the journal '*Nature*', this involved searching in an ad hoc manner in order to best draw out relevant papers.⁹

Discussion of Supplementary Approaches

These further methods supplemented the original search of academic research described above. The results of the Amazon.co.uk search were useful to indicate recent publications on climate change and conflict. But these results were not—so far—fully graded because of a shortage of time, and because it is unclear whether this modified search strategy was a fair representation of books published in this field.

The periodical review was also limited to major newspapers in English. Consequently, many reports noted tended to focus on a narrative that prioritises a global North perspective rather than an end-user perspective from many Southern conflict-affected regions.

Finally, the search of key journals was targeted to draw out relevant papers, but only identified twelve new papers for grading. This small number could imply that the search had already been successful—or that the targeting of key journals was still insufficient. Nonetheless, it showed there is a limited amount of material in these journals on the relationship between climate change and conflict.

Since these additional methods are only supplements to the broader literature search, any drawbacks are not particularly problematic. That said, all of the preceding criticisms of our own research methods indicate the many difficulties in seeking 'objectivity' in the survey. Each critique needs to be recognised in order to increase the quality of research going forward in the JSRP. A stronger focus on books and newspapers could be crucial given their influence in academic and policy environments.

Grading the Literature

The research team then processed the papers identified by the database searches. First, papers were read and summarised. Second, the papers were graded according to the quality and nature of their evidence. (See the Appendices for the methods of how annotated bibliographies were produced). The purpose of grading was to attempt to produce an objective method of assessing evidence. Yet, it should be said at the offset that there is no

⁹ As '*Nature*' is a weekly journal, it made more sense to utilise its search functionality rather than go through it manually. This search function only allowed two terms at once, so three separate searches were undertaken: "climate change" AND "conflict", "climate change" AND "war", "climate change" AND "violence".

possibility of totally eliminating researcher subjectivity in this grading process. Evidence itself reflects the underlying assumptions of cause-and-effect adopted by the authors of papers. Plus, different researchers will interpret papers and evidence according to their own judgment and training. The research team held discussions to agree on some common understandings of how to assess evidence but some personal biases remain.

The assessment of evidence followed the same procedure for other evidence papers by the JSRP with one addition that related to the underlying model of cause-and-effect relating to climate change impacts assumed in each paper. The research team therefore appended the following statements, which required grading between the parameters of ‘strongly disagree’ to ‘strongly agree’:

The underlying model of what contributes to conflict is clearly and transparently described.
The author reviews this underlying model critically
The underlying model is used consistently: evidence is presented in context of the model and predictions of the model are consistently used to interpret evidence.

This additional layer of analysis allows us to move beyond exactly *what* is being said (and then grading it) and into the question of *how* certain papers make links between climate change and conflict. Particularly within the climate change and conflict debate it is important to analyse not only the evidence being used, but exactly what kind of evidence is being presented for what underlying assumption of how climate change might cause violent conflict. In addition, the team also assessed the consistency of how evidence was used, and its role in making the argument of each paper. Indeed, as discussed above, these questions about ‘evidence’ are more important in evaluating the connections of climate change and violent conflict than simply grading the apparent quality of evidence alone.

Analysis

What is the Evidence?

This section summarises:

- Different models of conflict for which evidence is presented
- A description of the type of evidence presented
- An evaluation of the quality of evidence presented

This section does not summarise *all* the books, papers, and blogs analysed in our study, but reports on the main trends and cites useful examples. Please see the appendices for full details of our sources. The next section on implications considers lessons for understanding and governing climate change and conflict.

Different approaches to climate change and conflict

As discussed above, different studies present different evidence about climate change and conflict based upon assumptions about the causes of conflict. We found three key categories within the literature.

a) Studies that claimed direct, linear, causal linkages between environmental change, scarcity, and violent conflict, usually based on assumptions about population growth and how societies respond to competition for resources. These studies have been used (if not necessarily proven) mostly in relation to well-known examples of conflict such as Darfur and Rwanda, and have been used to generalise about fragile states. **Figure 2**, drawn from an additional source by Scheffran, is a good example of how this linear relationship between environmental change and violence is often presented.

b) Studies that emphasise indirect linkages between climate change and conflict. These studies do not assume that conflict is an inevitable outcome, but emphasise the role of local institutions and behaviors within countries and societies that lessen conflict in the event of environmental change and scarcity. These studies often refer to concepts such as adaptation and adaptive capacity, and explain in terms of how local institutions concerning resources such as cattle might break down and lead to activities such as cattle raiding. Some of these studies look at migration as a result of climate change for example. An alarmingly simplified depiction of the linkages can be seen in **Figure 3**, as presented by the German Advisory Council on Global Change (WBGU) (2007). (<http://www.wbgu.de/en/home/>)

c) Studies that highlight the politics of how climate change and conflict are themselves presented. These studies are often critical of predictions of extreme violence in the first category because these are seen to be misleading and unhelpful for countries affected. These studies tend to be written with a more complex understanding of what violent conflict is, and how evidence itself can be used politically.

These three categories also indicate three broad models of cause-and-effect for climate change and conflict that are used by writers to generate or present evidence. Table 2 shows a quick summary of these causal models, while Table 1 gives an overview of the method of quantification that is used to draw connections between climate change and violent conflict.

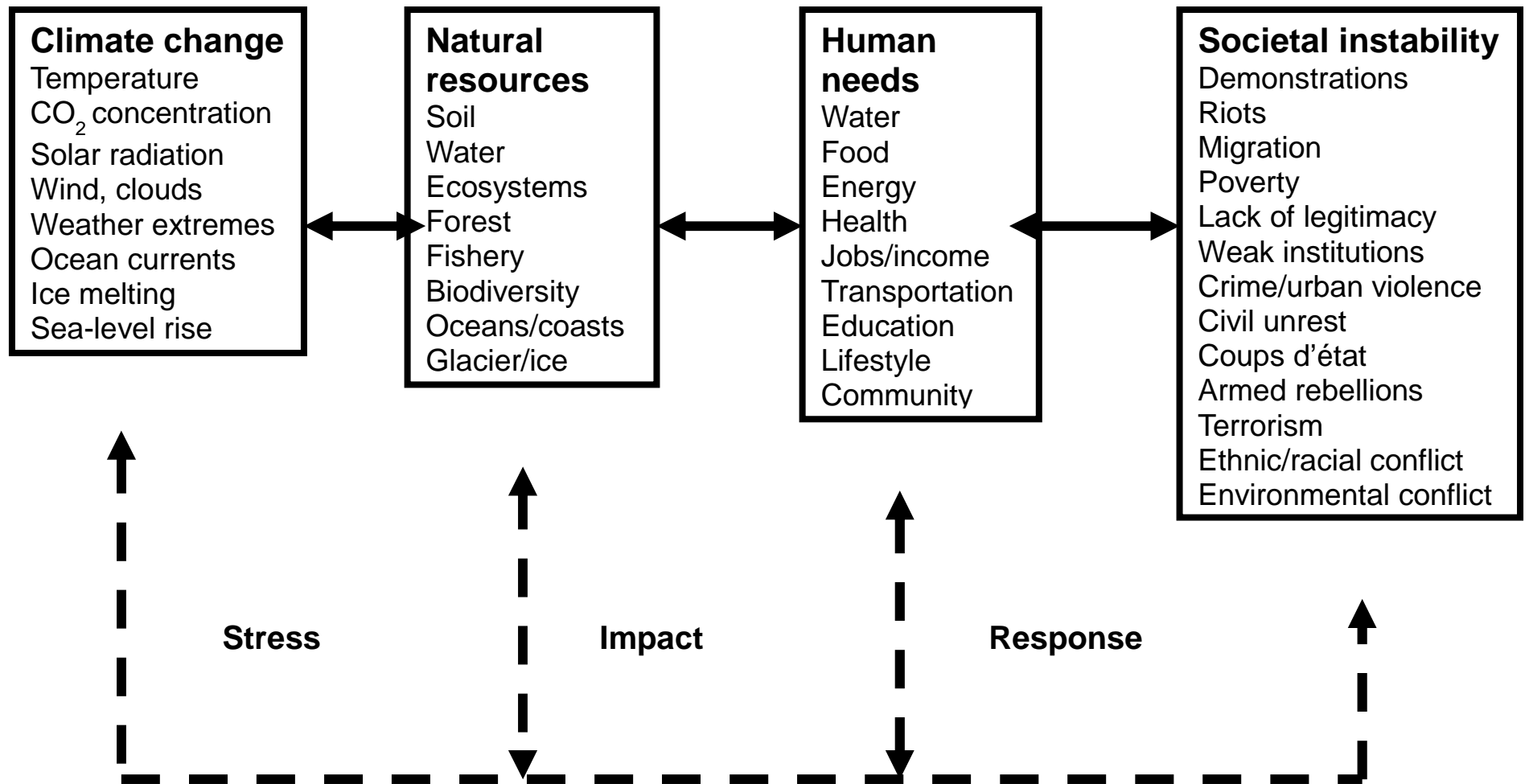
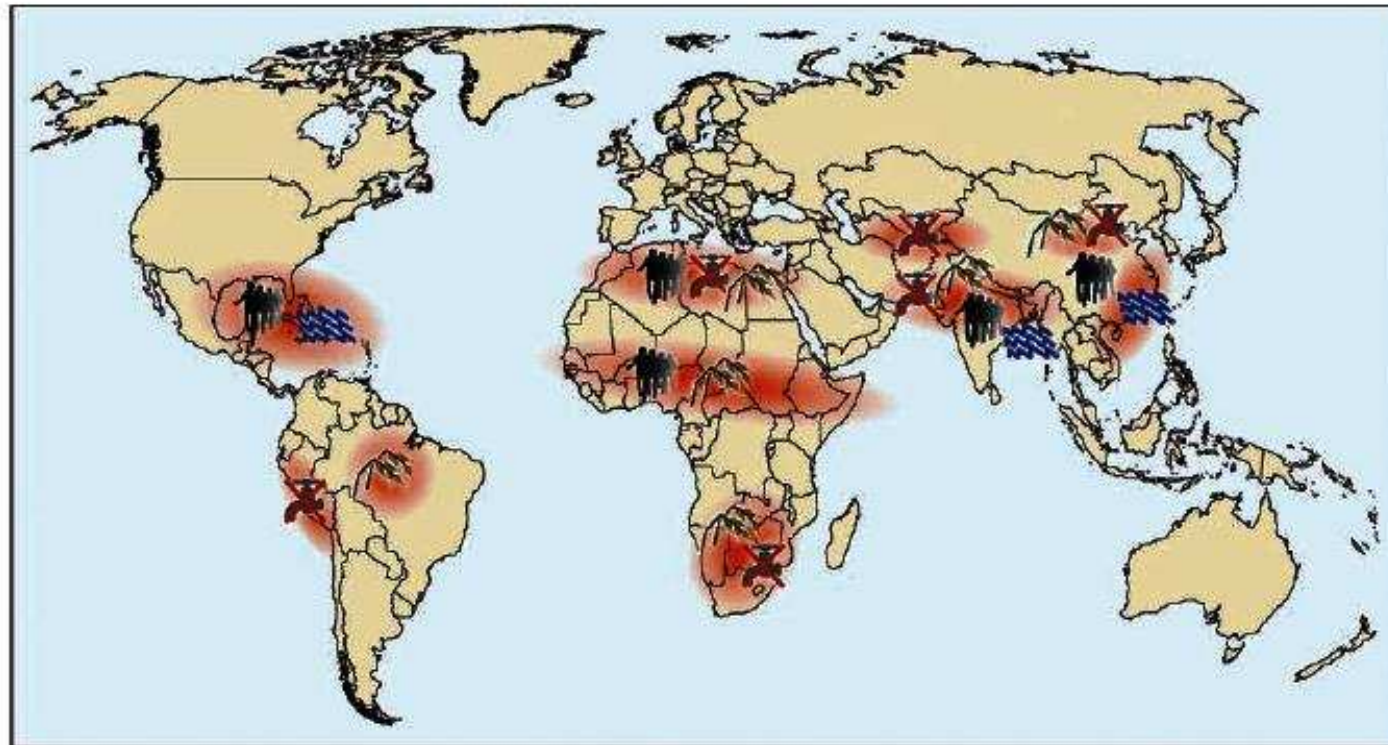


Figure 2: Example of depicting a linear causal relationship between climate change and violence

Figure 3: Example of depicting linkages between climate change and conflict

Security risks associated with climate change: Selected hotspots



The map only shows the regions which are dealt with in the WBGU report 2007 and which could develop into crisis hotspots.

Source: German Advisory Council on Global Change WBGU (2007): *Climate Change as a Security Risk*.

Conflict constellations in selected hotspots



Climate-induced degradation of freshwater resources



Climate-induced decline in food production



Hotspot



Climate-induced increase in storm and flood disasters



Environmentally-induced migration

Table 1: Method of quantification of climate change

The table below summarises what kind of data is used, or in other words how climate change is quantified, in the papers found through the systematic literature search. Some papers use various methods of quantification.

Method of quantification of CLIMATE CHANGE	Papers found in this category	# papers
GIS	Raleigh and Urdal (2007)	1
Event-based: sea level change	Dankleman et al. (2008; Federal Ministry for Environment (2002); Huser and Larsen (2008); Allouche (2011)	4
Event-based: precipitation	Kevane and Gray (2008); Brown and Crawford (2009); Dankleman et al. (2008); Federal Ministry for Environment (2002); Hall (2009); Huser and Larsen (2008); Meier et al. (2007); Omolo (2010); Temesgen (2010); Theisen (2008); Hendrix and Glaser (2007)	11
Event-based: land degradation	Theisen (2008); Hendrix and Glaser (2007); Dankleman et al. (2008)	3
Event-based: temperature	Burke et al. (2009); Brown and Crawford (2009); Dankleman et al. (2008); Federal Ministry for Environment (2002); Omolo (2010); Tol and Wagner (2008)	6
Event-based: extreme weather events and sudden disasters	Allouche (2011); Federal Ministry for Environment (2002); Huser and Larsen (2008), Meier et al. (2007); Reuveny (2007)	5

Method of quantification of CONFLICT	Papers found in this category	# papers
UCDP or similar	Raleigh and Urdal (2007); Raleigh (2010); Temesgen (2010); Hendrix and Glaser (2007)	4
Event-based	Hendrix and Glaser (2007); Obioha (2008); Witenburg and Adano (2009); Meier et al. (2007); Reuveny (2007); Theisen (2008); Tol and Wagner (2008)	1
Survey-based	Omolo (2010);	1
Participatory	Omolo (2010); Temesgen (2010)	2

From these methods of quantification, three broad models of conflict are evident in the literature. Please note:

- The first category included most studies analysed in this paper.
- It is also possible that the second category might include many more reports that do not have the words ‘conflict,’ ‘violence,’ and ‘war’ in the title (such as many writings on ‘adaptation’).

- It is possible for the second model to overlap with the first and third model. But it is not possible for the first and third model to co-exist.

Table 2: Three broad models of conflict found in the literature

Model:	Linear	Indirect	Critical
Underlying assumption	Climate change will change rainfall and degrade land and vegetation in locations where societies will use violent conflict to compete for resources.	Climate change will cause various, impacts on resources. But changes will only cause conflict where opportunistic actors break local formal and informal institutions, and sometimes where resources are more abundant.	The current public debate about climate change and conflict deliberately avoids existing research about the nature and causes of conflict in order to make donors support different objectives. A more nuanced understanding of conflict is needed.
Typical trigger of conflict	When land or water become unusable, people will claim resources elsewhere.	When land becomes unusable, and / or when opportunities for resource expropriation arise.	Conflict is possible, but when local adaptive capacity is missing, or eroded through cost cutting.
Typical type of conflict	War, raiding, and in some studies, genocide.	For example, cattle raiding during relatively wetter years. Conflict over land rights.	Indirect forms of conflict are possible, but the extreme projections of violence are misleading.
Implication for policy	Climate change must be stopped; potential conflict must be controlled strongly.	Build adaptive capacity, and local conflict resolution mechanisms.	Build adaptive capacity and locally relevant development; do not listen to the self-interested scaremongers.
Alleged criticisms from other studies	These studies simplify the complexity of environmental change; the existing and future adaptive capacity of societies; and the extent to which some actors want to portray conflict in order to legitimise their own agendas.	These studies overlook projections that climate change will change resources to levels beyond local adaptive capacity.	These studies do not take seriously the likely impacts of climate change on conflict. Strong state-led or military control is reasonable.
Example references	Diamond (2005), UNEP (2007)	Meier et al (2007)	Hartmann (2010)

(a) Linear models of conflict

The first category can be called linear models because they assume that environmental change leads directly to conflict. Various strands of each causal model were found.

Malthusian stories

Malthusian approaches are named after the 18th-century British cleric, Thomas Malthus, who argued that population growth will lead to sharp population falls as the result of scarcity, famine, and conflict. There is a history of political analysis about Africa in this vein. For example the US writers, Robert Kaplan (1994) and Paul Ehrlich (1990) have emphasised cumulative problems that they argue arise from population growth, ethnic tensions, and weak state structures. Such arguments, along with an often-repeated assumption that Africans are more prone to have violent conflict, have been widely questioned by other scholars for simplifying and stereotyping Africa in this way, often arguing that this is more an issue of 'Western' fears being superimposed onto African issues.¹⁰

Some of the most prominent writing on environmental conflict in general is Malthusian (or neo-Malthusian) in nature. One of the best-selling books on environment in recent years was *Collapse: How societies choose to fail or succeed*, by Jared Diamond (2005).¹¹ This book presented a model of conflict driven by population growth in irresponsible states in developing countries.

Problems of deforestation, water shortage, and soil degradation in the Third World foster wars there and drive legal asylum seekers and illegal emigrants to the First World from the Third World (498).

He also labelled the links between environmental stress and conflict as 'transparent:'

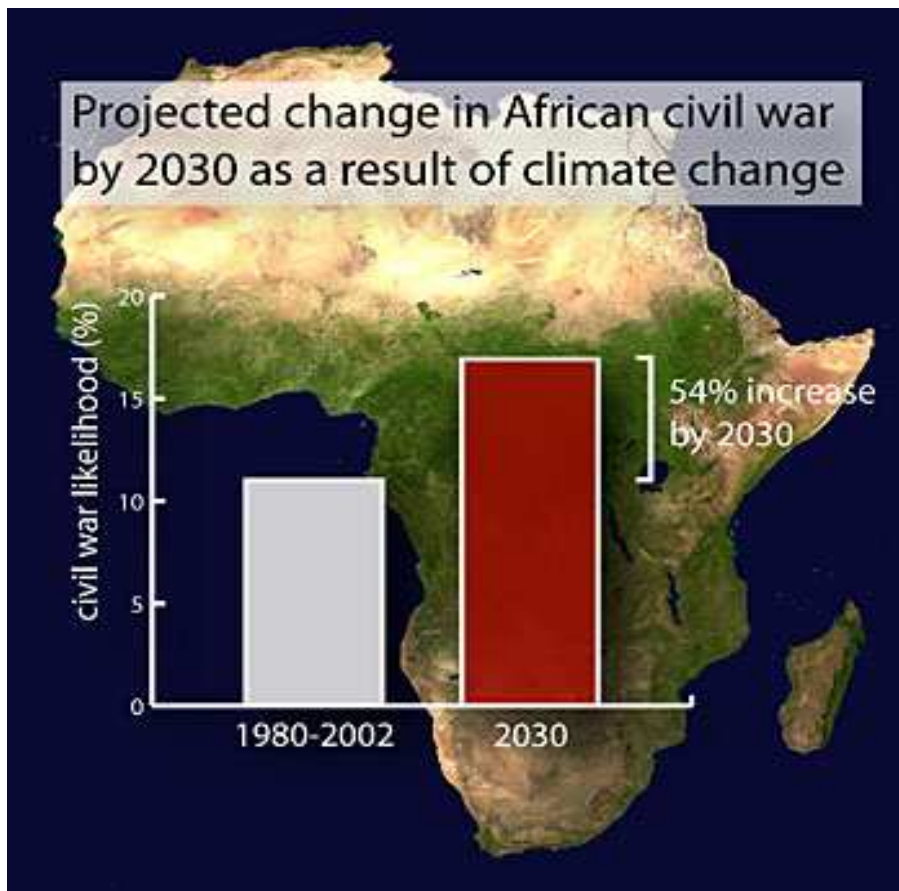
Countries that are environmentally stressed, overpopulated, or both become at risk of getting politically stressed, and of their governments collapsing. When people are desperate, undernourished, and without hope, they blame their governments, which they see as responsible for or unable to solve their problems. They try to emigrate at any cost. They fight each other over land. They kill each other. They start civil wars. They figure that they have nothing to lose, so they become terrorists, or they support or tolerate terrorism. The results of these transparent connections are genocides...civil wars or revolutions... the collapse of central government... and overwhelming poverty (516).

It should be made clear that Diamond's statements here are controversial, and challenged by various other studies we refer to. But this study is a useful starting point because it demonstrates the statement of a model of conflict as an assumed fact. An example of how this model of conflict assumes an unchallenged link between climate change and conflict is depicted graphically can be found in the example below from a press release of the University of Berkeley (2009), which makes a stark prediction without referring to any data at all to back up this claim.

¹⁰ See, for example, Mbembe 2001; Mkandawire 2002; Whitehead, 2004; Wainaina, 2005 Dominelli 2007; Mamdani, 2009; Schomerus, 2010.

¹¹ Diamond is not included in the bibliography compiled for this evidence paper, presumably because his lack of local-level empirical data would have excluded him.

Figure 4: Example of prediction of climate change conflict (Burke *et al*, 2009¹²)



Source: http://berkeley.edu/news/media/releases/2009/11/23_africa_climate_change.shtml

Diamond's book presents evidence for the 'transparent' connection between environmental change and conflict by presenting narrative histories of how various societies have (allegedly) managed population growth or forest cover over time (Easter Island and Rwanda are examples of societies that have led to societal collapse). But these histories are based on the application of universal cause-and-effect statements between forest loss and soil erosion; the impacts of these on agricultural productivity; and the resulting creation of conflict and collapse that do not reflect other scientific discussions of these processes. They furthermore ignore examples of local coping mechanisms, which can be particularly strong conflict mitigators in a so-called weak state.

In turn, these statements refer to a wider discussion about scientific explanation in environmental change that does not only refer to the impacts of climate change. 'Erosion,' for example, is a highly varied problem, and it need not be the only cause of agricultural problems in developing countries. Yet, many scientists have become used to assuming it is, in part because the normal means of measuring is called the 'Universal Soil Loss Equation,' which in turn was based upon the experience of the USA in the Dust Bowl in the 1930s that

¹² Maclay, K. (2009) 'Climate change could boost incidence of civil war in Africa, study finds,' *UCBerkeleyNews*, 23 November 2009. This website was not found in the literature search, but the paper it reports (Burke *et al*. 2009) was included.

are not necessarily transferable to other locations. Similarly, the same discussions also show that forest cover is not necessarily the key cause of erosion, and that many locations that have successfully converted tree-covered land into agriculture have prospered.

Books such as *Collapse* make arguments, and present evidence for these arguments, on the basis of causal assumptions that are widely questionable and have been criticised by other studies both before and after its publication (e.g. Peluso and Watts, 2001).¹³ Yet, these underlying causal models are not questioned in the book, nor discussed within popular audiences. The uncertainty about the underlying causal model is therefore important for assessing the quality of the ‘evidence’ presented for the connections between environmental change and conflict.

A similar influential study was the report by the United Nations Environment Programme (UNEP, 2007) that the UN Secretary General, Ban Ki-Moon used to claim that Darfur is the world’s first ‘climate war’.¹⁴ This report also adopts a very Malthusian tone, but also provides a variety of knowledge sources, and points to the problems of pre-existing political tensions and that contribute to crisis. For this reason, this report by UNEP could also be included in the second category of ‘indirect’ links between climate change and conflict. But we include it in this initial category because the report clearly indicates that environmental change (including climate change) is the key trigger for conflict.

The report writes:

‘UNEP’s analysis shows that there is a very strong link between land degradation, desertification and conflict in Darfur. Northern Darfur—where exponential population growth and related environmental stress have created the conditions for conflicts to be triggered and sustained by political, tribal or ethnic differences—can be considered a tragic example of the social breakdown that can result from ecological collapse. Long-term peace in the region will not be possible unless these underlying and closely linked environmental and livelihood issues are resolved’ (95).

It also states that deserts in Sudan and the Sahel have spread southwards by an average of 100km over the past four decades, linked to an explosion of livestock during this period from some 27 million to 135 million on fragile soils. This report also cites climate models that predict long-term declines in agricultural productivity for the Sahel (UNEP, 2007: 61):

And:

‘The scale of historical climate change as recorded in Northern Darfur is almost unprecedented: the reduction in rainfall has turned millions of hectares of already marginal semi-desert grazing land into desert. The impact of climate change is considered to be directly related to the conflict in the region, as desertification has added significantly to the stress on the livelihoods of pastoralist societies, forcing them to move south to find pasture’ (60).

This report by UNEP provides much information about rapid environmental change. Yet, UNEP’s use of terms such as desertification has been criticised in the past for overstating physical change as a cause of social problems, rather than other factors such as social

¹³ This article was not found through the systematic literature search.

¹⁴ This report was not found through the systematic literature search.

vulnerability to drought, and indeed the scientific uncertainty about the origins of drought and movements in vegetation on desert margins (e.g. Thomas and Middleton, 1994—although this critique too has its critics). As we note in section [c] below, there are also studies that show the long-term nature of the drought in the Sahel that implies degradation is not necessarily the result of humans alone, and that the physical causes of change are still contested (e.g. Dai et al, 2004).¹⁵

This report, nonetheless, is an in-depth description of crisis in Sudan, which argues for adaptive capacity to strengthen livelihood options in order to mitigate conflict. There is, however, an assumption that environmental changes are largely the result of human actions; that climate change has caused both degradation and conflict; and a general lack of discussion of alternative explanations of conflict. As we discuss in section [c] below, some critics have argued these assumptions underplay the responsibility of other actors, such as militias and the Sudanese state, in conflict (e.g. Kevane and Gray, 2008).

We shall return to this book in section [c] concerning criticisms of linkages between climate change and conflict. But it is also worth noting that the direct—and catastrophic—linkages of climate change and conflict are frequently adopted in some other recent books, and especially blogs on climate change. For example, *Tropic of chaos: Climate change and the new geography of violence* (Parenti, 2011), or the lengthily-titled, *Boiling point: How politicians, big oil and coal, journalists, and activists have fueled the climate crisis—and what we can do to avert disaster* by Ross Gelbspan (2004) tend to emphasise the sensational. These works include a variety of overtly populist and academic texts. It is important to ask how far the risk of worst-case scenarios might zoom in on only a handful of simple possible solutions and hide discussion of less volatile outcomes. Another question is whether authors are motivated by sensationalism, and possible impacts on book sales. Gelbspan—who himself has a career in journalism—suggests as much when he writes:

‘the climate issue is riven with conflict at every level—and conflict is, if nothing else, the lifeblood of journalism. ... To sidestep this story is to deprive oneself of an extraordinary professional challenge’ (Gelbspan, 2004: 85).

Assessing ‘evidence’ for the connections between climate change and conflict therefore needs to consider why, and on what grounds, writers make different claims.

We discuss more on how to interpret evidence in the section, ‘Implications’ below. But it is also worth noting at this stage that most of the studies coming from military sources also tend to adopt the perspective that climate change will lead inevitably to violent conflict. The implications of this are a securitisation of climate change, as well as a focus on solutions to the violence ‘proven’ to be caused by climate change through the means of the military. For example, one study by Hall (2009) from the Advanced Military Studies program in Fort Leavenworth, Kansas, argued that the reduction of water levels in Lake Chad will increase regional conflict. According to the author at some point the effects of population growth, migration into the system, climate change and refugees will ‘destabilise the system.’ Again, this long work is speculative, based on a causal model that resource scarcity will be responded to by violent conflict. This paper also presents a good example of how conflict narratives are shaped: Hall argues a linear progression of events and effect, ending with a relatively simple prediction of conflict that legitimises a relatively simple solution to be

¹⁵ Both Thomas and Middleton as well as Dai are additional sources not found through the systematic search.

found in the water levels of Lake Chad. We will return to the theme of presenting conflict as a linear, primarily security, issue with simple, primarily military, solutions later in this paper.

Regression analysis

Many studies using regression analysis have also adopted a causal model that assumes environmental change will lead directly to conflict or failing governance. These studies are different to the Malthusian stories above because they seek to investigate historic associations of various indicators of environmental quality and political outcomes, using samples of several statistics, rather than narratives about case studies. However, these studies pay little attention to historical adaptation strategies and, crucially, historical political environments that might have influenced political outcomes. They also make very broad assumptions about what aspects of environmental quality might lead to conflict.

For example, Hauge and Ellingsen (1998), in a large-n study found that land degradation, freshwater scarcity, population density and deforestation increase the risk of civil conflict. In a style of research broadly similar to Paul Collier's regression analysis of natural resources exports and conflict (Collier & Hoeffler, 1998; Collier, 2000), this paper used secondary, national-scale statistics of factors such as forest cover, soil degradation, visible forms of conflict, and the type of democracy within each country.¹⁶

This study was then re-assessed by Theissen in 2008, who instead argued that the statistics did not support the conclusions made in 1998 and that conflict was more attributable to poverty and dysfunctional social and political institutions. Yet, both papers assume it is feasible to measure environmental degradation and quality through indicators such as forest cover, and using national statistics. The point is that these kinds of studies analyse the alleged causes of conflict by using indicators of things they consider to be problematic. But the choice of these causal factors is controversial in themselves. Indeed, forest cover, in itself, has been linked to increases in conflict when it is composed of tree plantations (Gerber, 2010). Plus successful human settlement has often followed the conversion of forest in both developed and developing countries. Assuming that decrease in forest cover, by itself, is a legitimate cause of conflict is an assumption that needs to be justified much more than currently done by these kinds of papers.

Moreover, these papers fail to use information at a more local scale, and do not assess how affected people actually experience these factors. In a conflict area, the local manifestation of the 'type of democracy' tends to look rather different than to categories that seem fitting at the state level.

There are various other studies that consider the connections between diverse variables and violent conflict. Hendrix and Glaser (2007), for example, develop a model of conflict based upon projected trends in land degradation, the continued suitability of climate for Eurasian agriculture, and freshwater resources per capita mapped against an indicator of how far rainfall is projected to vary in coming years. A great deal of empirical data is presented to good effect, attempting to demonstrate (contrary to conventional wisdom) that variability in climate patterns in sub-Saharan Africa will not dramatically increase in the coming years. However, the authors' arguments are premised on the assumption that such variability would necessarily increase conflict, an assumption that they do not critically challenge.

¹⁶ Collier and Collier and Hoeffler were not found through the systematic literature search.

Raleigh and Urdal (2007) also use GIS data and information at the sub-national scale. They argue that population growth and density are associated with increased risk of conflict; while land degradation and water scarcity have a very minor effect. Lower levels of GDP were the most important predictor of armed conflict. This study is valuable because it shows that regression analysis can be done at the sub-national level. It emphasises a different outcome to the regression studies above by arguing that conflict is not a necessary outcome of climate change, and by suggesting that adaptive capacity (indicated here by wealth) is more important.

Climate models

A similar linear model has been adopted under various studies that predict violent conflict on the basis of climate models. For example, Burke et al (2008) used a quantitative analysis of historical temperature patterns in order to predict changes in the incidence of civil war in Africa under future climate change. They combine their estimated historical response of conflict to climate with climate projections from 20 general circulation models that have contributed to the World Climate Research Program's Coupled Model Intercomparison Project phase 3. The authors' conclusions are dramatic—arguing that the dangers of temperature increases far outweigh any potentially offsetting effects such as 'strong economic growth and continued democratisation.'

Similarly, the UNEP (2007: 61) report referred to above also reports on pre-existing UNEP research on climate models, based on a 'baseline climate' rainfall and temperature data between 1961 and 1990, and then various modeled scenarios for 2030-2060. The model predicted a 0.5 to 1.5°C rise in average annual temperature and an approximate five percent decline in rainfall. Using these figures to predict crop yields in sorghum, millet, and gum Arabic led to 'potentially disastrous' declines of up to 70 percent in some districts.

There is a long-standing debate, however, about how far these kinds of modeled predictions will lead to human impacts in the terms they describe. The main challenge is in predicting how far human adaptive capacity can respond to these challenges, or whether projected physical changes will imply direct and parallel impacts in current levels of economic activity (Reynolds et al, 2007). Much historic analysis reveals that measuring climatic change alone is rarely a good indicator of how markets and people respond to these changes (e.g. Adams and Mortimore, 1999).¹⁷ On the other hand, modelers claim that the rapidity of climate change will mean that current forms of adaptation are unlikely to work successfully. Working out how to adapt, however, needs information about how societies and different actors actually see and respond to scarcity, which projections based on climate models fail to do.

A more recent set of research considers the role of El Niño¹⁸ on conflict.¹⁹ Hsiang et al (2011) analysed the relationship of El Niño and war, concluding that El Niño doubles the risk of civil wars across 90 affected tropical countries. They also claim that El Niño helps account for a fifth of world conflicts between 1950 and 2004. The authors—who are from the Columbia University Earth Institute headed by Jeff Sachs—claimed a correlation of El Niño

¹⁷ Neither Reynolds nor Adams and Mortimore were found through the systematic search.

¹⁸ El Niño is the name given to the periodic warming of the tropical Pacific Ocean every three to seven years that has various connected impacts such as droughts and temperature changes across the globe. The related phenomenon, La Niña, originates from relative cooling of the eastern Pacific. La Niña often follows El Niño.

¹⁹ None of the material on El Niño cited here was found through the systematic literature search.

and civil conflicts that killed more than 25 people per year, using a dataset of 175 countries and 234 conflicts. They argued that countries affected by El Niño have a six percent chance of civil war breaking out, and a three percent chance during La Niña. (As a control, countries without either La Niña or El Niño stand a two percent chance of war). The authors claim that, overall, El Niño has played a role in between 21-30 percent of civil wars during this period.

One of the authors was reported as saying:

‘No one should take this to say that climate is our fate. Rather, this is compelling evidence that it has a measurable influence on how much people fight overall... It is not the only factor—you have to consider politics, economics, all kinds of other things’ (Mark Cane, 2011).²⁰

Yet, this study does not consider those other things, and instead is based on correlation of atmospheric events, and measurements of conflicts (within a national scale) that killed more than 25 people. Do these statistics prove causality, or are the climatic and conflict events only associated—and the indicator of conflict (25 deaths, nationally, per year) too simple? Again, this kind of study shows the importance of assessing the underlying model of causality as well as ‘evidence’ by itself. It is worth noting the lead author, in the same article, reportedly claimed they still did not know why climate feeds conflict, adding:

‘If you have social inequality, people are poor, and there are underlying tensions, it seems that climate can deliver the knockout punch’ (Hsiang, 2011).

Accordingly, is their research evidence of how El Niño causes conflict—or that ‘inequality, poverty, and underlying tensions’ cause conflict?

Studies such as these present their findings as evidence of a linear link between atmospheric changes and localised, socio-political changes in diverse contexts on the ground. Yet, they fail to engage in depth with historical political conditions. Moreover, the implication of these studies is that conflicts can be avoided if climate can be managed. As the second and third section of our review of climate studies show, many other analysts argue that a more useful approach is to address local vulnerability and governance. Some analysts also propose that it is important to question why so much research avoids discussing adaptive practices and local politics. (See section [b] below).

(b) Indirect models of conflict

The second broad category of studies assumes that climate change can be associated indirectly with conflict. These studies focus less on direct linkages between climate change and violent conflict but instead emphasise social practices (sometimes called institutions) and social vulnerability (sometimes called adaptive capacity) as mediating factors. In turn, these studies of climate change tend to propose solutions that do not just limit the potential physical impacts of climate change but also include building local adaptive capacity and conflict resolution.

²⁰ <http://www.sciencedaily.com/releases/2011/08/110824131527.htm>

Some of these studies are equally pessimistic to the Malthusian approaches listed above. Some, however, argue that local practices can mediate conflict, and as a consequence, the most important contribution of climate change policy is to help build those practices, rather than assume that climate change will lead inevitably to conflict and deduct from that that the only way to mitigate or prevent conflict is through environmental measures.

There is also a methodological difficulty here. As we noted in the discussion on methodology, our study focuses on books and papers with the words ‘conflict’, ‘violence,’ and ‘war’ in the titles. These sources tend to assume that conflict is a likely outcome from climate change. There are, of course, many other books and papers that talk instead about ‘adaptation’ (or adaptive capacity) where the focus of study is how people live *without* conflict. Our study, therefore, might present a bias by not acknowledging the large literature about climate change impacts that do not mention conflict and security explicitly. Some of these studies on adaptation and the possibility to experience research scarcity without conflict are also referred to in section [c] below on studies that critique links between climate change and conflict.

Resource capture and ecological marginalisation

The majority of literature on institutional controls on conflict discussed the negative impacts of climate change on competition for resources, and how these impacted on existing political divisions. These studies can look similar to, and have the same pessimism as, the Malthusian studies above. But we are treating them as different because they tend to explain environmental degradation in terms of what it means for different people, rather than assuming environmental change to be a visible and uniformly affective cause of change.

Much of the literature on the institutional conflicts associated with climate change overlaps with other writings about conflict and ‘natural resources’—where resources are defined as tradable and transportable commodities such as logs and gemstones (sometimes this distinction is referred to as lootable and unlootable resources). In some senses there were also direct similarities when papers argued that climate change would lead to an increase in stealing cattle. A common influence in the writings is the work of Thomas Homer-Dixon in the 1990s (e.g. Homer-Dixon, 1999), who used the concepts of resource capture and ecological marginalisation to refer to, respectively, the political opportunities for control from elites arising from resource scarcity, and the retreat of people from resource-scarce areas into fragile ecosystems, thus creating further environmental challenges.²¹

In a similar vein, Obioha (2008) critically analyses the Homer-Dixon/Malthusian link between climate change-conflict in northeastern Nigeria. This study finds that resource scarcity exacerbates group identity conflicts in the region, particularly among those who practice animal husbandry, which contributes to the indigeneity-based conflicts occurring throughout Nigeria.

Raleigh (2010) analyses an overview of African Sahel and argues that political and economic marginalisation/vulnerability is a critical control on whether conflict will occur. This paper, however, is based on existing databases in the same style of the regression analyses above,

²¹ Homer-Dixon’s work did not appear through the systematic literature search, but was referred to in some articles.

which in turn carry assumptions about the causal models of conflict (and the nature of environmental degradation).

But Meier et al (2007) provide a paper that challenges this perspective. This study looked at the motivations of people involved in conflict in the border regions of Ethiopia, Kenya, and Uganda—and thus takes into account local political dynamics—rather than statistical associations between measurements of conflict and environmental degradation. This study argued that raids on cattle are more likely to occur when vegetation is more abundant, and when raiding groups are more engaged in ‘aggravating behavior’. It also argues that cattle raids are low when reciprocal exchanges and peace initiatives between groups are low. This study provides an explanation for cattle raiding that is based on local explanations and motivations for raids, rather than on a linear association of environmental change and scarcity. This type of study therefore provides some evidence for the concept of resource capture. But it does not support the concept of ecological marginalisation on the grounds that ‘ecology’ itself is not the driving force for conflict.

Exacerbating existing risks

Various studies emphasise the cumulative effect of climate change on other political tensions, or as a ‘threat multiplier’ (e.g. Brown and Crawford, 2009; Scheffran, 2011).²² Blackwell (2010) for example, asks if climate change is ‘the straw that will break the camel’s back’ concerning pastoral communities in East Africa. He argues that climate change is the ‘underlying link’ between poverty and conflict among pastoralists in the Greater Horn of Africa. But this paper does not present in-depth evidence for this claim, and is again based on the assumption that added stresses will cause conflict. Plus, there is no discussion of how cattle raiding has existed historically as a persistent (and possibly permanent) phenomenon among pastoralists in this area.

Some papers, however, rely on more specific analysis of the institutions (or coping mechanisms) used by pastoral communities in the Horn of Africa, and the specific vulnerability of cattle again for raiding. Temestgen (2010) argues that environmental deterioration coupled with other social/political/economic factors ‘tremendously increase’ the likelihood of conflict in the Horn of Africa. This paper, instead, uses qualitative evidence and some fieldwork among pastoralist communities in Northern Kenya and Southern Ethiopia to argue that traditional institutions (which serve as coping mechanisms in times of environmental scarcity) are weakened due to policies of ethnic federalism, which disrupt reciprocal grazing arrangements. This weakening in turn increases the likelihood of violence/cattle raiding in pastoralist communities.

Witensburg and Adano (2009) uses its own dataset of resource scarcity, archives, and interviews. This paper supports the finding of Meier et al (2007) above, which claims that cattle raiding in northern Kenya is more likely in wetter years. Wetter years will experience more vegetation for cattle to eat, and possibly allow raiders more security in their own food supply, which will allow more time and opportunity to engage in raiding. The paper notes the lack of a statistical relationship between conflict and resource scarcity, but cites the importance of human agency in conflict, and the importance of political opportunities in determining the incidence of raids and that raids are used a way to express resentment. It uses

²² Scheffran’s work was not found in the systematic literature search.

‘violent deaths’ as a proxy for conflict. These indicators, of course, carry simplifications for how ‘conflict’ is defined.

Cumulative impacts on conflict can also come from migration. Reuveny (2007) argues that climate change will cause people in developing countries to migrate, and may cause conflict in receiving areas. It notes that this conflict occurs in the presence of resource competition, ethnic tension, distrust, and socio-economic/cultural fault lines. This model applies to general migration as well, which is accelerated by climate change. This article acknowledges that it does not find a causal link between climate change and conflict, and notes that its sample is likely too small to be generalised.

Social differentiation and vulnerability

Much existing work in environmental policy has highlighted the role of social vulnerability in making environmental change hazardous. Some analysts have argued that specific social groups—such as women and children—are essentially vulnerable because of historic social practices. Others have said that it is more important to see the circumstances when these groups become vulnerable rather than see vulnerability within social categories alone.

Some studies of climate change and conflict have emphasised social categories. Dankelman et al (2008) present a gendered analysis of how climate change impacts on human security, and whether adequate scope exists for women to participate in improved human security in a scenario of changing climate. This study, however, uses some quite categorical terms. For example, it says that ‘Men are more overconfident, thinking that they can predict and handle the future themselves, whereas women are more willing to adapt their strategies and behavior.’ Again, this kind of analysis of climate change and conflict presents ‘evidence’ for its argument. But its argument is based on a causal model that can be questioned. Furthermore, such emphasis on social categories implies certain solutions.

Omolo (2011) also discusses gender implications of climate change and conflict, but in a less essentialist way. This article proceeds from the assumption that climate change is occurring, and that it creates droughts and floods in northern Kenya. It argues that these changes are likely to increase the drivers of conflict in this area and increase the economic vulnerability of women. This article notes that pastoralist groups in this area have developed a complex set of coping strategies to deal with the changes and notes that mobility is an especially important component of this. The ability of women to be mobile is therefore an important determinant of their ability to reduce their own risk from climate change, and any conflict arising from climate change. But, as with many papers above, this paper also makes many assumptions about how climate change will happen, and how societies respond. It also does not account for what happens in times of abundance, such as floods or heavy rains which the author notes might also result from climate change.

Fragile states

The role of institutions in mediating (or failing to mediate) climate change has been emphasised in some literature within the discipline of International Relations. Climate change is represented as an added stressor to states that are already ‘fragile’ or unstable, especially concerning climate events that might affect disaffected populations. For example, Smith (2007) argues that there is an association between terrorism and climate change in Indonesia, the Philippines, and Bangladesh, even if this pattern cannot (yet) be demonstrated

statistically. The suggested mechanism is that climate change may create weak states, reduce state capacity, and create ungoverned spaces, which are easily exploitable by political extremists. This paper relies on existing literature to make its claims.

The paper does belong to a broader literature that works with the assumption of linear progressions and predictable outcomes of levels of state capacity. It uncritically assumes that a weak state creates ungoverned spaces and that ‘ungoverned’ spaces are a lawless breeding ground for political violence and terrorism (Mills and Herbst, 2007; Busby, 2007; Clunan, and Trinkunas, 2010). Not only is this assumption in need of interrogating, as Clunan and Trinkunas do in their edited collection, it is also symptomatic of broad-brush conclusions that often form the basis of the link between climate change and conflict.

A good paper to make the counter point - although one with its own questionable conclusions - is Temestgen (2010). Temestgen, as discussed above, sees the reason for local violence amongst pastoralists in Ethiopia’s federalism and thus argues that the strong Ethiopian state has undermined the very same local coping mechanisms that Smith dismisses as being able to govern ‘ungoverned spaces.’ Temestgen further concludes that his findings are applicable across the whole of Africa, which is hard to verify in a paper that draws on one case.

Pitting the two papers against each other serves to illustrate that no certainty exists whether a weak or a strong state serves as the better mitigator of conflict or whether climate change weakens or strengthens the state.

(c) Studies critiquing the links of climate change and conflict

The third broad category of studies focuses on criticising links between climate change and conflict. These studies are not *denying* climate change, nor suggesting that its effects will not be problematic. Rather, this body of work argues that there is a need to understand violent conflict in more complex ways than simply triggered by environmental or climate change, and consequently there is a need to look for other causes of social vulnerability and conflict.

Importantly, this section of work also proposes that the current concern about climate change and conflict can be damaging to development assistance, and to developing countries because it might misdirect assistance to military or security forces, rather than assist poorer people in developing capacities to help themselves. However, there seems to be limited research into the climate consequences of directing assistance to the military, for example into illegal logging by armies, with references often made in passing (Schomerus, 2007; Palmer, not dated). Military actors are also large users of greenhouse gases (Schoch, 2011).²³

Adaptive behaviours that lessen conflict

Much research within human ecology has highlighted the ability of societies to adapt to resource scarcity. These studies are not explicitly included in this review, because they usually do not refer explicitly to ‘conflict’, ‘violence’ or ‘war’. Indeed, our study has found that papers that do use these terms usually repeat the view that conflict is an inevitable outcome of climate change.

²³ Schoch, Palmer and Schomerus were not found during the systematic literature search.

It is worth noting that the widespread debate about adaptation to climate change, and different forms of adaptation, are about ways of responding to climate change that do not lead to conflict (e.g. see classic work by Peluso and Watts, 2001).²⁴ Adaptation, in turn, is a form of the debate about ‘institutions’ and ‘common property regimes’ in environmental behavior. In some ways, the ‘conflict’ debate is occurring in parallel—without connection—to discussions about adaptation.

There are, however, some explicit studies that have referred to how adaptive changes have avoided conflict (e.g. see as cited in Hartmann, 2010: 237). This kind of research seems based in local fieldwork-based studies involving end-users rather than analysis based on modeling or assumptions about how societies will respond. Witsenburg and Roba (2007), for example, found that there was less social violence in northern Kenya during times of drought and water scarcity than during periods of relatively higher rainfall. This study supports the findings of work above that suggested cattle raiding increased when vegetation was relatively more abundant. This study also pointed to the role of local common property regimes. Another study in northern Senegal from 1998–2002 found that drought-related migration among pastoralists also encouraged better and more responsive institutions, or shared behavior concerning adaptation to scarcity (Juul et al, 2003). There are many other studies like this.²⁵

Concerns about de-emphasising other causes of crisis

Another theme of research that questions the link of climate change and conflict focuses instead on how far this debate depoliticises and de-emphasises other, important, causes of conflict. These papers agree that conflict occurs. But they worry that blaming it on climate change misses the point.

For example, Huser and Larsen (2008) from the Norwegian Refugee Council argue that climate change is likely to contribute to an increase in forced migration in locations where people’s livelihoods are badly affected by salinisation, desiccation, etc. These authors argue, however, that the climate change and environmental factor is one among several root causes of conflict and forced migration. In particular, they criticise the phrases ‘environmental’ or ‘climate’ refugees because these terms imply a mono-causality rarely found in human reality. Figure 2 is another good example of the implied causal change between environmental factors and mass-migration.

Kevane and Gray (2008) more explicitly argue against the representation of the Darfur conflict as a ‘climate war’. They overtly criticise the United Nations and the economist Jeff Sachs for arguing that Darfur’s crisis can be explained in terms of climate change, and especially reductions in rainfall. They point out that commentators who suggest a climate change explanation for the Darfur conflict rarely present data to validate their claims, and instead rely on the assumption that Darfur is part of the Sahel, an area where rainfall has been low, variable, and in decline. Indeed, various analysts disagree about how to interpret the long-standing drought in the Sahel, and whether it is because of human influences. The authors argue that discussing rainfall as a cause of conflict reduces attention to questions of responsibility by the Sudanese government, or means of enhancing local adaptive capacity.

²⁴ Peluso and Watts are an additional source.

²⁵ None of the studies cited in this paragraph were found through the systematic literature search.

The paper implies but does not explicitly state the lack of historical awareness in the climate change/conflict debate. It is a recurring phenomenon that climate change is treated as a very recent development, creating previously inexperienced conditions that create previously unseen types of conflict. This is of course not the case: Darfur has seen severe periods of drought before; an extensive literature exists on the depoliticised misinterpretation of such drought patterns as the cause of famine and violence (e.g. Dai et al, 2004) Much of this literature is ignored in the current focus on Darfur as a climate war.

Concerns about weakening appropriate forms of development assistance

And some of the most explicit criticisms argue that the discussion of climate change and conflict serves a political purpose to undermine certain forms of development assistance, and instead empower other political agendas. These arguments refer to the role of the military in emphasising climate change and conflict; or the overall implications of writers such as Jared Diamond (2005) that managing environmental problems in developing countries is inherently linked to unstable regimes and military intervention. Indeed, Diamond writes:

People in the Third World can now, intentionally or unintentionally, send us their own bad things: their diseases like AIDS, SARS, cholera, and West Nile fever... unstoppable numbers of legal and illegal immigrants... terrorists; and other consequences of their Third World problems (518) ...as a result of those problems [they] are also creating problems for us rich First World countries, which may end up having to provide foreign aid for them... or may decide to provide them with military assistance to deal with rebellions and terrorists, or even have to send in our own troops (2005: 516).

Indeed, as Diamond implies, military intervention in conflict areas has come to represent the interests of the 'intervener', as much as those being 'intervened'. Finnemore (2003) argues that intervention must be coupled with legitimacy, which is generally achieved by coupling it with social dimensions beyond the use of force. This social dimension can often be found in the creating of internationally accepted standards. These are most commonly standards that draw on a human rights or institution-building agenda, both of which require a stronger state to be implemented. It follows from her argument that such international standards could include climate change policies, particularly as these are often presented as a security issue.

Betsy Hartmann (2010) is a key critic of this kind militarisation and securitisation of climate change policy. She writes:

Raising the specter of climate refugees and climate conflict obscures the real battle lines in the climate policy arena. ...We do not need the military to fight these battles. Instead they should take place in public, democratic, civilian spaces at all levels of politics and governance. Those who continue playing the climate refugee and conflict card are raising the stakes unnecessarily and threatening to militarize not only climate policy, but also development aid (Hartmann, 2010: 242).²⁶

Hartmann (2010) does not propose that climate change policy is unnecessary, or that the risk of conflict is not there. But she worries that the current emphasis on conflict as immanent and

²⁶ Hartman was not found through the systematic literature search.

inevitable empowers a political agenda that represents international development assistance as a question of military control to be undertaken by military actors. Instead, development assistance can build adaptive capacity and local means of addressing conflict that are more useful for affected people.

Implications: Assessing the evidence provided to link climate change and conflict

The preceding section outlined what is presented as evidence for the links between climate change and conflict in the literature we surveyed. In this section, we review the implications for how to assess *evidence* for the relationship of climate change and conflict.

This section carries three points:

- An assessment of how to consider evidence alongside causal models.
- A summary of what the evidence in the papers we analysed looked like.
- A discussion of the apparent trend suggesting analysts and journalists are ‘bandwagoning’ on the theme of climate change and conflict.

Evidence and causal models

Does the evidence presented in these studies ‘furnish proof’ that climate change causes conflict? The obvious conclusion from our summary above is that different analysts have presented different proof to argue varying viewpoints. Some of the strongest claims—e.g. Jared Diamond’s statement that there are ‘transparent linkages’ between population growth, environmental degradation, and conflict in Rwanda—are actually presented on the basis of *assumed* causal linkages; similar changes have not led to analogous outcomes in other locations.

Similarly, the studies that emphasise ‘large-n’ samples, using regression analysis, also reduce the apparent causes of conflict to criteria of environmental quality that assumes that variables such as forest cover are linear indicators of land degradation, and linked to rates of violence. Both assumptions seem extreme, and frequently, statistics are presented at the national scale that avoids local drivers of conflict.

Assessing the ‘quality’ of evidence is therefore a challenge. Sometimes reports claim to have good quality evidence because they refer to important and distressing crises such as Darfur and Rwanda—or use large numbers of statistics that look analytical to the untrained eye. But if these forms of evidence refer to a causal model of conflict that is unproven or simplistic, then this so-called evidence is of dubious value.

Evidence therefore needs to be assessed simultaneously with the underlying model of explanation. Yet, the underlying model is sometimes widely assumed to be true, even where there is much research and public debate to indicate that they are highly flawed. This phenomenon is not new. Some analysts in development and public policy have used terms such as ‘narratives’ or ‘mother statements,’ as a way to indicate that these assumptions are often repeated widely. The political scientist, Emery Roe, for example, wrote:

Development narratives tell scenarios not so much about what should happen as about what will happen according to their tellers—if the events or positions are carried out as described. (Roe, 1991:288).

Roe further suggested in a more recent piece of work that policies are best understood by looking at the narratives they present, rather than assuming that policies are based on evidence (Roe, 2006). This approach is helpful when looking at the narratives that underpin current policy approaches to climate change and conflict.

‘Environmental’ narratives have been widely discussed in previous research outside of debates about climate change. In the Himalayas, for example, Thompson et al (1986) noted that there was a widespread belief that population growth was leading to rapid deforestation, erosion, and crisis. Yet, on closer inspection, the actual experience of risk varied according to the vulnerability and adaptive practices of hill farmers; and the published estimates of deforestation in the region between 1965 and 1981, including from many ostensibly credible sources, varied by a factor of 67, even excluding apparent typing errors. Fairhead and Leach (1996) have also argued that much forest policy in Guinea in west Africa is based on the assumption that smallholder agriculturalists are deforesting land; when in fact villagers have for years created ‘forest islands’ for their own protection and resource use, and where the distinction between open savannah and closed forest is always varying. There are other examples (Forsyth and Walker, 2008).²⁷

The debate about environmental narratives argues there is a need to think about why assumptions remain in place despite the availability of research and experience to refute them. The very same issue arises when examining the most common conflict narratives, which often perpetuate the same simplified versions of the causes of conflict, despite a range of more nuanced evidence. This is a broad challenge: sometimes these beliefs are populist summaries that are repeated in newspapers, TV programs, and everyday discussion. Conflict actors and other interest groups are often interested in pursuing a particular ‘conflict narrative’, Darfur being a prominent example of how a conflict narrative was reshaped by a US-interest group (Lanz, 2009).

But beyond normative and ideological reasons for certain environmental and conflict narratives there are also links to how research and evidence gathering are undertaken. For example, in one academic paper about ‘how to do’ environmental assessments, the authors wrote about the various challenges of increasing participation as a way to reframe or change the objective of research. These authors openly admitted that:

Expanding participation does not necessarily benefit the assessment process—particularly in the short term. It can reduce the assessment’s quality, make the assessment logistically unmanageable and/or increase the difficulty of reaching consensus (Farrell et al, 2001:330).

And, it is unsurprising that evidence—and the causal models that justify data as ‘evidence’—change if the social participation of assessments and research change. Nancy Cartwright, the philosopher of science, has written:

Things look very different when we survey the whole problem for the users’ point of view than when we look for the point of view of the scientist charged with producing sound results to offer up as evidence (Cartwright, 2008: 30)

²⁷ None of the studies mentioned in this paragraph were found through the systematic literature search.

Clearly, many studies of climate change and conflict have presented evidence for these connections, but these are based on, either, assumptions about how they are linked; or empirical methods that are based on atmospheric or economic modeling that do not take into account local perspectives of the problems or adaptive behavior. These approaches to knowledge gathering are openly criticised in social sciences,²⁸ and yet reports on linear, assumed, linkages between atmospheric changes and local violence are printed and cited widely.

Assessing the quality of evidence for climate change and violent conflict should therefore draw reference to:

- Not just the data presented, but the plausibility of and evidence for the underlying causal model,
- How far research considers local adaptive responses based on historical context rather than just assumptions about how people respond,
- An assessment of which policies and actors are strengthened by different knowledge claims.

Summary of evidence analysed in this paper

Is evidence a bandwagon for climate change and conflict?

Our analysis has shown that many papers and books are emerging on the theme of climate change and conflict—and that many of the most eye-catching publications refer to a linear and urgent connection between forthcoming climate change and immanent conflict. It seems reasonable to ask if discussions of climate change and violence are now a fad; a process of discussing a problem in the hope of gaining attention, and possibly funds?

‘Bandwagoning’ refers to the process of joining in a topic of popular debate in order to strengthen one’s own position, even if that position is not directly relevant to the debate. We do not want to suggest that the problems of climate change and conflict are unimportant. But it is worth noting that some analysts are now asking if climate change is becoming a bandwagon for various other policy concerns (Jinnah, 2011). Indeed, analysts in international politics have argued for years that states and societies securitise issues to make them appear more urgent (Buzan et al, 1998; Duffield, 2001; Fierke, 2007).

Detraz, for example, has written:

[the] environmental activists Wangari Maathai suggested that Northern states might not act on climate change unless they are convinced of the severity of its impacts. She said...”climate change is an issue of security both locally and internationally,” This is a powerful example of the logic

²⁸ For example, one academic from the University of South Carolina has openly attacked the publication of the work connecting El Niño to violence, asking how it got through peer review.
<http://www.edwardcarr.com/opentheechochamber/2011/08/25/conflict-and-el-nino-how-did-this-get-through-peer-review/>

of using security language to shake Northern countries into action on climate change. (Detraz, 2011: 116).

There is no doubt that representing climate change in terms of war and violence catches attention in the media, and makes for interesting discussion. Our research highlighted that the academic papers on the relationship of El Niño to historic civil wars achieved a high level of discussion in the press, and that many bloggers and activists used this report to strengthen their own arguments. We do not present analysis of these non-academic writings in this current paper. But it is worth noting that many popular discussions do not question the underlying models of causality, and sometimes use the evidence presented as ‘proof.’

We would suggest there are obvious problems of allowing populism, or bandwagoning, to influence climate change policy too far. There is a need to discuss whether the causal models (and implied solutions) of many sensational approaches to climate change and conflict are appropriate. And adopting these models also implies that certain policies and political actors are appropriate solutions. There is a need to pause and think about who benefits from these approaches; and whether the models and proposed policies will help. According to one analyst at a UK-based think tank:

Efforts to link climate change with violent conflict may not be based on solid evidence, but they have certainly captured the attention of governments. They have played a vital role in raising the much-needed awareness of climate change as an issue that deserves global action. But at what cost? Focusing on climate change as a security threat alone risks devolving humanitarian responsibilities to the military, ignoring key challenges and losing sight of those climate-vulnerable communities that stand most in need of protection (Schoch, 2011: 1).

Conclusion: What is the role of climate change in violent conflict?

This paper has sought to answer the question: What is the evidence for climate change causing violent conflict? Our short answer is: So far, not much.

Of course, as this paper shows, there are many books, papers, and articles that have been published that claim to present evidence for these links. But, many of these studies are based on assumptions and causal models about how atmospheric changes result in violent conflict that are unexplored, unproven, or too simple. As a result, the evidence that is presented here is difficult to see as ‘furnishing proof’ that climate change is an active cause of violent conflict.

What does this mean for understanding the impacts of climate change, and how to govern conflict? We make three conclusions and suggestions.

First, the difficulty of establishing evidence for connecting climate change and conflict should not be seen as implying there is no problem; no connection; or no need for action. According to all reputable predictions, climate change will produce changes in rainfall, temperature, and weather events that will take place in locations with histories of violent

conflict, and where there are large numbers of people who have been vulnerable to famine and persecution in the past. It is likely that significant climatic changes will have impacts in these contexts. The challenge lies in understanding how impacts will occur, and then using that knowledge to develop adequate responses.

So far, however, the most common overt discussions of climate change and conflict have assumed that it is necessary to establish a causal link of the two by looking at very reduced definitions of violent conflict (such as wars that kill more than 25 people a year), or of environmental quality (such as forest cover) that do not indicate much complexity in how people achieve livelihoods or experience resource scarcity. Many other studies also simply assume that atmospheric changes will cause conflict simply by claiming that violence is a likely outcome. Others still adopt very linear assumptions that changes in resources will necessarily cause violence such as riots, crime, ethnic conflict, and terrorism without placing these projections in the context of local practices, history, or concerns (e.g. Scheffran, 2011)

It is therefore a source of concern that so many studies about climate change and conflict seek to present it in terms of a mono-causal or uniform association. Instead, there is a need for a more variable and less uniform model of causality. Some of the studies we reviewed seemed to converge on the finding that cattle raiding—as one form of violence—was positively correlated with climate, but only when wetter years produced more vegetation, healthier cattle, and presumably healthier people (e.g. Meier et al, 2007). This causal model of violence is based upon the opportunistic seizure of resources in zones where there are widespread social divisions. It is not the only explanation of how climate change and conflict are connected. But it is more plausible as one of various potential impacts than a macro mono-causal explanation that asserts a linear association between conflict and climate. More research about how and why changes in climate give occasions of conflict are needed in order to present a more complex linkage of climate change and conflict. Indeed, this example challenges the popular image of African crisis because it portrays violence as an opportunity for enrichment, rather than an inevitable result of drought.

Our first conclusion, therefore, is that there is a need for a more nuanced explanation of the linkages between climate change and conflict, including a more nuanced examination of how both climate change and conflict are conceptualised, that reflects local motivations and responses more than a single mono-causal association.

Second, there is a need to be aware of who benefits from the production of ‘evidence.’ This is a wide-reaching challenge. Some journalists—such as Ross Gelbspan, cited above—have somewhat openly discussed that writing about climate change in sensational terms is a professional opportunity. It is also clear that institutes and academics will achieve more visibility if they write about potential immanent disaster. Plus social-science critics have alleged that the military or authoritarian states are seeking to strengthen their own legitimacy by discussing climate change as a high-stakes question of national security (e.g. Hartmann, 2010).

Pre-existing research in environmental and public policy has argued that underlying assumptions (or narratives) will remain in policy debates—even though research has questioned or refined them—because it is in the interests of certain actors to repeat them. There is a need to ask who benefits from arguing different scenarios of climate change and conflict? Which organisations, governments, or other actors stand to gain by predicting

violence or proposing solutions? And how do these analyses impede debate about alternative policy proposals?

And third, there is a need to understand more about what causes conflict, and what social practices exist in zones or times that have no violence. Our paper has shown that most publications mentioning ‘climate,’ ‘war,’ ‘violence,’ and ‘conflict’ allege linear connections between climatic changes and violence, but do not engage very closely with pre-existing research that has focused on the origins of conflict alone.

At the same time, it is worth considering how adaptive capacity, or conflict resolution, are the norms that need to be studied rather than focusing on violence as the subject of study. For example, there are long-standing examples of adaptation to scarcity that are not labelled ‘conflict’ or ‘security.’ Finding out about how people live with scarcity and unpredictability might be more useful for locally-relevant governance of climate change than trying to prove that individuals will respond with violence to climate change.

This paper has sought to contribute to the debate about climate change and conflict by critically reviewing current claims about evidence—and by questioning whether it counts as evidence. We conclude by saying that these matters are too important to be decided by sensationalist and crude discussions about violence and climate. Claims about climate change and conflict need to be treated critically. While climate change is likely to have various impacts on human behaviors and resources, these need to be understood with reference to local context and practice rather than on the basis of bold claims based on assumptions.

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Appendix 1: Annotated Bibliography

Allouche, J. ‘The sustainability and resilience of global water and food systems: Political analysis of the interplay between security, resource scarcity, political systems and global trade’. *Food Policy* (2010), doi:10.1016/j.foodpol.2010.11.013

This article examines the resilience and sustainability of water and food systems to shocks and stresses linked to different levels and intensity of conflict, global trade and climate change. This paper forms a short critique of current approaches to such issues.

The author utilises a depth of theoretical and empirical data to argue that fears around water wars have been driven by a Malthusian outlook which equates scarcity with violence, conflict and war. The author rightly points to the thin evidence base that links climate change and conflict. There is no new data presented, but the paper benefits from its depth of insight on the basis of much other literature.

Coder:	CV
Score data quality:	2.33
Score quality analysis:	3
Total score:	5.5
Quantity of data/information used:	10%-50% empirical information
Type(s) of data/information used:	Quantitative; existing dataset Other
How insightful in terms of data/information?	No significant new data / information
How insightful in terms of analysis/theory? theoretical insight	Some significant new analysis /
Clear underlying model of conflict	Agree
Underlying model reviewed critically	Disagree
Underlying model used consistently	Agree

Barnett, J . ‘Security and Climate Change’, *Tyndall Centre Working Paper No. 7, 2001*

This paper starts from the perspective that climate change is a security issue, and seeks to reorient the discourse away from a limited ‘national security’ perspective .

Barnett makes the strong point that there is simply not enough existing evidence to make anything other than speculative claims about the effect of climate change on conflict. Aside from this, this paper is concerned with the relationship between security and climate change discourses, and offers little in terms of local level data or fresh insights on the relationship between climate change and conflict.

Coder:	CV
Score data quality:	
Score quality analysis:	
Total score:	
Quantity of data/information used:	Less than 10% empirical information
Type(s) of data/information used:	Theoretical
How insightful in terms of data/information?	Theoretical
How insightful in terms of analysis/theory?	No significant new analysis / theoretical insight
Clear underlying model of conflict	Disagree
Underlying model reviewed critically	Disagree
Underlying model used consistently	Disagree

Brauch, H.G. ‘Climate Change and Conflict Prevention: Can climate change impacts increase conflict potentials?’ *Growth (Lakeland)*, (June), 1-13.

This is clearly not designed as an article for publication therefore cannot be reasonably be assessed on the limited information it presents. Possibly downloaded in error.

Coder:	CV
Score data quality:	
Score quality analysis:	
Total score:	
Quantity of data/information used:	Less than 10% empirical information
Type(s) of data/information used:	Theoretical
How insightful in terms of data/information?	Theoretical
How insightful in terms of analysis/theory?	No significant new analysis / theoretical insight
Clear underlying model of conflict	NA
Underlying model reviewed critically	NA
Underlying model used consistently	NA

Bronkhorst, S. (2011) ‘Addressing Climate-related Conflict: Human Security and lessons from the Southern Sahelian Belt of Sudan’, *Conflict Trends*, Issue 2

Bronkhorst applies a widened notion of human security to an assessment of climate conflict between pastoralists and farmers in Southern Sudan. Moreover, the author argues that Traditional Conflict Resolution (TCR) mechanisms have a strong potential to decrease climate conflicts. The study takes a rather uncritical approach to linking climate change and

conflict and does not acknowledge the limited evidence for such claims. The author mentions her research but does not further elaborate on methodology or results, it is thus not clear on what evidence her conclusions are based.

Coder:	AH
Score data quality:	
Score quality analysis:	
Total score:	
Quantity of data/information used:	Less than 10% empirical information
Type(s) of data/information used:	Theoretical
How insightful in terms of data/information?	Theoretical
How insightful in terms of analysis/theory? theoretical insight	Some significant new analysis /
Clear underlying model of conflict	Agree
Underlying model reviewed critically	Disagree
Underlying model used consistently	Agree

Brumfiel, G., & Knight, J. (2003). ‘Climate of conflict: in the shadow of war’, International Alert.

This paper aims to assess the ‘consequences of the consequences’ of climate change. It concludes that conflict-sensitive climate change policies can actively promote peacebuilding, and that climate-proof peacebuilding and development policies can be effective climate change adaptation policies.

This paper clearly utilises a great depth of research to demonstrate the ‘double-headed problem’ of climate change and violent conflict. Whilst it correctly highlights that a great deal more local-level research is needed, it simultaneously utilises existing research rather uncritically to make a number of recommendations (such as the 2007 IPCC report.) Furthermore, the paper recommends linking peacebuilding and climate adaptation, but fails to critically interrogate such terms.

Coder:	CV
Score data quality:	2
Score quality analysis:	3.5
Total score:	5.5
Quantity of data/information used:	10%-50% empirical information
Type(s) of data/information used:	Other
How insightful in terms of data/information?	Theoretical
How insightful in terms of analysis/theory?	No significant new analysis / theoretical insight
Clear underlying model of conflict	Agree
Underlying model reviewed critically	Strongly disagree
Underlying model used consistently	Agree

Buhaug, H. (2010) ‘Climate not to blame for African civil wars. *Proceedings of the National Academy of Sciences of the United States of America*, 107(38), p.16477-16482. Available at: <http://www.pnas.org/cgi/doi/10.1073/pnas.1005739107>.

This article is a reply to Burke et al. (2009) and questions their conclusion that climate change and conflict are directly linked. Instead Buhaug argues that climate variability does not have a direct impact on short-term risks of civil war. However, the study does not consider indirect or long-term impacts of climate change on increased conflict risks. Moreover, Buhaug concedes that more rapid climate change in the future may potentially lead to more civil wars. The study is based on empirical datasets but unlike earlier studies takes a more nuanced view on definitions of civil war and other inclusion criteria such as time and place. Thus Buhaug is able to problematise methodological approaches in quantitative studies on climate wars and suggests improvements.

Coder:	AH
Score data quality:	3.33
Score quality analysis:	3.5
Total score:	7
Quantity of data/information used:	More than 50% empirical information
Type(s) of data/information used:	Quantitative; existing dataset
How insightful in terms of data/information?	Some new data / information
How insightful in terms of analysis/theory? theoretical insight	Some significant new analysis /
Clear underlying model of conflict	Agree
Underlying model reviewed critically	Agree
Underlying model used consistently	Agree

Buhaug, H., Hegre, H., Strand, H. (2010) ‘Sensitivity Analysis of Climate Variability and Civil War’, *PRIO Paper*, November 2010

This study is build on Buhaug (2010) and adds to the critique of Burke et al.'s (2009) claims for a causality between global warming and increased civil war. As in Buhaug (2010) the authors concede that there may indeed be a link between climate change and other forms of conflict. However, they stress that further research is needed in order to analyse social impacts of climate change further.

Coder:	AH
Score data quality:	3.33
Score quality analysis:	3
Total score:	6.5
Quantity of data/information used:	More than 50% empirical information
Type(s) of data/information used:	Quantitative; existing dataset
How insightful in terms of data/information?	Some new data / information
How insightful in terms of analysis/theory? theoretical insight	Some significant new analysis /
Clear underlying model of conflict	Strongly agree
Underlying model reviewed critically	Strongly agree
Underlying model used consistently	Strongly agree

Burke, M. B., Miguel, E., Satyanath, S., Dykema, J. a, & Lobell, D. B. (2009). ‘Warming increases the risk of civil war in Africa’. *Proceedings of the National Academy of Sciences of the United States of America*, 106(49), 20670-4. doi:10.1073/pnas.0907998106

The authors utilise a quantitative analysis of historical temperature patterns in order to predict changes in the incidence of civil war under future climate change. They combine their estimated historical response of conflict to climate with climate projections from 20 general circulation models that have contributed to the World Climate Research Program’s Coupled Model Intercomparison Project phase 3.

The authors proposed causal link between temperature rises and violent conflict is rooted in a quantitative analysis which removes the political context of such conflict from view. The authors’ conclusions are dramatic – it is argued that the dangers of temperature increases far outweigh any potentially offsetting effects such as ‘strong economic growth and continued democratization’. Given that they have not undertaken a political analysis they are not well placed to make such an assessment. The research methods these conclusions are based on are transparently demonstrated but move too easily from a correlative explanation into causality.

Coder:	CV
Score data quality:	2.33
Score quality analysis:	2
Total score:	4.5
Quantity of data/information used:	More than 50% empirical information
Type(s) of data/information used:	Quantitative; gathering own data
How insightful in terms of data/information?	Some new data / information
How insightful in terms of analysis/theory?	No significant new analysis / theoretical insight
Clear underlying model of conflict	Agree
Underlying model reviewed critically	Strongly disagree
Underlying model used consistently	Agree

Busby, Joshua, White, Kaiba, Smith, Todd (2010) ‘Mapping Climate Change and Security in North Africa’ *Climate and Energy Papers*, the German Marshall Fund of the USA

This study maps the relationship between climate change and security in North Africa (here North Africa also includes Mali, Niger, Sudan, and the Horn of Africa). Using a variety of empirical datasets and indicators the authors consider four issue areas: conflict, migration, terrorism, and humanitarian disasters. the study finds that a securitisation of climate change is occurring in the policy sector which is not based on academic evidence. By combining climate and socio-political indicators the authors make a sound and nuanced argument that shows that the countries will be most vulnerable to any potential security issues are not those most physically threatened by climate change but those with socio-economic vulnerabilities.

Coder:	AH
Score data quality:	3.66
Score quality analysis:	3
Total score:	6.5
Quantity of data/information used:	More than 50% empirical information
Type(s) of data/information used:	Quantitative; existing dataset
How insightful in terms of data/information?	Some new data / information
How insightful in terms of analysis/theory? theoretical insight	Some significant new analysis /
Clear underlying model of conflict	Agree
Underlying model reviewed critically	Agree
Underlying model used consistently	Agree

Blackwell, PJ (2010), ‘East Africa's Pastoralist Emergency: is climate change the straw that breaks the camel's back?’, *Third World Quarterly*, 31:8, 1321-1338

This paper argues that the Turkana are dependent on an environment that is no longer sustainable for the traditional form of pastoralism. On this basis, the author contends that these communities need to move beyond survival on food aid and towards fundamental livelihood strategy changes, rooted in an understanding of the effects of climate change.

This paper assumes that climate change is the ‘underlying link’ between poverty and conflict among pastoralists in the Greater Horn of Africa, yet fails to provide any in-depth evidence for this claim. The author relies heavily on cherry-picked reports on the issue and fails to critically interrogate these assumptions. The paper's methodology is entirely unclear. Whilst reference is made to interviews, information on the possible breadth and depth of these is not forthcoming, rendering the author’s conclusions debatable.

Coder:	CV
Score data quality:	1.5
Score quality analysis:	2.25
Total score:	3.5
Quantity of data/information used:	10%-50% empirical information
Type(s) of data/information used:	Qualitative, interview-based Other
How insightful in terms of data/information?	No significant new data / information
How insightful in terms of analysis/theory? theoretical insight	Some significant new analysis /
Clear underlying model of conflict	Disagree
Underlying model reviewed critically	Strongly disagree
Underlying model used consistently	Disagree

Brown, O., & Crawford, A. (2009). ‘Climate Change and Security in Africa’, *Foreign Affairs*, (March)

This desk-report attempts to assess the extent to which climate change may affect violent conflict in African states. It contends that climate change is best seen as a ‘threat multiplier’ that intensifies existing problems and vulnerabilities – any conflicts that arise from such threats depend more upon governments and governance rather than environmental change.

The authors appear careful not to engage in environmental determinism by making clear that their discussions are based on potential scenarios, not forecasts. Yet the bulk of this paper still attempts to establish a strong causal link between climate change and conflict. This results in a rather contradictory paper; whilst accepting the limitations of current theories proposing a causal link, it then proceeds to argue for exactly such links. Additionally, this paper tends to rely heavily on a few sources – for example Boko et al. (2007). Since this is a desk-report, it contributes little new insight to the climate change and conflict debate.

Coder:	CV
Score data quality:	3
Score quality analysis:	3
Total score:	6
Quantity of data/information used:	10%-50% empirical information
Type(s) of data/information used:	Other
How insightful in terms of data/information?	No significant new data / information
How insightful in terms of analysis/theory? theoretical insight	Some significant new analysis /
Clear underlying model of conflict	Agree
Underlying model reviewed critically	Agree
Underlying model used consistently	Disagree

Dankelman, I., Alam, K., Ahmed, W. B., Gueye, Y. D., Fatema, N., & Mensah-Kutin, R. (2008). 'Gender , Climate Change and Human Security Lessons from Bangladesh , Ghana and Senegal' Prepared for ELIAMEP. *Sustainable Development*, (May). Retrieved from http://www.gdnonline.org/resources/WEDO_Gender_CC_Human_Security.pdf

This study presents a gendered analysis of how climate change impacts on human security. It also assesses whether adequate scope exists for women to participate in improved human security in a scenario of changing climate. This study is deeply uncritical in its use of current research. It also underpins its gendered analysis with some rather sweeping claims. For example, that 'Men are more overconfident, thinking that they can predict and handle the future themselves, whereas women are more willing to adapt their strategies and behavior.' This paper includes some useful case studies yet fails to explore these in greater detail whilst also providing no data on the extent of interviews undertaken. Finally, this paper eventually fails to explore why exactly 'greater inclusion of women and inclusion of a gender-specific approach in climate change adaptation and decision-making may reverse the inequitable distribution of climate change impacts.'

Coder:	CV	
Score data quality:	1.83	
Score quality analysis:		2.5
Total score:	4.5	
Quantity of data/information used:	10%-50% empirical information	
Type(s) of data/information used:	Qualitative, interview-based Other	
How insightful in terms of data/information?	No significant new data / information	
How insightful in terms of analysis/theory?	No significant new analysis / theoretical insight	
Clear underlying model of conflict	NA	
Underlying model reviewed critically		NA
Underlying model used consistently		NA

Detraz, N., 2011. 'Threats or Vulnerabilities? Assessing the Link between Climate Change and Security', *Global Environmental Politics*, 11(3), p.104-120

Using the Copenhagen's School concept of 'securitization', Detraz argues that applying an environmental security framework to climate change can be beneficial for climate change. Even though he highlights some issues with this approach, for example, a focus on state instead of human security or an overt militarization of climate change issues, the author is generally in favour of linking climate change and security. Detraz claims to provide a 'meta-analysis' of the current debate (i.e. An extended literature review), however, this analysis is rather uncritical of the evidence used in any of the papers discussed.

Coder:	AH	
Score data quality:		
Score quality analysis:		
Total score:		
Quantity of data/information used:	Less than 10% empirical information	
Type(s) of data/information used:	Theoretical	
How insightful in terms of data/information?	Theoretical	
How insightful in terms of analysis/theory?	NA	
Clear underlying model of conflict	Strongly disagree	
Underlying model reviewed critically	Strongly disagree	
Underlying model used consistently	Strongly disagree	

Federal Ministry for the Environment (2002) ‘Climate change and conflict: Can climate change impacts increase conflict potentials? What is the relevance of this issue for the international process on climate change?’, *Environmental Policy*

This paper is in 3 parts. Part 1 is a description of a conference on climate change and conflict. Part 2 is a paper by Brauch on ‘Climate Change, Environmental Stress and Conflict’. Part 3 is a paper by Oberthur et al. on ‘Climate Change and Conflict Prevention’. Only parts 2 and 3 require assessment on the basis of evidence presented – the marks given in this grading sheet reflect an average across the 2 relevant parts.

Part 2: This report analyses the conflict dimension of societal and political implications of climate change in interaction with 5 other ‘primarily nature induced’ and ‘human induced’ factors. It is argued that a combination of these factors can contribute to ‘environmental stress’, which can then lead to a variety of (largely negative) ‘probable outcomes’ – including violent conflicts.

The author relies on his initial analysis of climate change being part of a ‘survival hexagon’, which is utilised to good effect in each of the case studies. This paper critically interrogates the work of the IPCC and attempts to highlight areas where further research is needed. However, like much climate change literature, this piece at first highlights how any ‘predictions’ will be purely speculative, but then goes on to outline a series of events based on such speculation which governments must mitigate against. That said, this paper retains a strong breadth and depth, drawing on existing literature to make a reasonable convincing set of suggestions for research, sensibly focusing on the non-military nature of potential climate change problems.

Part 3: The paper attempts to assess the importance of the increasing literature on the link between climate change and conflict for international discussions and negotiations on climate change issues. It is argued the rationale for attempting to mitigate the impacts of climate change is strengthened by the effect it can have (amongst other factors) in generating conflict. This, it is argued, should also push the notion of adaptation to the forefront of the international agenda.

This paper does not prevent empirical data since it is an analysis of international climate policy debates. Again, this paper contends that there is not enough scientific evidence to make a causal link between climate change and conflict, but that there is sufficient knowledge about the link between climate change and conflict prevention in order to form a sound basis for integrating such ideas into international policies.

Coder:	CV
Score data quality:	2.66
Score quality analysis:	3
Total score:	5.5
Quantity of data/information used:	10%-50% empirical information
Type(s) of data/information used:	Other
How insightful in terms of data/information?	No significant new data / information
How insightful in terms of analysis/theory? theoretical insight	Some significant new analysis /
Clear underlying model of conflict	Agree
Underlying model reviewed critically	Agree
Underlying model used consistently	Agree

Hall, E. (2009). ‘Conflict for Resources : Water in the Lake Chad Basin’, School of Advanced Military Studies, Fort Leavenworth , Kansas

This monograph discusses the propensity for conflict surrounding the diminishing water in Lake Chad. The paper uses a comparative case study to determine the extent that states face conflict over scarce natural resources. The author concludes that the reduction of water levels in Lake Chad will increase regional conflict. According to the author, at some point, the effects of population growth, migration into the system, climate change and refugees will ‘destabilize the system’.

This author’s analysis is rooted in an understanding of conflict and its drivers derived from the work of Collier, B.C Smith and Michael Klare, and fails to critically engage with any of them. Similarly, the relationship between environmental scarcities and inter/intra state conflict is uncritically drawn from Thomas Homer-Dixon’s work. Given the authors assumptions about the causal link between environmental stresses and conflict, his conclusions are unsurprising. This paper only draws on existing literature, and therefore is not a particularly useful paper.

Coder:	CV
Score data quality:	2.33
Score quality analysis:	2.5
Total score:	5
Quantity of data/information used:	10%-50% empirical information
Type(s) of data/information used:	Other
How insightful in terms of data/information?	No significant new data / information
How insightful in terms of analysis/theory?	No significant new analysis / theoretical insight
Clear underlying model of conflict	Disagree
Underlying model reviewed critically	Strongly disagree
Underlying model used consistently	Disagree

Hendrix, C., & Glaser, S. (2007). 'Trends and triggers: Climate, climate change and civil conflict in Sub-Saharan Africa', *Political Geography*, 26(6), 695-715. doi:10.1016/j.polgeo.2007.06.006

This article addresses the relationship between climate and the onset of civil conflict from two perspectives. The first is a model of conflict onset in which the variables of interest are measures of (a) trends: land degradation, climate suitability for Eurasian agriculture, and freshwater resources per capita and (b) triggers: interannual variability in rainfall. The second perspective involves assessing the outlook for the future based on an analysis of simulated changes in precipitation means and variability.

A great deal of empirical data is presented to good effect, attempting to demonstrate (contrary to conventional wisdom) that variability in climate patterns in sub-Saharan Africa will not dramatically increase in the coming years. However, the authors arguments are premised on the questionable assumption that such variability would necessarily increase conflict, an assumption which they do not critically challenge. That said, a positive point is that their presentation of quantitative analysis does not lead them to ignore the political dimensions of resource scarcity.

Coder:	CV
Score data quality:	3
Score quality analysis:	2.5
Total score:	5.5
Quantity of data/information used:	More than 50% empirical information
Type(s) of data/information used:	Quantitative; existing dataset
How insightful in terms of data/information?	No significant new data / information
How insightful in terms of analysis/theory? theoretical insight	Some significant new analysis /
Clear underlying model of conflict	Agree
Underlying model reviewed critically	Disagree
Underlying model used consistently	Agree

Huser, A., & Larsen, S. S. (2008) ‘Future floods of refugees: A comment on climate change, conflict and forced migration’, *Norwegian Refugee Council, April*

This paper argues that climate change impacts are likely to contribute to an increase in forced migration. It is contended, however, that the climate change and environmental factor is one among several root causes of conflict and forced migration.

This paper is a well-balanced discussion of the climate change and conflict debate, which tends to critically appraise common assertions. In particular, there is a strong criticism of the phrases ‘environmental’ or ‘climate’ refugee (which often is argued will lead to violent conflict) since these terms imply a mono-causality rarely found in human reality. However, this paper relies heavily on existing literature and therefore overall contributes little new information or insight to the debate.

Coder:	CV
Score data quality:	2.66
Score quality analysis:	3
Total score:	5.5
Quantity of data/information used:	10%-50% empirical information
Type(s) of data/information used:	Other
How insightful in terms of data/information?	No significant new data / information
How insightful in terms of analysis/theory? theoretical insight	Some significant new analysis /
Clear underlying model of conflict	Agree
Underlying model reviewed critically	Agree
Underlying model used consistently	Disagree

Kevane, M., & Gray, L. (2008). 'Darfur: rainfall and conflict', *Environmental Research Letters*, 3(3), 034006. doi:10.1088/1748-9326/3/3/034006

This paper argues that careful attention should be paid to examining the rainfall explanation of the emergence of violence in Darfur. It is contended that commentators suggesting a climate change explanation for the Darfur conflict rarely present data to validate their claims, instead relying on a general understanding that Darfur is part of the Sahel, an area where rainfall has been low, variable, and in decline.

These authors criticise Sachs for essentialising Darfur to rainfall - making the paper more of a critique of people who claim there is a hard link of climate change to conflict than an assessment of whether climate change and conflict really are connected in hard ways. This is a strong critique – there is a tendency in the debate on Darfur to mythologise Darfur as an archetypal ‘climate change conflict’, which overrides the political discussion of the conflict. The authors’ methodology is clear and they indicate the difficulty in establishing causality through a quantitative analysis which cannot take into account other key factors in the conflict.

Coder:	CV
Score data quality:	3
Score quality analysis:	3
Total score:	6
Quantity of data/information used:	10%-50% empirical information
Type(s) of data/information used:	Quantitative; existing dataset
How insightful in terms of data/information?	Some new data / information
How insightful in terms of analysis/theory? theoretical insight	Some significant new analysis /
Clear underlying model of conflict	Agree
Underlying model reviewed critically	Disagree
Underlying model used consistently	Agree

Leroy, M. and Gebresenbet, F. (2011) ‘Climate Conflict in the Horn of Africa?’, *Conflict Trends*, Accord

The authors analyse potential climate conflicts in the Horn of Africa and argue that there is no evidence to support popular claims of a climate war in Sudan. Moreover, they warn of the dangers of depoliticising political conflicts. While this is a nuanced argument there is no empirical evidence visible in the paper. The authors mention that they have undertaken their own research but besides this comment it is not evident what research was done. Thus, the article reads more like a literature review.

Coder:	AH
Score data quality:	
Score quality analysis:	
Total score:	
Quantity of data/information used:	Less than 10% empirical information
Type(s) of data/information used:	Theoretical
How insightful in terms of data/information?	Theoretical
How insightful in terms of analysis/theory? insight	No significant new analysis / theoretical
Clear underlying model of conflict	Disagree
Underlying model reviewed critically	Strongly disagree
Underlying model used consistently	Strongly disagree

Mazo, J. (2009). ‘Chapter Four: Conflict, Instability and State Failure: The Climate Factor’. *The Adelphi Papers* 49(409), pp87-118.

This paper explores the role of climate change on state weakness and failure. Though it claims to answer how representative the Darfur conflict is of how the changing climate may interact with other factors affecting conflict, it fails to do so and makes little reference to Darfur in the article. It appears to be a section of a larger volume, so, while not complete on its own, this may partially explain its utter failure to answer the question.

This article interrogates the assumptions behind the links drawn between climate change, resource scarcity, and state failure and offers theoretical insight into the nature of these links. However, it assumes a set expected outcomes of climate change without justifying their use, exploring the socio-political factors that may alter them, or allowing for the potential that climate change could bring both negative AND positive changes. Despite its useful theoretical insight, this paper is a largely descriptive, hypothetical account of the future effects of climate change on future state failure and fragility rather than an examination of the role of climate change in past occurrences.

This study contains no description of methodology and no data that could be considered local level. It draws on a substantial amount of secondary sources and statistics to demonstrate the general affects of climate change. Without access to its endnotes it is difficult to assess its evidence based, though it appears to be based predominantly in existing conflict and scientific literature.

Coder:	DS
Score data quality:	
Score quality analysis:	
Total score:	
Quantity of data/information used:	Less than 10% empirical information
Type(s) of data/information used:	Theoretical
How insightful in terms of data/information?	Theoretical
How insightful in terms of analysis/theory? theoretical insight	Some significant new analysis /
Clear underlying model of conflict	Disagree
Underlying model reviewed critically	Disagree
Underlying model used consistently	Agree

Meier, P., Bond, D., and Bond, J. (2007). ‘Environmental influences on pastoral conflict in the Horn of Africa’, *Political Geography*, 26(6), 716-735.

This study seeks to identify environmental indicators that may serve as harbingers of pastoral conflict/raids. It uses data collected by field monitors from the Inter- Governmental Authority on Development’s (IGAD) Conflict Early Warning and Response Network (CEWARN) in the Karamoja cluster (border regions of Ethiopia, Kenya, and Uganda). It finds that raids are

more likely when aggravating behavior and vegetation are high and reciprocal exchanges and peace initiatives are low. It shows that resource predation and looting may be important in sustaining raiding behaviour given the association between vegetation and raids. This article has transparent methodology and notes limitations to its conclusions, though not potential biases.

Coder:	DS
Score data quality:	3.66
Score quality analysis:	3.5
Total score:	7
Quantity of data/information used:	10%-50% empirical information
Type(s) of data/information used:	Quantitative; existing dataset
How insightful in terms of data/information?	Some new data / information
How insightful in terms of analysis/theory? theoretical insight	Some significant new analysis /
Clear underlying model of conflict	Strongly agree
Underlying model reviewed critically	Strongly agree
Underlying model used consistently	Strongly agree

Nordas, R. and Gleditsch,N. (2007). ‘Climate change and conflict’, *Political Geography* 26(6)

This article is a literature review of different perspectives connecting climate change and conflict. It is designed as an introduction to a series of articles and does not present its own empirical work or new theorization, though it notes a number of works that may be of interest to JSRP's analysis of these phenomenon that may not have come out in the literature searches.

Coder:	DS
Score data quality:	
Score quality analysis:	
Total score:	
Quantity of data/information used:	Less than 10% empirical information
Type(s) of data/information used:	Theoretical
How insightful in terms of data/information?	Theoretical
How insightful in terms of analysis/theory?	No significant new analysis / theoretical insight
Clear underlying model of conflict	Strongly agree
Underlying model reviewed critically	Strongly agree
Underlying model used consistently	Strongly agree

Obioha, E. ‘Climate Change , Population Drift and Violent Conflict over Land Resources in Northeastern Nigeria’, *Conflict* 23(4), 311-324

This article both uses and critically analyzes the Homer-Dixon/Malthusian link between climate change and conflict. It finds that resource scarcity leads to both Simple Scarcity and Group Identity conflicts in the region, particularly among those who practice animal husbandry, which contributes to the indigeneity-based conflicts occurring throughout Nigeria. This article notes that it uses both existing data on conflict incidence as well as observational studies. It is unclear however what conclusions are drawn specifically from the observational studies, or how these studies were carried out and does not note biases/limitations. This article does provide an interesting typology of conflict in this region as well as a rich theoretical discussion.

Coder:	DS
Score data quality:	2.33
Score quality analysis:	3.5
Total score:	6
Quantity of data/information used:	10%-50% empirical information
Type(s) of data/information used:	Qualitative, observation-based
How insightful in terms of data/information?	Some new data / information
How insightful in terms of analysis/theory?	Some significant new analysis / theoretical insight
Clear underlying model of conflict	Strongly agree
Underlying model reviewed critically	Strongly agree
Underlying model used consistently	Strongly agree

Omolo, N. (2011). ‘Gender and climate change-induced conflict in pastoral communities : Case study of Turkana in north- western Kenya’, *African Journal of Conflict Resolution*, 81-102.

This article proceeds from the assumption that climate change is occurring, that it creates droughts and floods in northern Kenya. It argues that these changes are likely to increase the drivers of conflict in this area and increase the economic vulnerability of women. This article notes that pastoralist groups in this area have developed a complex set of coping strategies to deal with the changes and notes that mobility is an especially important component of this. It proceeds from the point that climate change increases resource competition among pastoral groups which in turn increases conflict, but does not account for what happens in times of abundance, such as floods or heavy rains which the author notes may also result in conflict. In making this claim this paper also fails to discuss scarcity/abundance debates. This paper provides a very good description of methodology and data collection that uses both survey and focus groups. This paper presents some interesting findings, but builds upon a shaky foundation as it fails to interrogate the larger assumptions linking climate change to conflict. It seems to assume a general relationship between these phenomena and makes jumps in logic that assume causal mechanisms without explaining or substantiating them or exploring the potential for reverse causality. This article notes factors that can complicate conflict dynamics (ethnic divisions, human and food security, etc) but does not meaningfully incorporate them into its analysis. Policy and governance factors are also omitted. Its discussion on climate change and women's roles is also unnuanced, and seems to proceed from the same climate-conflict link to then assess vulnerabilities.

Coder:	DS
Score data quality:	3.33
Score quality analysis:	1.5
Total score:	5
Quantity of data/information used:	10%-50% empirical information
Type(s) of data/information used:	Qualitative, interview-based
How insightful in terms of data/information?	No significant new data / information
How insightful in terms of analysis/theory?	No significant new analysis / theoretical insight
Clear underlying model of conflict	Strongly disagree
Underlying model reviewed critically	Strongly disagree
Underlying model used consistently	Disagree

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

This study uses GIS data and small geographical units (rather than national averages) to assess the relationship between environmental change and conflict using the Uppsala/PRIO

dataset. It also included state-level GDP estimates and political attributes. It finds that population growth and density are associated with increased risk of conflict, whereas land degradation and water scarcity have a very minor effect. Lower levels of GDP were the most important predictor of armed conflict. This article has transparent methodology and provides a number of new analyses of existing data. It is notable for its inclusion of small geographical units, which give a more accurate picture of local-level conflict dynamics and allow the model to achieve greater predictive power.

Coder:	DS
Score data quality:	3
Score quality analysis:	4
Total score:	7
Quantity of data/information used:	10%-50% empirical information
Type(s) of data/information used:	Quantitative; existing dataset
How insightful in terms of data/information?	No significant new data / information
How insightful in terms of analysis/theory? theoretical insight	Considerable amount of new analysis /
Clear underlying model of conflict	Strongly agree
Underlying model reviewed critically	Agree
Underlying model used consistently	Agree

Raleigh, C. (2010), 'Political Marginalization, Climate Change, and Conflict in African Sahel States', *International Studies Review* 12(1), 69-86.

This article explores the increased incidence of communal conflict resulting from increased vulnerability of certain groups due to climate change. It finds that the extent of political and economic marginalization/vulnerability is a critical component of overall vulnerability to the effects of climate change and the resulting emergence of conflict. This variable mediates the effect of climate change on conflict, and can be used as a way to predict where climate-induced conflict may occur. This article does use existing datasets but does not note their potential biases/limitations. Despite the use of these datasets, this article relies heavily on existing literature to make its points.

Coder:	DS
Score data quality:	2.33
Score quality analysis:	2.5
Total score:	5
Quantity of data/information used:	10%-50% empirical information
Type(s) of data/information used:	Quantitative; existing dataset
How insightful in terms of data/information?	No significant new data / information
How insightful in terms of analysis/theory? theoretical insight	Some significant new analysis /
Clear underlying model of conflict	Strongly agree
Underlying model reviewed critically	Strongly agree
Underlying model used consistently	Strongly agree

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

This article argues that climate change will cause people in LDCs to migrate, and may cause conflict in receiving areas. It notes that this conflict occurs in the presence of resource competition, ethnic tension, distrust, and socio-economic/cultural fault lines. This model applies to general migration as well, which is accelerated by climate change. The article notes the importance of considering climate change in the context of LDCs with agriculturally-based livelihoods and high frequencies of disasters. This article acknowledges that it does not find a causal link between climate change and conflict, and notes that its sample is likely to be too small to be generalisable. The data used in this paper spans 80+ years and is limited to conflicts for which data is available, which fails to capture small scale incidents. In the absence of multivariate analysis it is difficult to see strong correlations. This paper's conceptualization of the factors affecting conflict as a result of environmentally based migration is interesting, though it is difficult to separate environmental push factors from other push factors. It is also an interesting overview of large instances of environmental migration and conflict from a wide range of countries. While it acknowledges changes in environmental patterns over time in its theoretical discussion, this paper does not discuss these changes in the data analysis section and focuses instead on specific instances of environmentally-induced migration rather than broader patterns.

Coder:	DS
Score data quality:	2.66
Score quality analysis:	3.5
Total score:	6
Quantity of data/information used:	10%-50% empirical information
Type(s) of data/information used:	Quantitative; gathering own data
How insightful in terms of data/information?	Some new data / information
How insightful in terms of analysis/theory? theoretical insight	Some significant new analysis /
Clear underlying model of conflict	Agree
Underlying model reviewed critically	Agree
Underlying model used consistently	Strongly agree

Conservation Development Centre, International Institute for Sustainable Development, Saferworld (2009): ‘Climate change and conflict: Lessons from community conservancies in northern Kenya’ , CDC/IISD/Saferworld Report, November 2009

The Saferworld report examines the relationship between climate change and natural resource scarcity induced conflict in northern Kenya. Based on their fieldwork, the authors claim that resource scarcity already has a detrimental impact on conflict between pastoralists and farmers which will increase with further change. They conclude, however, that climate change may have less of an impact on conflict risks if good local natural resource management systems are integrated well with a national resource strategy. The conclusions are based on field and desk-based research and linked to the broader literature. The research methodology, however, is not explained in detail. For example, which members of the local communities were interviewed remain unclear.

Coder:	AH
Score data quality:	2
Score quality analysis:	3.5
Total score:	5.5
Quantity of data/information used:	10%-50% empirical information
Type(s) of data/information used:	Qualitative, interview-based
How insightful in terms of data/information?	Some new data / information
How insightful in terms of analysis/theory? insight	No significant new analysis / theoretical
Clear underlying model of conflict	Strongly agree
Underlying model reviewed critically	Disagree
Underlying model used consistently	Agree

Smith, D, Vivekananda, J (2007) ‘A Climate of Conflict: The Links between Climate Change, Peace and War’, *International Alert: London*

This oft-cited report by International Alert argues that climate change and conflict pose a double-headed risk of either armed conflict (in 46 countries) or political instability (in 56 countries). The authors do not link climate change and conflict directly but maintain that the 'consequences of the consequences' will lead to four key risks: political instability, economic weakness, food insecurity, and demographic changes (migration and urbanisation). Case studies on different countries are used throughout the report, however, it is not made clear on what evidence the case studies are based. Moreover, the uncertainties of climate change are not considered and despite the claims that no direct link between climate change and conflict is being considered the report makes very generalised and deterministic statements on the issue. Nevertheless, three of the twelve policy recommendations that the authors give are concerned with the need for further research.

Coder:	AH
Score data quality:	
Score quality analysis:	
Total score:	
Quantity of data/information used:	Less than 10% empirical information
Type(s) of data/information used:	Theoretical
How insightful in terms of data/information?	Theoretical
How insightful in terms of analysis/theory? theoretical insight	Some significant new analysis /
Clear underlying model of conflict	Agree
Underlying model reviewed critically	Disagree
Underlying model used consistently	Agree

Smith, P. (2007). 'Climate Change , Weak States and the " War on Terrorism" in South and Southeast Asia', *Contemporary Southeast Asia* 29(2), 264-285.

This essay finds that while a clear link between climate change and terrorism cannot be established, an association between these activities is emerging and will continue to do so in the future. It focuses on Indonesia, the Philippines, and Bangladesh. The suggested mechanism is that climate change may create weak states, reduce state capacity, and create ungoverned spaces, which are easily exploitable by political extremists. This paper relies on existing literature to make its claims. It makes good points about the destabilizing impact of climate change and is a useful look at the general state of affairs in these countries, but is unable to draw more than associational linkages.

Coder:	DS
Score data quality:	
Score quality analysis:	
Total score:	
Quantity of data/information used:	Less than 10% empirical information
Type(s) of data/information used:	Theoretical
How insightful in terms of data/information?	Theoretical
How insightful in terms of analysis/theory? theoretical insight	Some significant new analysis /
Clear underlying model of conflict	Disagree
Underlying model reviewed critically	Disagree
Underlying model used consistently	Disagree

Temestgen, A. (2010). ‘Climate Change to Conflict: lessons from southern Ethiopia and northern Kenya’, *Fafo Report 2010 (09)*

This paper shows that environmental deterioration coupled with other social/political/economic factors "tremendously increases" the likelihood of conflict in the Horn of Africa. It focuses on pastoralist communities in Northern Kenya and Southern Ethiopia, and notes that traditional institutions (which serve as coping mechanisms in times of environmental scarcity) are weakened due to policies of ethnic federalism, which disrupt reciprocal grazing arrangements. This weakening in turn increases the likelihood of violence/cattle raiding in pastoralist communities. This paper is interesting for its use of qualitative methods and uses grey literature and qualitative fieldwork. It employs a double exposure conceptual framework that uses climate and policy environment as explanatory variables. This study provides extensive information on the study area, but limited information on the fieldwork design/methodology/limitations, other than that it was interview-based. It notes that the conclusions of this study can be applied throughout the continent, but does not justify this claim or account for differing policy environments or traditional institutional arrangements.

Coder:	DS
Score data quality:	3
Score quality analysis:	3.5
Total score:	6.5
Quantity of data/information used:	10%-50% empirical information
Type(s) of data/information used:	Qualitative, interview-based
How insightful in terms of data/information?	Some new data / information
How insightful in terms of analysis/theory? theoretical insight	Some significant new analysis /
Clear underlying model of conflict	Strongly agree
Underlying model reviewed critically	Agree
Underlying model used consistently	Agree

Theisen, O. (2008). ‘Blood and Soil? Resource Scarcity and Internal Armed Conflict Revisited’, *Journal of Peace Research* 45(6), 801-818.

This article replicates the Hauge and Ellingsen (1998) study that found the strongest link to date between renewable resource scarcity and civil conflict, and found little support for this purported link. It concludes that poverty and dysfunctional institutions are robustly related to conflict. This paper uses the dataset from the original 1998 study as well as other existing data sets, but does not discuss the limitations of this data. It does however note possible limitations of using national aggregate data in later modeling. It notes that causality cannot be established, though cites the feedback mechanism between conflict and environmental degradation. This article contradicts many of the common assumptions behind prominent

theoretical views, and provides rigorous criticism of their models, and notes the need for a definition of degradation.

Coder:	DS
Score data quality:	2.66
Score quality analysis:	3.5
Total score:	6
Quantity of data/information used:	10%-50% empirical information
Type(s) of data/information used:	Quantitative; existing dataset
How insightful in terms of data/information?	Some new data / information
How insightful in terms of analysis/theory? theoretical insight	Considerable amount of new analysis /
Clear underlying model of conflict	Strongly agree
Underlying model reviewed critically	Strongly agree
Underlying model used consistently	Strongly agree

Tol, R. and Wagner, S. (2008). ‘Climate Change and Violent Conflict in Europe over the Last Millennium’, *FNU Working Paper 154*.

This article finds that conflict in Europe over the last thousand years has been more intense during colder periods, which confirms the conclusions of Zhang et al. (2006) that colder periods tend to be more violent, and that climate change may lead to reduced violence conflict in Europe. It notes that patterns of conflict related to temperature were more intense in medieval than modern times. It does note the possible reversal of this relationship in the tropics, however. It uses existing datasets and acknowledges their shortcomings, and also notes the limitations of the statistical analysis methods used. The conclusions of this paper are interesting and are arrived at through transparent methodology, though reverse causality and intervening variables are not noted. Its conclusions are however limited to Europe and Northern latitudes.

Coder:	DS
Score data quality:	3.66
Score quality analysis:	3
Total score:	6.5
Quantity of data/information used:	More than 50% empirical information
Type(s) of data/information used:	Quantitative; existing dataset
How insightful in terms of data/information?	Some new data / information
How insightful in terms of analysis/theory? theoretical insight	Some significant new analysis /
Clear underlying model of conflict	Strongly agree
Underlying model reviewed critically	Strongly agree
Underlying model used consistently	Strongly agree

Verhoeven, H., 2011. ‘Climate Change , Conflict and Development in Sudan : Global Neo-Malthusian Narratives and Local Power’, *Development and Change*, 42(3), p.679-707

Verhoeven argues that neo-Malthusian narratives of climate conflict in Darfur are theoretically and empirically problematic. According to Verhoeven, neo-Malthusians take a global outlook on the climate and security link and thus prioritise state defense over human security. Moreover, this kind of narrative is not only used by Western powers but also by African elites who use it to justify dam-building and agricultural projects that marginalise vulnerable groups. This is an extremely critical and well-argued article that unfortunately lacks empirical evidence. The author does not stop at questioning the climate security discourse but also shows problems with the definitions of violence and conflict themselves.

Coder:	AH
Score data quality:	
Score quality analysis:	
Total score:	
Quantity of data/information used:	Less than 10% empirical information
Type(s) of data/information used:	Theoretical
How insightful in terms of data/information?	Theoretical
How insightful in terms of analysis/theory? theoretical insight	Some significant new analysis /
Clear underlying model of conflict	Strongly agree
Underlying model reviewed critically	Strongly agree
Underlying model used consistently	Strongly agree

Warner, K., Hamza, M., Oliver-Smith, A., Renaud, F., and Julca, A. (2009). ‘Climate change, environmental degradation and migration’, *Natural Hazards* 55(3), 689-715.

This paper focuses largely on environmentally induced migration and only tangentially touches on conflict. It uses one quotation to note the relationship between water shortage and conflict, but makes no other connection. I makes this note as part of its larger discussion on factors (including conflict) of migration. This article presents significant other information on environmental causes of migration, but it has been graded on the extent to which it explores the environment-conflict relationship.

Coder:	DS
Score data quality:	
Score quality analysis:	
Total score:	
Quantity of data/information used:	Less than 10% empirical information
Type(s) of data/information used:	Theoretical
How insightful in terms of data/information?	Theoretical
How insightful in terms of analysis/theory?	NA
Clear underlying model of conflict	Strongly disagree
Underlying model reviewed critically	Strongly disagree
Underlying model used consistently	Strongly disagree

Witensburg, K. and Adano, W. (2009). ‘Of Rain and Raids: Violent Livestock Raiding in Northern Kenya’, *Civil Wars* 11(4), 514-538.

This article explores whether violent livestock raiding in Northern Kenya shows any seasonality by creating its own dataset and using archival material and interviews. It notes the assumption that conflict will be driven by resource scarcity and competition, but finds that raiding occurs more often in wet than dry years. This disproves the assumption, but implies the fluctuations of climate change will impact raiding. It notes the lack of a statistical relationship between conflict and resource scarcity, but cites the importance of human agency in conflict, and the importance of opportunity in determining incidence of raids and that raids are used a way to express resentment. It uses "violent deaths" as a proxy for conflict but doesn't note the shortfalls of this approach or explore the potential problems of assuming this link. This study notes some limitations of the data used, but does not touch on biases in assessment or limitations internal/external validity of its conclusions.

Coder:	DS
Score data quality:	3.33
Score quality analysis:	2
Total score:	5.5
Quantity of data/information used:	More than 50% empirical information
Type(s) of data/information used:	Quantitative; gathering own data
How insightful in terms of data/information?	Some new data / information
How insightful in terms of analysis/theory? theoretical insight	Considerable amount of new analysis /
Clear underlying model of conflict	Strongly agree
Underlying model reviewed critically	Agree
Underlying model used consistently	Agree

Appendix 2: Grading Form

Evidence Paper Grading Form

Full citation:

Initials grader:

1. Please assess the amount of evidence the work contains (enter a '1' to select):

Roughly how much of the work being assessed presents empirical data/information– rather than theory, hypotheses, review of other literature etc.?	50% or more	
	between 10% and 50%	
	10% or less	

2. Please select *main* category/ies of empirical data/information the work uses (enter a '1' to select):

A. Quantitative, using existing dataset	
B. Quantitative, gathering own data	
C. Qualitative, interview based	
D. Qualitative, ethnographic / participatory observation	
E. Other primary sources	

3. Please answer the following questions, *for selected category/ies only*:

A. Quantitative, using existing dataset (enter a '1' to select)

	Strongly disagree	Disagree	Agree	Strongly agree	Score
Indicators used accurately capture the phenomenon the author aims to draw conclusions about (proxies are appropriate, measures are sensitive to changes on the ground).					
The process of compiling the data is transparent: the author provides the source of his data and describes how data is collected by a third party.					
Potential biases in the data are acknowledged: data not missing at random, limited number of observations, measurement error, etc.					
The paper has a sound identification strategy: the author shows that the observed relationship indicates a <i>causal</i> relationship and that it is not due to reversed causality, non-random allocation of 'treatment', intervening third (omitted) variables, etc. The author acknowledges limitations and provides robustness checks.					
Conclusions are supported by the data. Limitations to the internal validity (do conclusions apply to case(s) investigated?) and external validity (do conclusions apply to cases other than those studied?) are discussed.					

B. Quantitative, compiling own dataset (enter a '1' to select)

	Strongly disagree	Disagree	Agree	Strongly agree	Score
Method of data collection is transparent and clear.					
Data collected is representative of the wider population the research question implies: participants are selected in some systematic way. Nonresponse is limited.					
Potential biases in the data are limited/acknowledged: interviewer bias (respondent influenced by characteristics of interviewer), strategic bias (respondent provides inaccurate answers with some personal gain in mind), recall bias.					
The paper has a sound identification strategy: the author shows that the observed relationship indicates a <i>causal</i> relationship and that it is not due to reversed causality, non-random allocation of 'treatment', intervening third (omitted) variables, etc. The author acknowledges limitations and provides robustness checks.					
Conclusions are supported by the data. Limitations to the internal validity (do conclusions apply to case(s) investigated?) and external validity (do conclusions apply to cases other than those studied?) are discussed.					

C. Qualitative, interview based (enter a '1' to select)

	Strongly disagree	Disagree	Agree	Strongly agree	Score
Information collected is adequately representative of the population / group the research aims to draw conclusions about					
The method of interviewing is clear, including the time frame of interviews, number of interviewees.					
Potential interview biases are limited/acknowledged: interviewer bias (respondent influenced by characteristics of interviewer), strategic bias (respondent provides inaccurate answers with some personal gain in mind), recall bias.					
Conclusions drawn are supported by the interviews; findings show that a substantial share of the interviews supports the conclusion(s).					
The analysis is contextualized in a broader literature / history. Generalizability of the conclusion(s) is considered.					

D. Qualitative, ethnographic / participatory observation (enter a '1' to select)

	Strongly disagree	Disagree	Agree	Strongly agree	Score
Information collected is adequately representative of the population / group the research aims to draw conclusions about					
Potential biases in the collection of information are limited. Efforts to triangulate information are made.					
Information is richly textured; nuanced and detailed information about local level experiences is included. Information is not limited to a handful of quotes.					
Conclusions drawn are supported by the observations made. Findings show that a substantial share of observations supports the conclusion(s).					
The analysis is contextualized in a broader literature / history. The broader relevance of the conclusion is considered.					

E. Other primary sources (i.e. archives, government documents, reports, photographs)

	Strongly disagree	Disagree	Agree	Strongly agree	Score
Information collected is adequately representative of the population / group the research aims to draw conclusions about					
Potential biases in the collection of information are limited. Efforts to triangulate information are made.					
Method of data collection is transparent and clear.					
Conclusions drawn are supported by the information collected. Findings show that a substantial share of information collected supports the conclusion(s).					
The analysis is contextualized in a broader literature / history. The broader relevance of the conclusion is considered.					

TOTAL SCORE QUALITY DATA / INFO
TOTAL SCORE QUALITY ANALYSIS
TOTAL SCORE
TOTAL SCORE MENDELEY

4. Please assess the overall quality of the work (enter a '1' to select)

4.1 In comparison to other literature you have reviewed, how insightful do you consider this work to be in terms of data/information?

No significant new data/information presented	
Some new data/information presented	
A considerable amount of new data/information presented	

4.2 In comparison to other literature you have reviewed, how insightful do you consider this work to be in terms of analysis presented?

No significant new analysis or theoretical insight.	
Some new analysis or theoretical insight	
A considerable amount of insightful analysis or theoretical insight	

5. Please give a 1-3 line summary of the main argument of the work and a 1-3 line annotation (assessment of the quality of the work)

--

Completeness check:

Please answer question 1

Appendix 3: List of Databases searched

The searches were done using the following staged approach as suggested by the LSE Library. Their advice begins with three general abstracting and indexing databases, followed by a number of specialist databases, then finally some freely available and niche resources.

Stage one: general abstracting & indexing databases

The following resources are quality-controlled, general abstracting & indexing databases. They include records from large but limited sets of peer-reviewed journal literature. Using these resources will ensure that an extensive set of peer-reviewed journal literature is searched.

- Scopus <https://catalogue.lse.ac.uk/Record/1252795>
- ISI Web of Knowledge <https://catalogue.lse.ac.uk/Record/1149290>
- IBSS <https://catalogue.lse.ac.uk/Record/1149716>

Stage two: subject specialist databases

The following resources are subject-specific abstracting & indexing databases, which provide focussed coverage of the subjects in question. They can be utilised to gap-fill after searches with the databases in stage one have been used.

- ELDIS (<https://catalogue.lse.ac.uk/Record/1152004>)
 - ENDS (<https://catalogue.lse.ac.uk/Record/663683>)
 - Environmental impact from climate change to biodiversity loss: documenting man's impact (<https://catalogue.lse.ac.uk/Record/1263831>)
 - GreenFILE (<https://catalogue.lse.ac.uk/Record/1151905>)
- Columbia International Affairs Online (CIAO) <https://catalogue.lse.ac.uk/Record/648529>. It uses a Google search engine which is difficult to search in a structured manner, so some experimentation may be required.

A specific list of climate focused journals is available here

http://zw4gk5cr3l.search.serialssolutions.com/?V=1.0&N=100&L=ZW4GK5CR3L&S=T_W_A&C=climate

Stage three: web-based, free to access services

The following resources are freely available scholarly literature search engines. They examine much of the material covered by the databases above, but also have the advantage of including "grey" literature, such as working papers, NGO/ IGO material, blog content etc. Google Scholar is the leading product in this area, but it is recommended that at least one other resource be used to guard against potential Google bias.

- Google Scholar <http://scholar.google.co.uk/> (searches across scholarly literature as defined by Google; selection and ranking are both opaque)
 - Scirus <http://www.scirus.com/> (emphasis is on scientific literature, but contains information on all scholarly disciplines)
 - RefSeek <http://www.refseek.com/> (new product; searches across IGO and NGO websites, as well as academic sites for scholarly literature, broadly defined)
 - OAISTER <http://oaister.worldcat.org/> (search engine which searches across institutional repositories. Particularly useful for working papers & other informal literature, can also throw up information from non-Western sources. Also picks up book chapters)
- There are also some free resources here (there are only 7): <http://www.delicious.com/LSELibrary/climatechange>

Stage four: other resources

These resources fulfil a variety of needs for searching for specialised types of information. As with stage 2, the resources can be used selectively. They may also be considered to be outside the scope of the literature review (e.g. gateways for regional and governmental information).

For your search topic, I would recommend having a look at books and theses and dissertations, if time allows; the other sources are likely to be less important. Searching for books.

- Worldcat <http://www.worldcat.org/> (federated catalogue of worldwide library catalogues)
- Searching for theses and dissertations.
- Proquest dissertations and theses <https://catalogue.lse.ac.uk/Record/1149203> (indexing & abstracting service for international theses)
 - DART Europe <http://www.dart-europe.eu/> (federated search tool to search across European repositories of PhD theses)
 - Database of African Theses and Dissertations (DATAD) <http://www.aau.org/datad/>
- Searching for blog content:
- Technorati <http://technorati.com/>
 - Bloglines: <http://www.bloglines.com/>
- Searching for press and news material:
- Nexis <https://catalogue.lse.ac.uk/Record/1149745> (full text versions of a large number of Major international, national and local newspapers)



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- Social Science Research Council (USA)
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- Video Journalism Movement (Netherlands)
- World Peace Foundation, Tufts University (USA)

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