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# Conflicting messages? The IPCC on conflict and human security

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ABSTRACT

Violence seems to be on a long-term decline in the international system. The possibility that climate change would create more violent conflict was mentioned in scattered places in the Third and Fourth Assessment Reports from the Intergovernmental Panel on Climate Change (IPCC), published in 2001 and 2007 respectively. The empirical literature testing for relationships between climate change and various forms of conflict has undergone a major expansion since then. The report from Working Group II of the Fifth Assessment Report contains a much more careful assessment of the climate change-conflict nexus. The Human security chapter reports high agreement and robust evidence that human security will be progressively threatened as the climate changes. But as far as the impact on armed conflict is concerned, it paints a balanced picture, concluding that while individual studies vary in their conclusions, 'collectively the research does not conclude that there is a strong positive relationship between warming and armed conflict'. The chapter also argues that climate change is likely to have an influence on some known drivers of conflict, and this point is reiterated in other chapters as well as the Technical summary and the Summary for policymakers. A chapter on 'Emergent trends …' has a somewhat more dramatic conclusion regarding a climate-conflict link, as does the Africa chapter, while a methods chapter on 'Detection and attribution' dismisses the climate-change-to-violence link. The entire report is suffused with terms like 'may', 'has the potential to', and other formulations without any indication of a level of probability. Overall, the Fifth Assessment Report of the IPCC does not support the view that climate change is an important threat to the long-term waning of war. Still, the report opens up for conflicting interpretations and overly alarmist media translations.



## New threats to security?

Globally, in the first decade after World War II, an average of some 300,000 people per year died in battle-related violence. In the first decade in the new Millennium the figure had shrunk to around 44,000. An influential argument has been made that this is part of a broad and long-term decline in the use of violence in human affairs (Pinker, 2011). However, the world is not yet a peaceful place by any means, and the decline in armed group violence is certainly not monotonic. Many potential threats to peace have been proposed, including environmental change, and more specifically climate change. For instance, United Kingdom and Germany have pushed for climate change to be recognized as a security issue by the UN Security Council and the Council has held three debates on the issue (2007, 2011, 2013). In the most recent session, Germany's representative stated that 'with the current trends of $CO_2$ emissions, climate change will continue and lead us into a 4 degrees scenario with devastating consequences – with a high risk to economic growth and a grave threat to peace and security.' (German Mission to the UN, 2013). In academic circles, strong statements have also been made about a climate-conflict link. Notably, a prominently published article by Burke, Miguel, Satyanath, Dykema, and Lobell (2009) foresaw 393,000 additional battle-related deaths in sub-Saharan Africa over a 28-year period up to 2030 if temperatures continued to rise and new conflicts were as deadly as those in the period 1981–2002. However, there is no consensus in the scholarly community about such dire projections of future climate wars; in fact most observers conclude that there is no robust and consistent evidence for an important relationship between climate change and conflict (Bernauer, Böhmelt, & Koubi,

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2012; Scheffran, Brzoska, Kominek, Link, & Schilling, 2012; Theisen, Gleditsch, & Buhaug, 2013).[1]

Although climate change is likely to have severe consequences for people around the world, in particular for already vulnerable populations, the link to violent conflict is a potential but contested consequence. In this article, we examine how the Intergovernmental Panel on Climate Change (IPCC) has dealt with the question of a climate-conflict nexus in its three most recent assessment reports over the period 2001–14. We focus in particular on the most recent report from Working Group II of the Fifth Assessment Report (AR5) (IPCC, 2014a), which has by far the most comprehensive treatment of this issue. While the two previous reports dealt with the question of a climate-conflict nexus in an unsystematic and sometimes haphazard manner, the Human security chapter of the new report (Ch 12) presents a more balanced and comprehensive assessment. However, there are significant inconsistencies between different chapters in AR5. Other problems with IPCC's evaluation of the climate-conflict nexus are the lack of clear adjudication of what existing evidence shows and a failure to provide a solid assessment of the probability of future climate conflict and its severity if it occurs.

## The IPCC

The IPCC was set up in 1988 as a daughter organization of the World Meteorological Organization and United Nations Environment Programme and endorsed by the UN General Assembly (Hulme & Mahony, 2010). Its task was 'to provide the world with a clear scientific view on the current state of knowledge in climate change and its potential environmental and socio-economic impacts' (IPCC, no date). In its reports, the IPCC 'reviews and assesses the most recent scientific, technical and socio-economic information produced worldwide ... It does not conduct any research nor does it monitor climate related data or parameters.' Governments endorse the IPCC reports and thus 'acknowledge the authority of their scientific content. The work of the organization is therefore policy-relevant and yet policy-neutral, never policy-prescriptive.'

The most important documents published by the IPCC are the highly influential and widely read Assessment Reports. We comment on the last three: IPCC (2001), IPCC (2007), and IPCC (2013a, b, 2014a, b, c).[2] All these reports are in three volumes prepared by different Working Groups. In AR4 and AR5 the WG I report is titled 'The Physical Science Basis', WG II 'Impacts, Adaptation and Vulnerability', and WG III 'Mitigation of Climate Change'. The WG II report deals with the social consequences of climate change, which is our main focus here.[3]

The reports are prepared by panels of academics. Individual chapters are sent out for review at least twice. In the final stages, the reports are also reviewed by governments (IPCC, 2013a). As noted by the IPCC, this commits governments to accepting the reports as valid summaries of the state of knowledge, but it also potentially opens up for political pressure. Reviewers are asked to comment on drafts and suggest revisions, but the review process is not blinded. The selection of authors for the various chapters can potentially be influenced by political concerns. As a minimum, the logic for selecting authors is based on a strong priority to having representation of authors with different nationalities, rather than based exclusively on picking the world-leading experts on the various topics. The national processes for nomination of authors vary (IPCC, 1999).

Since the IPCC does not conduct any research itself, it depends on existing publications up to a certain cut-off date. Generally, the IPCC relies on peer-reviewed research, but also uses other sources, such as industry journals, unpublished working papers, and workshop proceedings. This is particularly common in WG II, which summarizes the social science research about the consequences of climate change. A wide-ranging examination of the IPCC by the InterAcademy Council (IAC, 2010: 18), an international body set up by national academies of science, acknowledged that some governments, particularly in developing countries, had not always nominated the best experts, that the author-selection process suffered from a lack of transparency, and that the regional chapters did not always make use of experts from outside the region. It also cited a study that found that while 84 percent of the sources for IPCC's Working Group 1 on the physical science basis derived from peer-reviewed sources, it was only 59 percent for Working Group 2 on the vulnerability of socio-economic and natural systems to climate change (IAC, 2010: 16).

## Conflict in the IPCC assessment reports

In an early critical summary of research on climate change and conflict in this journal we argued that the field of climate-conflict research was weakly developed and that the IPCC had little systematic research to draw on (Nordås & Gleditsch, 2007). We concluded that, in order to move forward, the scholarly community should give priority to: disentangling the various potential effects of climate change on conflict; promoting a closer coupling of climate change models and conflict models; considering what kinds of violence we expect to result from climate change; attempting to balance positive and negative effects of climate change as well as the effects of various strategies of adaptation; and focusing on consequences for areas particularly vulnerable to conflict. Since then, there has been a major expansion of research in this field, and a series of studies have addressed these points. Hence, the most recent report from the IPCC (2014a) has a much larger body of evidence to synthesize. This is apparent when assessing how the climate-conflict nexus has featured in the IPCC reports from 2001 to 2014.[4]

In an earlier study (Nordås & Gleditsch, 2013) we reported an extensive search in the then two most recent IPCC Assessment Reports (2001, 2007) carried out in order to evaluate the IPCC's treatment of the relationship between climate change and armed conflict. The following search profile was applied to all substantive parts of the IPCC reports:

'armed' OR 'conflict' OR 'violen' OR 'war'

The term 'violen' captures 'violence' as well as 'violent'. By searching for all instances of these terms, 'conflict' also yields hits for 'conflicts', 'conflict-ridden', 'conflicting', etc. The term 'war' includes 'wars', 'warlike', etc. More limited searches in AR4 using a wider list of search terms (including 'riot', 'uprising', 'insurrection', 'revolution', 'genocide', 'massacre') did not yield additional hits, and we found no indication that a wider search would have yielded additional material (Nordås & Gleditsch, 2013).

Occurrences of the search terms were classified into *irrelevant hits* (such as when 'war' picks up World War II), 'conflict' is found in 'conflicting priorities', or 'violen' occurs in 'violent cyclones', *low relevance hits* (e.g. where 'conflict' refers to conflict of interest without violence; or where the reference is to consequences of conflict), *medium relevance* (where climate change is believed to increase the duration or severity of on-going conflicts), and *high relevance* (where it is argued that violent conflict has been caused by climate change or by a resource scarcity which is likely to be exacerbated by climate change). In this article, we extend the analysis to AR5.

In our analysis of TAR and AR4, we assessed each of the high-relevance hits, studied the evidence for the statements, including whether it was based on peer-reviewed research, and tried to trace

the sources. Sometimes, a chain of citations would continue to reproduce conventional wisdom or hearsay or end up in a circular pattern. Because the search terms occur so much more frequently in AR5, we cannot go into individual instances in the same detail here; but have traced sources for high-relevance hits in cases where we were unfamiliar with the publications or uncertain about the evidence base.

Table 1 shows the frequency of the four terms in the three searches. The incidence of 'conflict' and the three related terms fell radically from TAR to AR4, but rose to new heights in AR5. This is not surprising in view of the fact that Chapter 12 was allocated to 'Human security', with a special section devoted to conflict. Clearly, the IPCC now pays more attention to the possibility of conflict as a result of climate change, but this does not in itself tell us how the IPCC assesses this possible link. We now turn to a substantive discussion of the three most recent assessment reports.

## TAR

Most of the over one hundred occurrences of the word 'conflict' in the TAR were irrelevant or of low or medium relevance. The high-relevance cases discussed the potential for 'water wars', conflicts generated by climate change-induced migration, or resource wars in the wake of climatic shifts.

The general tenor of the discussion of 'water wars' is that 'negative trends in water availability have the potential to induce conflict between different users' (IPCC, 2001: 84). However, the sources cited for this view provide no evidence for it. In fact, while frequent threats can be cited, outbreaks of interstate violence over water have been rare or even non-existent (Wolf, 1998). Some of the sources also stress that water is more frequently a source of cooperation, even between countries that have gone to war on other issues, such as India and Pakistan (Dellapenna, 1999). TAR cites the widely publicized 'water conflict chronology' developed by Gleick (1998), but overlooks that few of the listed conflicts involve any actual violence and that most concern the use (or threat of use) of water as a weapon in an on-going conflict. TAR's chapter on Africa (Ch 10) argues that along with resource degradation and population growth, water scarcity can create conflict, but no sources are cited for this claim (IPCC, 2001: 495). Ironically, both TAR and AR4 ignore academic empirical work that concludes that shared water resources in international rivers are associated with an increased risk of conflict (Furlong, Gleditsch, & Hegre, 2006; Toset, Gleditsch, & Hegre, 2000).[5]

In discussing the possibility that climate change could lead to migration that in turn would generate conflict over resources, the TAR follows many NGO and policy reports in citing the warnings by Myers (1993) about up to 200 million future 'climate refugees'. However, it is generally recognized that this figure represents guesswork rather than a scientifically-based estimate. Another cornerstone of this discussion is the work of Homer-Dixon (1991, 1999), which argues the case for resource scarcity as an important contributing cause of conflict, exemplified by several case studies. However, the TAR does not mention the widespread criticism of Homer-Dixon's work, that it selects on the dependent variable and fails to consider whether cases on non-war might have equally serious scarcities (see e.g. Gleditsch, 1998; Levy, 1995).

**Table 1**
The use of terms indicating conflict or violence in recent IPCC WG II reports.

| Report | TAR | AR4 | AR5 |
|---|---|---|---|
| Year | 2001 | 2007 | 2014 |
| Term | | | |
| Irrelevant | 47 | 10 | 9 |
| Low relevance | 37 | 57 | 27 |
| Medium relevance | 6 | 4 | 50 |
| High relevance | 27 | 10 | 169 |
| Sum | 117 | 45 | 255 |
| Pages in report | 1032 | 987 | 2635 |

Number of occurrences of terms from the search profile. Based on electronic searches in the WG II reports on-line. The search in TAR includes some hits from WG III on mitigation. Since the TAR is no longer available in electronic form, we cannot eliminate these hits, but they are in any case few relative to WG II. A more detailed analysis of the discussion of conflict in TAR and AR4 is found in Nordås and Gleditsch (2013).

## AR4

By 2007 there was increasing public concern about the security implications of climate change, as indicated by for instance the calling of a first special session of the UN Security Council on the topic (UN, 2007), as well as the Nobel Peace Prize Award to the IPCC and Al Gore. However, AR4 WG II, which was published that year, was finished too early to be influenced by these events. In fact, as noted in Table 1, our search terms occurred *less* frequently in AR4, perhaps because the IPCC had strengthened its standards and realized that the amount of peer-reviewed systematic research was still limited. AR4 does contain some references to a possible climate-conflict link, but not many. Most of the high-relevance items are found in the Africa chapter (Ch 9) and the Synthesis report does not contain any.

As in TAR, the prospect of 'water conflict' surfaces in AR4 (IPCC, 2007: 299) in a guarded formulation that climate change can potentially lead to conflict via competition for water resources. However, the basis for this appears to be a two-page article in a newsletter (Lopez, 2004) that explains why, despite the potential for conflict, three countries in Central America have achieved transborder *cooperation* on water issues. The three other high-relevance references are similarly cautiously worded and weakly founded. Thus, they offer little or no support for a climate-change-to-armed-conflict scenario.

The Africa chapter contained 11 references to the search terms, more than any other chapter. Most of these are classified as of medium relevance, but there are three 'high relevance' hits. Still, none of the works cited provides much evidence that climate change will cause violent conflict.

## The Fifth assessment report, AR5[6]

As noted in Table 1, the AR5 has much more frequent references to conflict (and the other search terms) than the earlier reports. Most of them occur in the Human security chapter (Ch 12), which has a 4½ page section on conflict (12.5). However, there is also fairly extensive discussion of conflict in Ch 19 on Emergent risks and key vulnerabilities and in Ch 22 on Africa, a brief but important section in Ch 18 Detection and attribution of observed impacts, as well as smaller comments in 20 other substantive or regional chapters, as well as the two summary chapters (Technical summary, TS, and Summary for policymakers, SPM). There is considerable cross-referencing, so many other chapters refer to the main points about conflict from the Human security chapter, which also brings up the total number of hits for our search terms.

### *The Human security chapter*

Overall, the treatment of conflict in the Human security chapter is balanced. It relies exclusively on published sources[7], most of which are probably peer-reviewed, and well reflects the state of the literature. It cites studies that argue that large-scale climate change is associated with war and the collapse of empires, but cautions

that such 'findings from historical antecedents are not directly transferable to the contemporary globalized world' (pp. 15–16). In summarizing the literature on short-term warming and armed conflict, the chapter concludes that 'Some of these studies find a weak relationship, some find no relationship, and collectively the research does not conclude that there is a strong positive relationship between warming and armed conflict' (p. 16). The authors also cite various studies on rainfall deviations and civil war. Here, again, some studies find a relationship and others do not. 'There is high agreement that in the specific circumstances where other risk factors are extremely low (such as where *per capita* incomes are high, and states are effective and consistent), the impact of changes in climate on armed conflict is negligible.' (p. 16) All of this is fully in line with previous summaries of the literature, such as Bernauer, Böhmelt & Koubi (2012), Gleditsch (2012), Scheffran et al. (2012), and Theisen et al. (2013). The study by Hsiang, Burke, and Miguel (2013), to which we return below, says otherwise. But in the Human security chapter the latter study is treated as one of several literature summaries, and not given additional weight, although there is a cross-reference to Ch 19 (p. 25).

The chapter notes that there is 'some agreement' that climate variability is associated with non-state conflicts (generally smaller and localized conflicts), but that the risk is mediated by the presence of conflict-management institutions.

The chapter finds that 'Many of the factors that increase the risk of civil war and other armed conflicts are sensitive to climate change', citing poverty, slow economic growth, economic shocks, and inconsistent political institutions (p. 17). This is not controversial. However, there are (at least) three problems here: First, none of the studies on climate and conflict, with the possible exception of literature on heat and individual aggression, assume that climate has a direct influence on violence. The assumption, usually if not always made explicit, is that climate change (be it increasing heat or changes in precipitation) influences other factors, which in turn lead to conflict. Without these intervening factors (or mechanisms) the relationship between climate change and conflict simply cannot be understood. Thus, it is misleading to say first that 'collectively the research does not conclude that there is a strong positive relationship between warming and armed conflict' and then go on to posit a link nevertheless because warming will influence well-known and established risk factors.[8]

Secondly, correlations are not transitive (except when they are very high, cf. Langford, Schwertman, & Owens, 2001). Thus, it is not a given that establishing a link from A to B and from B to C is sufficient to establish empirically a link from A to C. (For instance, if a modest correlation from A to B is driven by one subset of cases and a correlation from B to C by another, A and C are unlikely to be linked at all.) What the chapter authors might usefully have done here is to look for studies that have explicitly examined the two-stage process, from climate change to the risk factors and from the risk factors to conflict. Few studies so far have attempted this. Two studies that have done so are Koubi, Bernauer, Kalbhenn, and Spilker (2012) and Bergholt and Lujala (2012). Neither of these articles provides much support for the A–C link. Both of them are cited in the Human security chapter, but the point about the lack of transitivity in the two-stage process is missed.

Finally, to strengthen the first part of the proposed indirect link from climate change to civil war, a cross-reference to Ch 10 (on the economic effects of climate change) would have been useful. This chapter is quite modest when it comes to the global economic effects expected to result from global warming: 'For most economic sectors, the impact of climate change will be small relative to the impacts of other drivers' (Ch 10: 3). Globally aggregated economic impacts of global warming are a small fraction of income up until 3 °C … . A global mean average temperature rise of 2.5 °C may lead to global aggregated economic losses between 0.2 and 2.0% of income …'. This refers to a loss in the level of annual income rather than to a drop in the growth rate of the economy. The time-frame is not specified, but one of the CLAs of the chapter has written elsewhere that the global loss of GDP over a fifty-year period is less than an average year's economic growth (Tol, 2014).[9] Thus, at the level of global warming currently foreseen, we are not facing a major global economic upheaval. Of course, as Ch 10 notes, 'aggregate impacts hide large differences between and within countries'. Also, climate could be one of the causes why some countries are trapped in poverty, and climate change may make it harder to escape poverty, although Ch 10 emphasizes that the evidence is thin and contradictory. Hence, the robust finding that poor countries have more civil war (Hegre & Sambanis, 2006) is by no means irrelevant, but must be tempered by the potential for redistribution in a world that will be on average much wealthier. In the WG III on mitigation, published two weeks after the WG II report, the chapter on 'Economics of adaptation' (Ch 17) suggests that the global adaptation costs will be between $70 billion and $100 billion globally by 2050. Although the authors qualify this by saying that 'there is little confidence in these numbers', this reinforces the relative optimism of the WG II report with regard to the economic consequences of climate change. This obviously has important implications for the possible role of economic factors in generating conflict.

Apart from titles in the bibliography, there are no references in the Human security chapter (or in the rest of the WG II report) to 'water wars'[10] or, for that matter, to 'environmental security'. Although the term 'climate refugee' occurs frequently in the references in the Human security chapter, in the main text it only turns up once in order for the authors to note that the term is 'scientifically and legally problematic'. The chapter reviews a number of studies that reject the widely-reported view that climate change was a major driver of the conflict in Darfur and instead identify government practices as far more influential.

Although the Human security chapter is cautious about drawing conclusions about the relationship between climate change and conflict, there is little question about its conclusion with regard to the general issue of human security: 'Human security will be progressively threatened as the climate changes (high agreement, robust evidence)' (Ch 12: 2). The chapter acknowledges the variety of definitions of human security and chooses to define it very widely 'as a condition that exists when the vital core of human lives is protected, and when people have the freedom and capacity to live with dignity. In this assessment, the vital core of human lives includes the universal and culturally specific, material and non-material elements necessary for people to act on behalf of their interests.' (Ch 12: 3). The chapter finds that climate change is a threat to human security because it undermines livelihoods, compromises culture and identity, induces migration that people would rather have avoided, and challenges the ability of states to provide the conditions necessary for human security.

Other scholars apply much narrower definitions. For instance, *Human Security Report* (Mack, 2005: viii), widely read but not cited in the WG II report, limits human security to the protection of individuals from the threat of violence. This approach allows statistical tracking of the ups and downs of human security through numbers on interstate and civil war, group conflicts and one-sided violence, and violent crime. By contrast, the definition in the Human security chapter is too wide to allow serious attempts to assess the secular trend. For some forms of human security that are close to the narrower definition (such as fatal victims of climate-related natural disasters, Ch 12: 25), one can obtain a yardstick for measuring whether human security is generally increasing or decreasing, but for even broader aspects it becomes very difficult. In

such cases, it will be doubly difficult to assess the deviations from this trend attributable to climate change. There is a real danger that any kind of social change disliked by some group becomes a threat to someone's human security. For instance, the amount of 'migration that people would rather have avoided' must be considerable, but is hardly measurable. And even if it were, would this entity be of much interest unless we can say something about the actual consequences of the move? Globalization generally gets a bad rating in the human security literature (featuring as a stressor and, along with climate change, putting people in double jeopardy, cf. Leichenko & O'Brien, 2008), but for many people it also is associated with higher income and a better life. As Mack (2005: viii) notes, a concept of human security that is overly broad may be useful for advocacy, but has limited utility for policy analysis.

*Emergent risks*

Chapter 19 deals with 'Emergent risk and key vulnerabilities'. An emergent risk is defined as 'A risk that arises from the interaction of phenomena in a complex system' (Ch 19: 13). Specifically, this refers to the interaction between climate-generated hazards with the vulnerability of societies or ecosystems (Ch 19: 14). This chapter finds climate change to be an emergent risk because, as argued in Chapter 12 and elsewhere, factors such as poverty and economic shocks that are associated with conflict are influenced by climate change. However, as already pointed out, these are *intervening* factors, mechanisms that are hypothesized – and sometimes demonstrated – to explain why climate change is associated with more conflict. The *interaction* of climate change with economic and political factors and the possible effects of such interactions on conflict is a different matter, which has been lacking in much of the research on the climate-conflict nexus. (One exception is Fjelde & von Uexkull, 2012: 444, which finds that 'the effect of rainfall shortages on the risk of communal conflict is amplified in regions inhabited by politically excluded ethno-political groups', but this study is not cited in Ch 19.) This chapter also relies heavily on Hsiang et al. (2013), which is described as the 'only meta-analysis in the literature'.[11] That study, however, is neither about interaction effects nor about mechanisms. This discussion would therefore appear to have been more appropriately located in the Human security chapter – except that the authors of that chapter chose to attribute less influence to it. The outcome, that the substance of the Hsiang et al. (2013) article is not discussed in the Human security chapter but in the Emergent risk chapter, is hard to understand except possibly as a political compromise.

*Detection and attribution*

The hardest blow to the hypothesized climate-conflict nexus is found in an unexpected place, Chapter 18 on 'Detection and attribution of observed impacts'. The essence of this chapter is to assess the occurrence of magnitude of 'changes in climate that deviate from historical conditions, irrespective of the driver of climate change.' The chapter points out that relatively few studies of the effects of climate change assess specifically the consequences of anthropogenic climate change as distinct from natural fluctuations (Ch 18: 3ff). It is linked directly to the assessments made by most other chapters in the report, but its definitions for detection and attribution differ from those found in other chapters (Ch 18: 5ff). The chapter also notes that there are substantial challenges to the detection and assessment of the impacts of climate change on natural and human systems since virtually all such systems are affected by factors other than climate change and these need to be controlled for. Another complication is the ability of many systems to adapt to climate change (Ch 18: 6). In many ways, this is the chapter most skeptical of excessive claims about the effects of climate change. This skepticism emerges particularly clearly when it turns to possible effects of climate change on conflict. There seem to be two reasons for this skepticism: One is that results in the existing literature that indicate a climate-conflict link are contested. Secondly, the empirical literature focuses on interannual variability rather than climate change. 'While a plausible argument could be made that climate change has increased interannual variability and has, therefore, contributed positively to the rate of civil conflict, this argument has not been tested in the literature.' (Ch 18: 25) The chapter therefore dismisses the impact of climate change on civil conflict, small-scale communal violence, and violent crime[12], in all the three cases concluding that 'neither the detection of an effect of climate change … nor an assessment of the magnitude of such an effect can currently be made with a high degree of confidence' (Ch 18: 25). With regard to interstate war, by far the most severe armed conflicts in the Twentieth Century in terms of battle deaths, the chapter states categorically (Ch 18: 25) that 'there is no evidence of a climate change effect on inter-state conflict in the post-WW II period'.

*Africa*

The Africa chapter (Ch 22) provides 15 high-relevance hits in our electronic search, but given the discussion of conflict in the three chapters just reviewed, it is not as important as in AR4 (IPCC, 2007). The Africa chapter repeats the idea from the Human security chapter that climate change might affect other factors that are also drivers of conflict. However, in many cases, the wording is cautious and refers mainly to the potential to *exacerbate* or *multiply* existing threats, including conflict. The potential for water conflict is mentioned (e.g. p. 56) but as conflict of interest, not necessarily involving violence.[13] The chapter's section on violent conflict (22.6.1.1) notes that the environment is rarely considered the most decisive cause of conflict; and that 'it remains disputed whether, and if so, how, the changing climate directly increases the risk of violent conflict in Africa' (p. 45). Here, the debate between Burke et al. (2009) and Buhaug (2010) is cited. (The debate has continued in Buhaug, 2014; Cane et al., 2014; Hsiang & Meng, 2014; O'Loughlin, Linke, & Witmer, 2014; Raleigh, Linke, & O'Loughlin, 2014). However, based on Hsiang et al. (2013), the Africa chapter goes on to claim that 'views are emerging that there is a positive relationship between increases in temperature and increases in human conflict'. As noted, these views are now sharply contested (Buhaug et al., 2014).

The relationship, if any, between climate change and conflict via migration is presented in vague terms, with reference to 'interaction of climate change, disaster, conflict, displacement, and migration' (p. 46). No more detail is given regarding the nature of this interaction. A single source (Kolmannskog, 2010) is the main foundation here. This study does not establish a clear link between climate change and conflict and has a very limited empirical base – 49 semi-structured interviews of 'experts and affected people' conducted in selected areas in Kenya and Somaliland and what appears to be an even smaller number of interviews in Burundi. The reliance on this source is surprising given the extensive literature on migration, including some studies that discuss a possible link between climate change and conflict via migration (see e.g. Gleditsch, Salehyan & Nordås, 2007).

The Africa chapter states explicitly that 'causality between climate change and violent conflict is difficult to establish' (p. 5), yet goes on to say on the same page that 'the degradation of natural resources as a result of both overexploitation and climate change will contribute to increased conflicts over the distribution of these resources'. The latter statement is based on Kumssa and Jones (2010), an article which makes no new contribution to

understanding the potential link between climate change and violent conflict, and without any references or empirics to support a claim about such a link.

*The authors*

Each substantive chapter has two Coordinating Lead Authors (CLA) and a number of Lead Authors (LA). In addition, there are several Contributing Authors (CA), two or three Review Editors (RE), and some chapters also have a Chapter Scientist (CS) or Voluntary Chapter Scientist (VCS). The Summary for Policymakers has 72 Drafting Authors, mostly consisting of Coordinating Lead Authors from the substantive chapters. Richard Tol, one of the two CLAs for Chapter 10 on the economic effects, withdrew during the drafting of the SPM because he felt that the summary was becoming overly alarmist (Reuters, 2014).[14] The SPM is the most 'political' part of any IPCC report since representatives of decision-makers participate in the determination of the final wording and it is not the first time that formulations in an SPM create controversy. Following the publication of the report of AR5 WG III (on mitigation), it was revealed that there had been a tug-of-war between different countries on the issue of fossil fuel subsidies. A formulation in the WG III report now reads '... complete removal of fossil fuel subsidies in all countries could result in [significant] reductions in global aggregate emissions by mid-century [at negative social cost]'. The bracketed words were deleted as a last-minute compromise between four oil-producing countries that wanted the entire sentence deleted and a number of European countries that wanted it retained (Peters, 2014: 25). Several CLAs have suggested that 'the resulting document should probably be called the Summary by Policymakers, rather than the Summary for Policymakers' (Stavins, 2014: 1).

An advance list of authors in AR5 WG II was released by IPCC (2010). It is clearly incomplete. We have therefore compiled our own by combining the lists given in the individual chapters. Few people will be surprised not to find the name of Bjørn Lomborg on the list; omissions like William Nordhaus (the dean of climate change economics) and Thomas Bernauer (a major contributor to the political science literature on climate change) are a bit more surprising.

It would not be surprising if the choice of authors had at least some influence on how the literature has been reported in the various chapters. Solomon Hsiang is a CA for the Emergent risks chapter, the only chapter that features Hsiang et al. (2013) as '[t]he only meta-analysis of the literature' and thus raises it to a higher status, but also for the Detection and attribution chapter, where its conclusions are implicitly rejected. His co-author Burke is a CA for the Africa chapter. Although a direct influence from author to contents can by no means be inferred, it seems likely that there has been a tug-of-war over some of the formulations. So far, the newspaper interviews given by Richard Tol provide the only small window on this, although some of us who have served as reviewers can attest to considerable changes over the various drafts, many of which are more attributable to interpretations of the literature than to new studies becoming available at a late stage.[15]

The strong emphasis on broader aspects of human security in the Human security chapter is not surprising given the previous work of CLA Neil Adger, with many of his associates among the LAs and CAs. In fact, the links in terms of previous co-publication between the 14 authors and editors of this chapter are so numerous that it probably would have been worthwhile to seek to broaden the writing group. While a coherent team no doubt can work effectively, it can also inadvertently overlook some of the disagreements in the field.

Altogether 1729 reviewers commented on earlier versions of individual chapters. Their names were not listed although some of them are known to us. The full list of referees will be posted with the final report. While the Human security chapter did not have a well-published expert on armed conflict on its author team, several such were consulted as reviewers.

## Dealing with uncertainty

Like all trend-based analyses, which build arguments about future events based on data from the past, the IPCC reports deal in uncertainties. The question of how to report the degree of certainty has evolved over the assessment reports (Mastrandrea & Mach, 2011) and has varied between the working groups. Generally, the IPCC now relies on two metrics: *Confidence* (expressed qualitatively) in the validity of a finding, based on the type, amount, quality, and consistency of evidence and the degree of agreement and *degree of uncertainty* (expressed probabilistically), based on statistical analysis of observations or model results, or expert judgment. Where there is high agreement and robust evidence, the lead authors are asked to present a level of confidence or a quantified measure of uncertainty (Mastrandrea et al., 2010: 2f). Where such estimates are possible, authors are encouraged to provide information on the tails of the distribution of outcomes, since even low-probability outcomes (such as meteorite collisions or 100-year floods) can have significant impacts if they are large, persistent, broad, or irreversible. Quantifiable evidence is summed by using a six-point likelihood scale, ranging from Virtually certain (99–100% probability) to Exceptionally unlikely (0–1%). For non-quantifiable evidence, a two-dimensional confidence scale is used, as shown in Fig. 1.

This two-dimensional scale is applied frequently in the WG II report in general, and its use does not seem very controversial. A much more problematic aspect of the language of the report is the frequent use of terms like 'may', 'has the potential to', etc. Clearly, using such terms means a claim more modest than saying that something 'is likely' to happen. A minimum interpretation of 'may' is that the probability of an event is greater than zero. Since it is extremely rare in social science that we judge the probability of events to be precisely zero, such a statement is almost devoid of empirical content. It cannot be distinguished from 'Exceptionally unlikely (0–1%)' in the parts of AR5 that use a quantitative scale. A more generous interpretation is that 'may' means 'there is a low probability of an event' (in other words, lower than what is required to say 'is likely'). A legitimate use of 'may' would be to pose a hypothesis. But if one is not in a position to test it, then the statement is left hanging.

Progressively stronger formulations are 'in some cases', 'in many cases', and 'probably' – the latter can reasonably be interpreted as meaning that the probability of B occurring as a result of A being greater than 0.5.

In Table 2, we list some of the terms used in the report that indicate low-probability relationships. The final column contains terms that state a more general uncertainty (or lack of clarity)

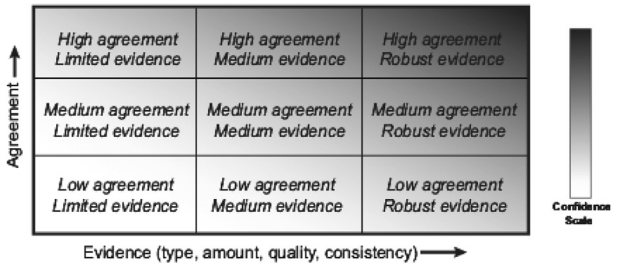


**Fig. 1.** Confidence scale building on level of agreement and type of evidence. Source: Mastrandrea et al. (2010: 3, Fig. 1). Darker shading means higher confidence, summed up by using five qualifiers: very low, low, medium, high, and very high.

**Table 2**
Tentative translations of expressions of uncertainty in the WG II report.

| $p > 0$ | $P >> 0$ | $p >>> 0$ | $p > .5$ | General uncertainty or lack of clarity |
|---|---|---|---|---|
| may | in some cases | in many cases | probably | there is justifiable common concern that |
| might | is reported as | are coupled | are closely coupled | suggests that |
| can | | are particularly | will | raises the question whether |
| could | | widely used | would | is being increasingly recognized |
| has a potential to | | | is associated with | there is evidence of |
| is a potential cause of | | | increases | |
| is sensitive to | | | exacerbates | |
| is expected to | | | | |
| is capable of | | | | |
| due to | | | | |
| has led to | | | | |
| at the nexus of | | | | |
| undermines | | | | |
| is characterized by | | | | |
| is a driver of | | | | |
| contributes to | | | | |

Terms that occur in the plural ('are potential causes of') have mostly been changed to the singular for consistency. Combinations of these terms also occur, such as 'could potentially' (Ch 8: 22).

without our being able to assign even a rough probability to them. 'There is justifiable common concern that' (climate change leads to conflict) is one such. All of the formulations contained in Table 2 are found in the WG II report, many of them in the Human security chapter.

The terms in the left-hand column (i.e. the vaguest ones) are not only the most numerous but also occur more frequently. We conducted a comparison between the SPMs for WG II and WG I (on the scientific basis). While the WG I SPM used 'may' words ('may', 'might', 'can', or 'could') on average 1.2 time per page, the frequency in the WG II SPM was 1.3 and in the Human security chapter 1.9. On the other hand, 'will' words ('will' or 'would') were used on average 3.6, 0.83, and 0.47 times per page in the three documents. Moreover, in the science report (WG I SPM) the use of 'may' and similar terms mostly occurred in phrases that mentioned a possible exception from a general rule ('It is likely that there will be some decline in the AMOC [Atlantic Meridional Overturning Circulation] by about 2050, but there may be some decades when the AMOC increases due to large natural internal variability …', p. 24) or to indicate the impossibility of drawing a firm conclusion ('A projection of when the Arctic might become nearly icefree in September in the 21st century cannot be made with confidence for the other scenarios …', p. 25). On the other hand, a fairly typical sentence in the Human security chapter expressed a loose causal connection ('This Chapter assesses research on how climate change may exacerbate specific threats to human security …', p. 4). The frequent use of 'may' terms might have been justified as a way of indicating that 'under certain circumstances, a relationship is likely'. But this does not work well if those circumstances are not specified.

On the whole, it would probably be best to avoid the use of terms like 'may' in academic writing except to state conjectures. Misrepresentation of the scientific basis is a real hazard when using such terminology. There is also a considerable danger that when material from WG II is cited, 'may' will be translated into 'will', particularly when the conclusions of the report are being referred in media reports or in summaries to policymakers and a general audience. Thus, a possibly well-meaning attempt to simplify a message ends up altering the meaning. The difference is illustrated by the two summary chapters. The TS states that 'Climate change indirectly increases risks from violent conflict …' (p. 25), while the SPM says that 'Climate change can indirectly increase risks of violent conflicts …' (p. 20).

A long line of research in psychology indicates that probability terms expressed in words rather than numbers are subject to a wide range of interpretation by observers. Budescu, Broomell, and Por (2009) conducted an experiment that demonstrated that even the terms used in the WG I quantitative assessment scale (such as 'virtually certain' denoting a 99% probability, 'very likely' 90%, etc.) were interpreted variously by their subjects. For instance, in one statement 'very likely' was interpreted to mean probabilities lower than 70% by one quarter of the subjects. If the interpretation of standard terms in the IPCC reports is subject to so much uncertainty, the situation is probably worse for non-standard terms like 'may'.

In an investigation of management practices in intelligence agencies, Tetlock and Mellers (2011: 548) criticize 'the vast majority of intelligence estimates' for their reliance on 'vague-to-the-point-of nebulous verbal characterizations of the likelihood of outcomes, including the use of terms like "may" and "is likely to"'. Tetlock & Mellers interpret the resistance of intelligence agencies to be more precise to 'obfuscation: retreating behind opaque verbiage that … makes it impossible to track relative predictive performance and impossible to tease apart factual and value judgments …'. Unfortunately, these harsh words apply quite well to the IPCC WG II reports.

### *Media translations*

Although most immediate media reactions were reasonably accurate and close to the text of the report, dramatic headings proclaimed disaster in *Daily Mail* ('Climate change will lead to war, famine and extreme weather, claims IPCC report'; Zolfagharifard, 2014), *Telegraph* ('IPCC report: global warming to increase heatwaves, flooding and conflict'; Demetriou, 2014), and *Independent* ('IPCC report paints bleak picture of war, famine and pestilence'; Connor, 2014). From the press conference on the report, one leading Norwegian newspaper cited the Norwegian Minister of Environment as saying that she 'foresees a future with more armed conflict'.[16] The same paper also cited one of the lead authors of the Human security chapter as having said that 'climate change will increase the risk of violent conflict, *inter alia* because of more poverty and economic downturns' (Sandberg, 2014). The translation of 'may' into 'will' in this paragraph is precisely what one has to fear as media rely on the WG II report without having read it very carefully. Later, it transpired that the WG II Lead author in fact had not been interviewed by the paper at all and that she stands by the conclusions of the Human security chapter.[17] Another national Norwegian newspaper has also claimed that the WG II report concludes that additional violent conflict 'will' occur as a result of climate change (Paust, 2014). Even the UN News Center headed its story: 'Climate change impacting entire planet, raising risk of hunger, floods, conflict – UN report' (UN, 2014).

## Conclusion

The AR5 WG II report generally paints a reasonable picture of the state of the art regarding our knowledge about the relationship between climate change and conflict. The number of empirical studies has increased tremendously in the years since the AR4 was published in 2007, and the IPCC is in a much better position to assess the state of the art while living up to its goal of using mainly peer-reviewed evidence. The main problem is the inconsistency of that evidence. This is noted in the report, and it would probably have been better to say that the main problem about the security implications of climate change is precisely the insecurity. Instead of saying that straight out, the IPCC is stuck with inconsistencies between chapters, some not-too-well-grounded statements about indirect effects, and a lot of loose language using terms like 'may' and 'is capable of'. The four main chapters that deal with conflict present somewhat different messages, with Ch 19 the most alarmist and Ch 18 largely dismissive of the climate-change-conflict link, but there is almost no cross-referencing, and the summary chapters (TS and SPM) seem to rely mostly on the Human security chapter.

We started by noting the decline of group violence in the last few decades. In the last three years, the number of battle deaths has once again risen, mainly due to the bloody civil war in Syria. In the background lurks the prospect of violence between China and its various neighbors and between Russia and the Ukraine. None of this actual and potential violence can be readily related to climate change. The prospects for a continued 'waning of war' are precarious, but not primarily because of a climate change. The Fifth Assessment Report of the IPCC does not, on the whole, support a pessimistic view of the future of conflict because of climate change.

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## Endnotes

[1] There is a substantial literature criticizing the climate-security link from a constructivist perspective. For instance, McDonald (2013: 42) finds that the most powerful climate security discourses 'are unlikely to inform progressive or effective response to global climate change'. For a similar argument, see Demeritt (2006). Our interest is in the theoretical and empirical merits of the climate-conflict nexus, not in how and why people talk about it.

[2] Using standard IPCC terminology, we refer to the Third Assessment Report as TAR, the Fourth as AR4, and the Fifth as AR5. We do not discuss the first two assessment reports (1990, 1995), which contain very few if any comments on a possible climate-conflict relationship.

[3] 'Conflict' and other of our search terms occur occasionally in the report from AR4 WG III on mitigation, but much less frequently than in the WG II report.

[4] In an analysis of 'historical documents' on climate change (including IPCC reports up to 2007), Detraz and Betsill (2009) found only a dozen references to 'conflict'. However, in the IPCC reports they seem to have searched only the Summary for policymakers. This gives a very simplified picture of these reports.

[5] Of course, the risk of conflict in any given dyad was extremely small, and remained very small even after adding the shared river risk factor. Thus, this was not a question of 'water wars' dominating the international arena, as had been suggested by some of the policy-oriented literature.

[6] This analysis is built on the version released on 31 March 2004 at www.ipcc-wg2.gov/AR5/. At the final meeting of Working Group II on 26–29 March, all chapters were accepted in the version dated 29 October 2013, except the Summary for policymakers (SPM), which was edited at the meeting. The precise cut-off date for material accepted for inclusion in the Human security chapter is not stated in the report, but one of the chapter's two Coordinating Lead Authors confirms that it was 31 August. A few papers may have been cited that were still in press, and this was allowed if they were lodged in an archive by IPCC – in effect they are treated the same as gray literature (pers.comm. from Neil Adger, 2 April 2014 and 22 April 2014).

[7] By contrast, Ch 22 on Africa contains numerous references to 'grey' literature.

[8] Another possible criticism, suggested by a referee, is that climate change (directly or indirectly) might influence inhibitors of conflict and that the effects could cancel each other out. This is not discussed in the IPCC report.

[9] The TS uses the same formulation, while the SPM talks of 'global annual economic losses'.

[10] Recent empirical work on the risk of domestic or interstate conflict over water (Bernauer, Böhmelt, Buhaug, et al., 2012; Bernauer, Böhmelt, & Koubi, 2012; Brochmann & Gleditsch, 2012) offers little support for the 'water wars' argument, and the whole tenor of the debate appears to have shifted towards an emphasis on cooperation over shared water resources.

[11] Hsiang et al. (2013) was published just before the cut-off for literature considered by WG II. A number of experts in climate science and conflict studies were cited early on with critical remarks in the German magazine *Der Spiegel* (Becker, 2013), but a rebuttal to this article and to a follow-up article (Hsiang & Burke, 2014) from a number of the people whose work has been included in the meta-analysis is only now in press (Buhaug et al., 2014).

[12] Apart from Chs 18 and 19 there is little discussion of climate change and individual aggression. However, two chapters (Ch 9 on Rural areas and Ch 13 on Livelihoods and poverty) briefly refer to increased gender-based violence within households in the aftermath of natural disaster.

[13] Similarly, Ch 9 on Rural areas has several references to 'conflicts or over scarce resources' (or similar formulations) and Ch 14 on Adaptation needs and option to 'water conflict' – in both cases without implying violence, judging from the cited literature.

[14] An article Daily Mail (Rose, 2014) reported charges that there were errors in some of Tol's paper that had been used in drafting the economics papers and alleged that Tol was now the victim of a smear campaign. In turn, the IPCC issued a press release (IPCC, 2014c) explaining the IPCC procedures for correcting whatever errors might be found in its reports or underlying material.

[15] A complete archive of drafts, comments, and responses to the comments will eventually be made available by the IPCC when the final reports are published, probably towards the end of 2014 (IPCC, 2013a, b).

[16] Confirmed by Jon Berg, Head of the Communications Department, Norwegian Ministry of Climate and Environment, 4 April 2014.

[17] Pers.comms. from Grete Hovelsrud, 1 April 2014. The journalist maintains, however, that the statements attributed to her were derived from oral remarks she made at the presentation of the report, pers. comm. Tor Sandberg, 7 April 2014.

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