

Climate Change and Conflict[□]

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Human-induced climate change is one of the most drastic neomalthusian scenarios. A number of claims about the conflict-inducing effects of climate change have surfaced in the public debate in recent years. However, the suggested causal chains presented in the literature from climate change to social consequences like conflict are long and fraught with uncertainties and rarely substantiated with reliable evidence. Climate change has so many potential consequences for the physical environment that we could expect a large number of potential paths to conflict. The gaps in our knowledge about the consequences of climate change for conflict and security are daunting considering the combination of the uncertainties of both climate and conflict research. However, social scientists are now beginning to respond to the potential security challenges of climate change. We discuss some of the challenges and opportunities in this important strand of research, and present how this special issue contributes by approaching the security concerns of climate change in a systematic way.

Draft introduction to the special issue of *Political Geography* on 'Climate Change and Conflict', fall 2007. The other articles included in the special issue are by Barnett & Adger, Hendrix & Glaser, Meier, Bond & Bond, Raleigh & Urdal, and Reuveny. Earlier versions of these articles can be downloaded from www.cicero.uio.no/humsec.

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We gratefully acknowledge valuable comments from the editor of *Political Geography* and three anonymous referees. This article builds on a conference paper (Nordås & Gleditsch, 2005) that was presented to the Workshop on Human Security and Climate Change, Holmen fjord hotell, Asker, Norway, 22–23 June 2005 as well as on Gleditsch, Nordås & Salehyan (2007). We are also grateful to the Center for Climate and Environmental Research (CICERO) at the University of Oslo and the Global Environment Change and Security (GECHS) for collaboration in the organization of the workshop. In addition, the Research Council of Norway, UNEP's Division for Early Warning and Assessment, the International Human Dimensions Program for Global Environmental Change (IHDP), and the Norwegian Ministry of Foreign Affairs supported the workshop and our work in editing this special issue.

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Climate change

Global climate change will have profound implications for the quality of life of hundreds of millions of people. The prospect of man-made climate change illustrates for the first time in human history that man is in a position to exercise a significant influence on the global environment.² This is a testimony to mankind's inventiveness and power on the planet but also a warning about its possible harmful consequences. The Third Assessment Report (TAR) of the Intergovernmental Panel on Climate Change (IPCC 2001) firmly established climate change as a political issue on the global agenda. The Fourth Assessment Report, currently being finalized (IPCC 2007) has estimated it to be 'very likely' that human activities have contributed significantly to the observed temperature increase in the recent half century, i.e. an assessed probability in the interval 90–99%. The IPCC have also outlined a series of probable effects of climate shifts on a series of natural systems. These in turn are likely to impact on human activities.

Given the range and scope of consequences of climate change, it is not surprising that there is a concern about its security implications. Indeed, this began to surface soon after the TAR was published and has recently accelerated, even though the issue is peripheral in the IPCC reports. Despite the breadth of this security concern in the public debate, statements about security implications have so far largely been based on speculation and questionable sources. Even the IPCC, which rightly prides itself of being a synthesis of the best peer-reviewed science, has fallen prey to relying on second- or third-hand information when commenting on the implications of climate change for conflict.

The research frontier is being pushed back in both climate change research and conflict research, but the gaps in our knowledge are daunting considering the combination of the two. However, social scientists are now beginning to respond to the potential security challenges of climate change. This special issue presents a first attempt to approach the security concerns of climate change in a more systematic way. Of course, caution must be exercised in drawing conclusions from the articles published here and particularly in formulating policy recommendations. Nevertheless, this special issue demonstrates that the concern about the conflict implications of climate change is warranted even though some of the apocalyptic visions currently disseminated by NGOs as well as some governments are less than solidly

² Disregarding the debate about 'nuclear winter' (Sagan & Turco, 1993), an issue that seems to have died with the end of the Cold War and the demise of the strategy of Mutual Assured Destruction.

founded. Above all, we aim to show that these issues are researchable and should be made a research priority.

The Security Scenario

The IPCC reports make only scattered comments about violent conflict as a consequence of climate change, and when such a link is mentioned is largely unsubstantiated by evidence. Nonetheless, the security threat from climate change has been presented in public debate in increasingly flamboyant wording, largely based on secondary and politicized sources.

In October 2003 a report to the US Department of Defense (Schwartz & Randall, 2003) received wide public attention for presenting a grim future scenario with warring states and massive social disturbance as a result of dramatic climate change. The authors argued that their scenario was plausible and that it 'would challenge US national security in ways that should be considered immediately' (op.cit.: 1). More recently, eleven retired US generals and admirals added more military authority to the issue, arguing that 'Climate change can act as a threat multiplier for instability in some of the most volatile regions of the world' and that this 'presents significant national security challenges for the United States' (CNA, 2007: 1). The German Environment Ministry (2002: 4) has found that 'evidence is mounting that the adverse effects of climate change can, particularly by interaction with a number of socio-economic factors, contribute to an increasing potential for conflict'. The United Kingdom used its position as chair of the Security Council to put the issue on the Council's agenda and the British Foreign Minister argued that the impacts of climate change, such as crop failure and lingering drought, sea-level changes, and river basin degradation 'went ... to the very heart of the security agenda' (UN, 2007).³ Former UN Under-Secretary-General for Humanitarian Affairs, Jan Egeland, in reference to the Darfur crisis, has warned of 'an enormous increase in environmental conflicts all over Africa' (Egeland, 2007). A number of NGOs have joined the argument. The Christian Aid charity has warned that 184 million people could die in Africa alone as a result of climate change before the end of the twenty-first century and that 'at least one billion people will be forced from home as the effects of climate change deepen an already burgeoning global migration crisis' (Christian Aid, 2006, 2007). Climate change has also been related to conflict by officials of international organizations for research on the envi-

³ However, a number of other governments, including representatives of the Group of 77 and the Non-Aligned Movement argued that the Security Council was encroaching on the agenda of other UN agencies and that the issue belonged in the General Assembly and the Economic and Social Council.

ronment, such as Kevin Noone, Director of the International Geosphere-Biosphere Programme (IGBP) (Askelin, 2004) and by academics such as Jeffrey Sachs (2005), Swart (1996), and Thomas Homer-Dixon (2007). But there are also more skeptical voices, such as Barnett (2001a,b, 2003) and Suhrke (1997).

The Premise Providers

The IPCC reports are by far the most important sources laying the premises for the climate change debate. Despite the growing concern about the security implications of climate change, this issue is hardly dealt with in their reports. In the *TAR* a 1,000 pages long volume on 'Impacts, Adaptation and Vulnerability' of socio-economic and natural systems deals with topics ranging from hydrology and water resources, ecosystems, coastal zones and marine ecosystems, human settlements, energy and industry, insurance, and health, in addition to region-specific reports.⁴ The report discusses the challenges of meeting key human needs such as adequate food, clean water, clean air, and adequate and affordable energy services. Heat waves, flooding, storms, and drought can cause famine, population displacement, and the outbreak of diseases, and a decline in the productivity of rural areas may accelerate migration to the cities. The relative vulnerability of different regions to climatic change is largely determined by their access to resources, information, and technology, and by the stability and effectiveness of their institutions. Therefore, 'climate change is likely to increase world and country-scale inequity, within the present generation and between present and future generations, particularly in developing countries' (IPCC, 2001, Working Group II: 85).

Very few concrete links between climate change and violent conflict are suggested by the *TAR*. The clearest statement refers to how climate-related migration may increase the risk of political instability and conflict (op.cit.: 85). The discussion of hydrology and water resources suggests a 'potential for international conflict (hot or cold) over water resources' (op.cit.: 225). Reduced water availability may induce conflict between different users. Specifically, the report refers to reduced water availability in the semi-arid savannah ecosystems of tropical Africa, which could exacerbate conflicts between herdsman and farmers (op.cit.: 394). Present agreements about water allocations in absolute terms may create conflicts in the future when the total absolute amount of water available is different (op.cit.: 225). The *TAR*

⁴ The Fourth Assessment report (IPCC 2007) is in the process of being published but the material released to date does not lead to any major modifications of our summary and critique.

suggests also that the fishing industry faces possible adverse effects of climate change (op.cit.: 369f.), and that since fish reserves are among the most important economic resources in many countries and fish stocks are trans-boundary resources, this could lead to conflicts between countries, as it already has in the US-Canada agreement on the Pacific salmon.

The influential and widely-publicized *Stern Review* on the economics of climate change commissioned by the British government (Stern, 2006) also refers to how conflict 'may' arise under certain circumstances, mainly as a result of forced migration, which the report estimates to up to 200 million people by 2100, but again this is not its main focus.

The Sources

While the hard science in the climate change debate is backed up by peer-reviewed studies, this is not the case for the literature relating climate change to conflict. The headline hitters are reports from think-tanks and governments. To the extent that they cite any relevant sources at all, these tend not to be peer-reviewed. For instance, when the IPCC links forced migration to conflict it cites Myers (1994/1996), Kennedy et al. (1998), and Rahman (1999). Although titled 'Climate Change and Violent Conflict', Rahman (1999) – a chapter in an edited volume – contains little either on conflict or climate change. Norman Myers and Donald Kennedy, although their works are more substantial, are not specialists on conflict and the cited works did not appear in academic journals. Myers (1996) is a journalistic account based on the assumption that we are on our way to 'environmental ruin worldwide' (p. 17). He sees shortages of food and freshwater and deforestation as issues that could lead to conflict within and between nations. On all of these issues, there are academic literatures that could have served to temper Myers' unremitting neomalthusianism, but these are not cited by the IPCC. In fact, although scarcities like these present major problems for livelihood and health, it is highly disputed whether there is a clear link to armed conflict (Esty et al., 1998; Hauge & Ellingsen, 1998; Theisen, 2006). Myers' estimates for future environmental refugees (150–200 million), which have no basis in peer reviewed studies, are cited uncritically by the *Stern Review*

(p. 00).⁵ An update to 250 million, based on an interview with Myers, surfaces in Christian Action (2007: 6, 50).⁶

The IPCC reference to water conflicts cites Biswas (1994) and Dellapenna (1999). These sources address adaptation and cooperation as much as conflict. There is, indeed, a literature that suggests a potential for water wars (see e.g. Gleick, 1993; Renner, 1996; Klare, 2001), but other writers are very skeptical (Beaumont, 1997; Wolf, 1999). A statistical study finds that neighboring countries that share rivers experience low-level interstate conflict somewhat more frequently (Gleditsch et al., 2006), but a companion study finds that they also tend to cooperate more (Brochmann & Gleditsch, 2006). Yoffe, Wolf & Giordano (2003) argue that cooperation consistently trumps conflict in handling shared international water resources.

Finally, on the issue of shared fisheries resource, also raised by the IPCC, Myers (1996: 9) notes that nations bordering on the North Atlantic have gone 'to the edge of hostilities over cod stocks'. But of course, the so-called 'cod wars' or 'turbot wars' (Soroos, 1997) of the North Atlantic are remarkable for their *lack* of interstate violence. Coast guard and naval forces have been involved in these disputes, but so far not a single shot has been fired between them.

The Causal Chains

Although the government and IGO-sponsored writing on climate change fails to cite convincing sources for a link to armed conflict, a literature is just beginning to emerge, as evidenced by the five articles that follow. This literature outlines several possible causal chains from climate change to conflict. The starting-point for most of these is that climate change results in a reduction in essential resources for livelihood, such as food or water. This can have one of two consequences. Either, those affected by the increasing scarcity start fighting over the remaining resources. Or, if that is not possible, people are forced to leave the area, adding to the number of international refugees or internally displaced persons. Fleeing environmental destruction is at the outset a less violent response to adverse conditions than armed conflict or genocide. But when the migrants encroach on the territory of oth-

⁵ The Stern Review seems on more solid ground when it notes that 200 million people live in coastal floodplains at less than one meter elevation, although no source is given for this calculation. Apart from the fact that a one-meter sea-level rise is higher than the IPCC's highest estimate for 2100, no consideration is given to countermeasures, such as dikes, or a gradual retreat from the most exposed areas.

⁶ Three quarters of one billion additional forced migrants by 2050, according to Christian Action (2007), are not displaced climate change but by development projects such as dams (645 mill.), natural disasters (50 mill.), and conflict (50 mill.)

ers that may also be resource-constrained, the potential for violence arises again. Barnett & Adger review a broad range of studies of both of these effects, focusing particularly on conditions for agriculture in countries where a large majority of the population are still dependent on employment in the primary sector. If climate change results in reduced rainfall in the dry season, this is likely to result in reduced crops, and in turn to starvation or unemployment or both. Poverty will be more widespread, leading to increased grievances and better recruitment opportunities for rebel movements. Some of these effects are confirmed in the articles by Hendrix & Glaser (2007), Raleigh & Urdal (2007), and Meier, Bond & Bond (2007). Barnett & Adger also argue that climate change will reduce the capacity of states to mitigate these problems, an argument that parallels the argument by Fearon & Laitin (2003) that weak states are more prone to civil war. A possible objection to Barnett & Adger's argument is that urbanization and the decline of employment in agriculture is a world-wide phenomenon and one that is generally associated with greater prosperity and stronger states which again means that these countries are likely to be less vulnerable to the conflict-inducing effects of climate change. Since climate change is usually discussed in a 50–100 year perspective, a crucial question is how much of the climate-related reduction in agricultural employment can be absorbed by on-going processes of economic change, which have been accelerated by the globalization of the world economy. Another great element of uncertainty is how global warming will affect the global productivity of agriculture, since some areas are likely to become more suitable for agriculture.

Barnett & Adger, but even more so Reuveny (2007) point out that migration may lead to conflict in host communities. Indeed, several studies have suggested this and the case of Bengali immigration from the plains into the Chittagong Hills and Assam has been cited as an example. However, migrants may also be valued for their skills and for their contributions to cultural variability. A study by Salehyan & Gleditsch (2006) indicates that most countries with an influx of refugees since the 1950s remain peaceful. But the probability of organized armed conflict with more than 25 battle deaths is nevertheless more than tripled in migrant-receiving countries. Many migrants come from conflict areas. They retain a direct stake in the outcome of fighting in their country of origin and they can easily be mobilized for one side or the other. Militant groups find it easy to recruit members among the refugees and transnational rebel networks may serve as conduits for the spread of armed violence. For instance, Rwanda became involved in the war in the Democratic Republic of Congo in the late 1990s after Hutu refugees began to organize opposition groups in the camps. Purely environmental

refugees, on the other hand, do not have the same political agenda and grievances, nor do they have the same experience in organizing armed insurgencies. While competition for resources or jobs in the host country and inter-ethnic fears, may lead to violence in various forms from murder to riots, organized armed conflict is less likely. Large numbers of economic migrants are attracted to Western Europe and North America every year because of the employment opportunities. While such immigration is not without friction, it generally does not lead to armed insurgency.

Reuveny examines 38 cases in Asia, Africa, and Latin America. Half of these he classifies as 'no conflict'. In many, perhaps, most of the 19 conflict cases, the environmental pressures are clearly mixed with inter-ethnic violence that predates the migration and some cases (El Salvador, Guatemala) were probably escalated by the ideological tensions of the Cold War and fueled by outside powers. In the absence of a multivariate analysis, it is difficult to conclude how much of the violence to attribute to the migration. Many of the violent cases also exhibit mostly unorganized violence and do not show up in compilations of armed conflicts.

A rather different way in which conflict could be influenced by climate change lies in our response to the burning of fossil fuels, in itself a major cause of the greenhouse effect. If the industrialized world makes a large-scale shift to renewable sources of energy or potentially almost inexhaustible sources like nuclear power, this would inevitably have social consequences. Adger & Barnett (2007) seem to assume that this would lead to conflict, although they do not elaborate on this scenario. Oil dependence is a fairly robust predictor to civil war (Fearon & Laitin, 2003; Ross, 2006) and if the oil prices were to decline precipitously from their present high level, this would reduce the capacity for authoritarian governments and looting rebel movements to sustain armed action. On the other hand, economic decline is also associated with civil war (Collier et al., 2003). The net effect is not easy to predict.

If there is a technological breakthrough in CO₂ removal, oil consumption can continue at a high level without further harm to the climate. This may be the preferred solution for many oil-producing as well as oil-consuming countries. However, climate change poses a classical 'problem of the commons' in relation to bearing the costs of developing new technology. There is also an effect of conflict on oil prices; as certain conflict scenarios in the Middle East increase the price of oil dramatically, which could again increase conflict risk further as the oil reserves become an even more tempting 'honey pot'. Oil prices might continue to rise. The depletion of current reserves will probably force the introduction of alternative forms of energy at

some point, although when the peak of global oil production is likely to occur is a hotly contested point. A third possibility is that fossil fuels will be replaced by bio-oil and similar renewable products. This might lead to increased competition for land and potentially to increased food prices. But this scenario has not been investigated by the IPCC or the *Stern Review* or any of the articles in this issue.⁷

The Way Ahead

Studies of the effects of climate change talk mostly about the future but should learn from the past. Unfortunately, conflict prediction remains at the stage where meteorology was decades ago: the best prediction for tomorrow's weather was the weather today. Conflict models still have a hard time doing better than predicting that countries at war today will remain at war next year and the peaceful will remain peaceful. But with better theory and more sophisticated methods for checking the robustness of the relationships that individual studies come up with (Hegre & Sambanis, 2006), we should soon be able to do better. Five points seem particularly important if we are to make progress in investigating the climate-to-conflict relationship.

First, we need a tighter coupling of the climate change models and the conflict models. Much of the literature, including the IPCC reports, when commenting on the social effects tend to move from sophisticated climate models to hearsay evidence and (at best) case studies of unknown representativity. The studies by Hendrix & Glaser (2007) and Raleigh & Urdal (2007) are pioneering in this respect because they show how model results from the climate change models can provide input to rigorous studies of conflict.

Second, we need to consider carefully what kinds of violence we expect to result from climate change. Hendrix & Glaser (2007) study state-based internal armed conflicts at the national level. Raleigh & Urdal (2007) use the same set of conflicts but focus on climate-related scarcities in the conflict zones, since most internal conflicts affect only a limited part of the country. Reuveny (2007) refers to several kinds of violence, including one-side violence (genocide and politicide), non-state violence (between groups, but where the state is not an actor), and unorganized violence. Among the cases of alleged climate-related violence, Rwanda is one of the bloodiest (as is the more recent case of Darfur), but only if the one-sided violence is included. Theisen & Brandsegg (2007) analyze scarcity conflicts on a new dataset on non-state violence, and argue forcefully that this kind of violence

⁷ In its discussion of the effect of climate change on energy sources, the IPCC (2001, Working Group II: 399) focuses on hydro-electric power stations,

is more likely to be affected by resource scarcity than state-based conflicts. This is a promising avenue for the future study of the conflict implications of climate change. Meier, Bond & Bond (2007) also study non-state conflicts, but based on events data reported by a conflict early warning network for a limited area along the border of three states. Clearly, a more extended network of conflict monitoring at the local level would be extremely helpful in future empirical studies of climate-related conflict.

Third, the study of climate change and conflict needs to balance the positive and negative effects of climate change as well as the effects of various strategies of adaptation. While the climate change models perform such an assessment for factors that lead to higher and lower rates of CO₂ in the atmosphere and in the effect on temperatures, the discussion on the social effects tend to focus on an enumeration of possible negative effects, large and small. An analogy with the study of economic effects of disarmament, an area of both academic and public concern during the Cold War and after, may be instructive. Many on the right as well as left of the political spectrum focused on the negative economic effects of disarmament such as unemployment, less funding for military research (with possible civilian spin-offs). However, most econometric studies, using established models of the national economies, concluded that the net economic effects of disarmament were likely to be positive and that the problems of unemployment could be overcome if the reduced arms spending was channeled in the right direction (Klein, Lo & McKibbin, 1995; Gleditsch et al., 1996). In the event, the end of the Cold War led to massive reductions in defense budgets in both East and West and the worst-case scenarios in the market economies did not materialize.⁸ It seems much less likely that such a balanced accounting will yield a positive outcome for climate change, whether measured by an economic yardstick or a conflict measure, but the two multivariate studies published here, Hendrix & Glaser (2007) and Raleigh & Urdal (2007) provide a foretaste of the pros and cons such studies are likely to come up with.

Finally, some of the recent writings on climate change and security are focused largely on consequences for the rich countries. If climate change leads to more deprivation in the Third World, it could also generate additional terrorism that impacts on the security in the wealthy part of the world. But as Barnett & Adger argue (and this is not a point of great controversy in the literature), regardless of the precise nature and size of the changes, they will primarily affect poor countries (and poor people in the poor countries).

⁸ The transition problems were much greater in the former command economies, but not due to disarmament.

Perhaps the security scenarios are constructed with the benign intention of arousing the world to greater attention to a global issue. But they could also lead to greater emphasis on a national security response to whatever degree of climate change is seen as unavoidable. This would not be helpful to the primary victims of climate change.

Increasingly, it is being argued that we are already seeing the effects of climate change unfolding in conflicts in Africa and Darfur in particular. The number of on-going state-based armed conflict has declined by nearly one-third since the peak just after the end of the Cold War. The severity of conflict, as measured in battle deaths, has been on a declining trend (with several ups and downs) since World War II, first mainly due to a decline of conflict in Europe, then in East Asia. While troubled areas of the world still exist, the Middle East and Africa in particular, there are still signs of hope. Even in sub-Saharan Africa, the number of ongoing conflicts has declined in the past decade.

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