Connecting Climate and National Security
The George C. Marshall Institute
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Connecting Climate and National Security

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Arlington, Va.
Climate change is an urgent and growing threat to our national security, contributing to increased natural disasters, refugee flows, and conflicts over basic resources like food and water. The present day effects of climate change are being felt from the Arctic to the Midwest. Increased sea levels and storm surges threaten coastal regions, infrastructure, and property. In turn, the global economy suffers, compounding the growing costs of preparing and restoring infrastructure.

National Security Strategy (Executive Office of the President, 2015, p. 12)

The change wrought by a warming planet will lead to new conflicts over refugees and resources; new suffering from drought and famine; catastrophic natural disasters; and the degradation of land across the globe.

National Security Strategy (Executive Office of the President, 2010, p. 47)

The impacts of climate change may increase the frequency, scale, and complexity of future missions, including defense support to civil authorities, while at the same time undermining the capacity of our domestic installations to support training activities.


Climate change will affect [the Department of Defense] in two broad ways. First, climate change will shape the operating environment, roles, and missions that we undertake … Second, DOD will need to adjust to the impacts of climate change on our facilities and military capabilities.

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There is little question that climate change has become entrenched as a “national security” issue. The Obama Administration has proclaimed climate change to be a present and future threat to the security of the United States. Two different National Security Strategies articulate the case for environmental forces creating security challenges domestically in the U.S. and around the world and two successive Quadrennial Defense Reviews show that the U.S. military is shifting its strategic thinking as well as resource allocations to accommodate these new threats. Together, they demonstrate that the institutionalization of environmentally-induced conflict as a U.S. security concern is complete. Anthropogenic climate change, characterized by a rise in global temperature and projected effects thereof, is expected to lead to all sorts of calamities here and abroad.

But is it true? These government documents and the bevy of think tank reports that echo this theme would leave one with the impression that the answer to this question is “yes.” And, by saying yes, one is left with little choice but to accept changes in strategies, programs, and budgets to respond or reflect those challenges as well as likely agreeing to policies that demand the mitigation of greenhouse gas emissions in order to respond to the principal root of the problem.

The recent focus on refugees fleeing Syria has shed new attention on the climate-security connection. Some recent scholarship boldly claimed that deteriorating environmental conditions explain the origins of Syrian instability. The Syria case, like Darfur, shows exactly why drawing these plain causal lines is so problematic. Syria did suffer through a severe drought which undoubtedly proved challenging for the Assad regime. But without the other contributing elements, would it have launched into war? Maybe, but probably not. These connections are explored both in the specific case of Syria and in more general terms looking at the links between drought and instability.

The George C. Marshall Institute took a deep look at the linkage between environmental factors and security concerns in our 2012 report, Climate and National Security: Exploring the Connection. That review revealed a number of theoretical and methodological concerns with the climate-security hypothesis and summarized a strong line of empirical literature that showed the proposed linkage was overstated. This extends and updates that analysis. In doing so, our conclusion is unchanged:

In summary, efforts to link climate change to the deterioration of U.S. national security relying on improbable scenarios, imprecise and speculative methods, and scant empirical support. Accepting the connection can lead to the dangerous expansion of U.S. security concerns, inappropriately applied resources, and diversion of attention from more effective responses to known environmental challenges. The danger of this approach is that it offers a sense of urgency which may not be warranted, given the gaps in the current state of knowledge about climate, the known flaws in the methods used to construct the scenarios on which these security concerns are based, and confusion over the underlying causes of those security concerns. (Kueter, 2012, p. 5)
The Asserted Climate-Security Connection

The defense and intelligence communities, numerous think tanks, and retired senior military officials report with confidence that (1) climatic change will occur (2) with sufficient severity that (3) dislocations generating conflict will occur, and (4) these conflicts will negatively impact the security of the United States, and (5) therefore require mitigation strategies to address emissions of greenhouse gases and investments in new military equipment and force planning.

Futurist Peter Schwartz sparked public imagination about the security consequences of climate change with a provocative 2003 report commissioned for the U.S. Department of Defense (DOD) (see, for example (Townsend & Harris, 2004) and (Stipp, 2004)). Schwartz and co-author Doug Randall argued that an abrupt climate change scenario would “potentially de-stabilize the geopolitical environment, leading to skirmishes, battles, and even war due to resource constraints” (Schwartz & Randall, 2003, p. 2). The basis for the Schwartz-Randall scenario of choice, the collapse of the thermohaline conveyor in the Atlantic Ocean, proved unsupportable, but still efforts to directly link climate to national security concerns were well underway.

Indeed, it should surprise few that the argument has developed as it has. Since the 1970s, some security scholars have pushed environmental degradation and resource competition as a source of future international instability and conflict (Zubrin, 2012). The end of the Cold War encouraged exploration of what forces might drive instability in the wake of superpower competition with many articulating the case for environmental degradation and resource scarcity (Baldwin D., 1995), (Brown L., 1988), and (Mathews, 1989). The Clinton Administration embraced these arguments (Executive Office of the President, 1996) and the military actions in Somalia and Haiti during that period appeared to bolster the claims. Climate change offers a new context for advancing these arguments.

In 2007, the respected Center for Naval Analyses (CNA) called climate change a “threat multiplier for instability” that “threatens to add new hostile and stressing factors” to the international security environment (Center for Naval Analyses, 2007, p. 6). Shortly thereafter, the Brookings Institution weighed in with an edited volume featuring many individuals whom would assume leadership roles in national security affairs in the years to come (Campbell & Weitz, 2008).

Congressional hearings on the topic soon followed and the Congress ordered the intelligence community to further study the matter. The Central Intelligence Agency (CIA) formed a unit devoted to tracking the topic. The Director of National Intelligence commissioned a series of detailed reports. The Deputy Assistant Secretary of Defense for Strategy was tasked with helping DOD leadership to understand the implications of climate change. And, of course, the issue was incorporated into the Obama Administration’s National Security Strategies and Quadrennial Defense Reviews.
A recent White House assessment said: “A changing climate will act as an accelerator of instability around the world, exacerbating tensions related to water scarcity and food shortages, natural resource competition, underdevelopment, and overpopulation” and further called climate change a “threat multiplier that will aggravate stressors abroad such as poverty, environmental degradation, political instability, and social tensions — conditions that enable terrorist activity and other forms of violence. The risk of conflict may increase” (Executive Office of the President, 2015, p. 8).

Specific conflicts are now linked to climate change. Darfur was the first such attempt, but the ongoing conflict in Syria is receiving considerable attention. Patterns of drought in the region are judged to have been abnormal and solely explainable by climate forcings, which is “the first link in the causal chain” resulting in the civil war (Fountain, 2015). Others dispute the claim and forcefully contend the focus on climate as a source of conflict in Syria diverts attention from the motives for the uprising and shifts responsibility away from the actions of the Syrian government (Châtel, 2014).

How are these predictions of doom derived? The methodologies are strikingly similar. The findings of the Intergovernmental Panel on Climate Change (IPCC) are accepted without critical review, and security experts are then asked for their opinion on what may happen under the various projections of environmental change offered. In other words, a global temperature rise, induced primarily by human activities, is assumed to be occurring and to accelerate over time. Computer climate models offer projections of the global and regional environmental effects (droughts, floods, storms) of those temperature increases. Generals, admirals, former defense, security, and intelligence officials then consider what implications a particular set of environmental phenomenon would have on a particular region. At no point are the underlying scientific relationships required to validate the anthropogenic climate change case examined in detail so as to judge probability, much less causality. Furthermore, the causal linkage between environmental changes and instability also is accepted uncritically.

Dr. Fingar offers a clear explanation of the approach in his 2008 testimony to the Congress. He noted first that the National Intelligence Assessment (NIA) “used a fundamentally different kind of analytical methodology from what is typical for an intelligence product.” The justification for this departure from standard practice is lacking. Fingar explained that “our primary source for climate science was the United Nations Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report” and “we relied predominantly upon a mid-range projection from among a range of authoritative scenario trajectories provided by the IPCC.” In laying out the specific findings of the NIA, Fingar further reinforced the dependency of the analysis on the IPCC assessment of how the climate is changing. He identified the connection explicitly: “In the study, we assume that the climate will change as forecast by the IPCC” (Fingar, 2008, pp. 2-3).
The government’s work is hardly alone in its deference to the IPCC. The CNA’s many reports rely on the IPCC assessments. Jeffrey Mazo’s *Climate Conflict* “relies on the IPCC Fourth Assessment Report and reviews of scientific research published after the IPCC cut-off date for the physical science and climate projections” (Mazo, 2010, p. 12), as does James Lee’s *Climate Change and Armed Conflict* (Lee, 2009, pp. 66-67), and Cleo Paskal’s *Global Warring* (Paskal, 2010). The aforementioned Brookings Institution study does as well (Gulledge, 2008).

Interestingly, while the foundation of the climate-security argument are the science assessments and projections from the IPCC, the international group’s most recent reports provide little support for the connection between climate change and security concerns. Reviewing the Fifth Assessment’s discussion of the security question, Gleditsch and Nordas are particularly critical of the international bodies’ loose use of language. The use of vague terms renders the document prone to misinterpretation by external audiences, specifically the media, and encourages statements to be read in an “overly alarmist” way (Gleditsch & Nordas, Conflicting Messages? The IPCC on Conflict and Human Security, 2014). Indeed, “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” (Gleditsch & Nordas, Conflicting Messages? The IPCC on Conflict and Human Security, 2014, p. 89).

A robust set of studies has emerged in recent years examining the environment-conflict hypothesis at a variety of levels of conflict, regions, and environmental effects. These reviews cast much doubt on the central connections of the argument and, in turn, undermine support for the notion that a warming planet will give rise to future conflict.

**Considering Climate Change**

The climate-conflict hypotheses relies on acceptance of the fact that (1) the Earth is warming at rates consistent with projections; (2) that the climate models adequately represent the interactions of physical processes; (3) that those same models accurately forecast observed climatic outcomes when actual observational data is used to test them; (4) that these models properly move from global to regional levels and (5) that the scenarios outlining economic development, industrial structures, demand for energy, and consumer behavior (among the various items that comprise the SRES scenarios) are accurate.

Based on this approach, anthropogenic emissions are to lead to more intense and frequent storms, rising sea levels, drought or more frequent rain, and by consequence refugees, crop failure and famine. These conclusions and the methods and data on which they are based are not examined here. The George C. Marshall Institute recently looked at these and related questions (George C. Marshall Institute, 2015) and has done so previously (George C. Marshall Institute, 2008) (George C. Marshall Institute, 2007) (George C. Marshall Institute, 2007). These and other works raise serious questions about how the climate is changing, how it will change, and what causes these changes.
Those reviews show that there are fundamental questions about theory, evidence, and the predictive accuracy of the models used to forecast deleterious effects of global warming. For purposes of evaluating the security implications, these uncertainties cut against the probability of security crises rising to the level of significance suggested.

Fundamental to the argument about impacts on national security are climate models. They are used widely and their results are interpreted as accurate approximations of how climate will change. Some climate models have been adjusted, or calibrated, to the point where they provide a reasonable simulation of some aspects of climate. These simulations are then used to claim that model output is a valid representation of the climate system. They are not. The difference between calibration and validation of models is critical. Climate models are routinely calibrated, or adjusted, to make their output look more like the real world. However, calibrating a model to produce a realistic simulation of current climate conditions does not ensure that it will provide realistic projections of future climate conditions. Realistic representations of current climate or projections of future climate require a model that is both validated and has an accurate set of inputs. Validation requires that the model be developed using one set of data, then its output shown to match an independent set of data. At this time, no climate model has been validated (George C. Marshall Institute, 2008).

Even with these basic concerns about how the climate is changing, estimating the impacts of a warming climate adds even more complexity to an already questionable foundation. Faced with an inability to predict future human emissions, climate scientists use the scenario approach. The IPCC defines a scenario as “an image of the future” and a set of scenarios as alternate images of the future.

Projections of the future impacts of climate change are based on assumptions about future climate change that are largely qualitative in their approach, meaning they are based on the simple assumption that, if it gets warmer, there will be a continuation in the changes in natural systems observed over the last century. These findings are derived from a four step approach:

1. The IPCC’s emissions scenarios were used as input to a climate model.
2. The output from the climate model was used as a prediction of future climate.
3. The predicted future climate was used as input to an empirical impact model, e.g., river run-off as a function of rainfall and temperature.
4. The difference between the output of the impact model and current conditions was assumed to be the impact of climate change. (George C. Marshall Institute, 2007)

Our 2007 review of this approach concludes simply that: “Each of these steps is so fraught with uncertainty or unrealistic assumptions that the outputs of exercise are meaningless,” (George C. Marshall Institute, 2007, p. 5). For example, the scenarios assume the same suite of technologies is used throughout the scenario. Of course, such an assumption is unrealistic. New technologies and production practices are adopted
regularly—improving productivity, and affecting energy use and emissions patterns, as well as consumer behavior. No modeling approach can reliably capture the variability of those trends over the timescales estimated by climate impact models. Further complicating the predictive capabilities of the approach are uncertainties about the economic development and energy pathways that the developing world will follow. A related critique of the impact modeling approach is that it does not adequately represent adaptation to changing climatic conditions that would lessen the negative impacts of those changes. Use of drought-resistant crops and improved irrigation practices, for example, would dramatically increase agricultural productivity and overall yields in the developing world, while simultaneously reducing vulnerability to certain climate changes.

The scenarios tend to assume the developing world will use large amounts of fossil fuels, which is likely true in the near term (20-30 years from today). But, the approach fails to account for improved efficiencies or the introduction of new practices that may lessen the rate of growth in fuel use or reduce the emissions from that use which would accompany the rising standards of living in the developing world. Rising standards of living in the developing world greatly expand the adaptive capacity of those populations (Goklany, 2011). The finding has profound implications for the impact modeling approach. Goklany explains:

“Therefore, even if one assumes that there will be no secular technological change—that is, no new or improved technologies will become available between the 1990s and 2100—developing countries’ adaptive capacity should on average far exceed that of the United States today. Therefore, although claims that developing countries will be unable to cope with future climate change may have been true for the world of 1990 (the base year), they are simply inconsistent with the assumptions built into the IPCC scenarios…” (Goklany, 2011).

By failing to account for the positive effects of prosperity, the impact modeling approach used by the IPCC, and subsequently relied upon by the climate-security literature, is guaranteed to produce overly pessimistic outcomes. It is another example of the deterministic approach that pervades the climate-security discourse.

A more recent IPCC assessment reveals that “projected changes in climate extremes under different emissions scenarios generally do not strongly diverge in the coming two to three decades, but these signals are relatively small compared to natural climate variability over this time frame. Even the sign of projected changes in some climate extremes over this time frame is uncertain” (Intergovernmental Panel on Climate Change, 2011, p. 9). The statement is significant for two reasons. First, it is an admission that natural forces will exert dominant influence over “climate extremes” over the period of 10-20 years and that, in some instances, the models are unable to state definitely whether the purported human impact is positive or negative. Second, and most important for questions of security planning, the uncertainty over the 10-20 year period is very telling for defense planners. Looking beyond two decades to judge the security threats and challenges to the U.S. (or any other state, for that matter) may be intellectually stimulating, but it offers little insight into strategy, program development, or budgeting.
Examining the Climate-Security Connection

The climate-conflict hypothesis is an argument linked together in a chain. Each link in the chain must be accepted as true for the entirety of the argument to be valid. The argument is a casual set of events occurring in a sequence to produce an impact. These can be droughts, floods, hurricanes or storms, which cause famines, refugees, or tensions as groups/countries compete for resources. These conditions give rise to decreased economic prosperity, social unrest, more refugees, and more group or state action to secure resources. In turn, those conditions create security concerns about state or regime survivability, integrity, or stability. The environmental effect is the cause of some other phenomenon that, in turn, creates the security problem. As environmental issues gained prominence in the security studies community, some scholars put the hypotheses to critical examination, aside from case studies or theoretical debates. These efforts reveal significant methodological concerns as well as scant empirical support for the supposed link between environmental variables and social instability or intra- and interstate conflict.

Methodological Concerns

Case studies, conjecture, and expert opinion are the principal means by which the connection between environmental factors and security concerns are established. Most analyses first identify an area of ongoing or expected strife and then identify environmental variables viewed as contributing to or potentially inciting greater conflict or insecurity. Dr. Thomas Fingar, the Deputy Director of National Intelligence for Analysis and Chairman of the National Intelligence Council, explained to the U.S. Congress in 2008 that “From a national security perspective, climate change has the potential to affect lives (for example, through food and water shortages, increased health problems including the spread of disease, and increased potential for conflict), property (for example through ground subsidence, flooding, coastal erosion, and extreme weather events), and other security interests” (Fingar, 2008, p. 6).

CNA said: “Climate change will affect both slow-onset disasters such as droughts and rapid-onset disasters such as storms and floods” (Center for Naval Analyses and Oxfam, 2011, p. 1). They continue: “As climate change leads to increased number of disasters, economic stresses (such as loss of agricultural production and reduced access to water) and social pressures (such as migration), which tend to exacerbate tensions and produce violence, will increase, particularly in already marginal economies.”

Paskal claims that “by combining the clear trends in environmental change with the clear trends in geopolitics we start to see the broadstrokes of what may lie ahead.” One trend she sees is that “the changing environmental condition could exacerbate the potential for conflict in areas where new geopolitical realities already chafe” (Paskal, 2010, p. 18).

The International Institute for Strategic Studies’ Jeff Mazo uses a case study approach typical of the literature when he summarizes thousands of years of human history to
create the connection between environmental collapse and civilization failure (Mazo, 2010, pp. 43-72). Mazo then uses the case of Darfur to illustrate his sweeping conclusions, calling it the “first modern climate change conflict.”

Gleditsch (1998) is critical of the overreliance on such case approaches because they lack the ability to control for other causes of conflict. In methodological terms, there is no variation on the dependent variable. One needs also to examine those instances where conflict does not occur in order to properly test the causal strength of the environmental factor. Some analysts are even more critical: “The most important things about the use of history in this environment-conflict literature is the way many authors pick and choose historical evidence in a way that highlights the negative instances whilst ignoring the positive,” (Barnett, 2000, p. 285). Selection bias, or more accurately confirmation bias, prevents an accurate test.

The CNA, Brookings Institution, and the various U.S. government reports use regional or security affairs experts to comment on a presented set of environmental scenarios. This approach is nearly impossible to validate and verify as they are opinions, albeit the informed opinions, of those presenting them. These assessments rest on the preconceived notions, judgments, and experiences of those asked to comment. While those views are not discountable, they certainly should not be accepted solely at face value. Furthermore, the methods used risk becoming circular. The proofs used to validate the expert opinions are the case studies which inform the expert opinions. Empirical and statistical analysis ought to validate the case studies and opinions supporting climate-conflict hypothesis. If it does not, then additional questions about the validity of the linkage between climate change and conflict comes into question.

One extensive literature review identified nine distinct methodological problems in the environmental conflict literature. They are:

- **Resource Scarcity or Environmental Degradation**—Most studies use the two phenomena interchangeably, but degradation of the environment may or may not contribute to scarcity of a resource (see (Barnett, 2000) and (Gleditsch, Armed Conflict and the Environment: A Critique of the Literature, 1998)).

- **Incomplete Definitions and Polemics**—Policy and political debates about environmental security lack the specification needed to provide testable hypotheses against empirical data.

- **Overlooking Important Variables**—Most proof of the environment-conflict linkage is based on bivariate analysis and “overly simplistic reasoning” and “ignores political, economic, and cultural variables” that have better explanatory power (Gleditsch, Armed Conflict and the Environment: A Critique of the Literature, 1998, p. 389). In other words, to accept that refugee flows from Bangladesh into India from a flood will ignite a conflict, one must ignore the other socio-economic forces explaining why India and Bangladesh might go to war. The literature also tends to overlook the significance of differences in regime type, shown elsewhere in the security literature to be directly associated with conflict probability.
Untestable Models—The case studies used to construct the proofs typically rely on multiple independent variables acting through intervening variables, such as changing rainfall patterns creating droughts which reduce food supplies leading to group manipulation of food supplies and social unrest. Many of the dependent variables used are imprecise as well, such as social unrest or health problems, meaning that they defy measurement in a meaningful fashion. Without greater specificity in the dependent variable, tests for causal connections are imprecise.

Lack of a Control Group—The case study approach by nature is anecdotal and as such scholars must take care to construct their research designs in ways that enable variation of the features under examination. A defense of biased case selections for environmental scenarios has been offered by Homer-Dixon and others, claiming that environmental scenarios offer greater complexity than other sources of conflict. Not only is that untrue, but accepting that view requires the concession that environmental scenarios cannot be tested in a qualitative format with variable variation. Empirical work done subsequently reveals that such tests are possible and accepting the conclusion should give pause to those seeking to build policy from them.

Reverse Causality—In many of the regions examined by the literature ongoing conflicts have destroyed and damaged local environments, resulted in loss of food supplies, and dislocated populations. In turn, that damage reinforces resource scarcity and social unrest. In the context of the climate-conflict debate, these ongoing conflicts cut against the explanatory power of climate change as the source of local environmental degradation and potential causation of local or regional tension or conflict.

Using the Future as Evidence—Much of the literature presents environmental sources as a cause of future, rather than past, conflicts. The environment may be a causal element in conflict, but reliance on the future is an appeal to argument, rather than evidence, as proof of the causal relationship. All the environmental variables cited in the climate-security literature are documentable and therefore testable against known instances of conflict. A review of that evidence therefore should show a positive link between past floods, droughts, or other environmental degradation with intra- or interstate conflict when other explanatory variables are accounted for. If they do not, then the hypothesis is not proven and the conclusion that environmental conditions breed conflict is not supported.

Drawing Lessons from Foreign and Domestic Conflict—The resource wars literature draws lessons from interstate war, but most warfare in the post World War II period is internal to states. Internal conflicts have very different characteristics and causes. Generalizing lessons from interstate to intrastate conflict is problematic, but the environmental-conflict literature generally fails to reflect those lessons.

Changing Levels of Analysis—The environmental-conflict literature “freely jumps” between systems, nation, or dyadic levels of analysis when developing theories and examining empirical evidence. Hypotheses appropriate for one level of analysis may not follow to another or even be logically consistent with the other levels.
In their study of the effects of changing rainfall patterns on rates of rebel and communal violence in Africa, Raleigh and Kniveton offer easy illustration of how these concerns can manifest themselves and confound the resulting interpretations. As noted, in order for social disorder or conflict to emerge from an environmental cause, a number of intervening actions and reactions have to occur in sequence. Raleigh and Kniveton observed that alternative, and sometimes competing, hypotheses can emerge during careful consideration of those sequences. In their case, the key intervening variable between climate and conflict is rainfall pattern change. Raleigh and Kniveton offer four competing hypotheses to illustrate this point:

1. Increased conflict is likely to follow periods of above average decreases in rainfall as groups compete over a scarce resource;

2. Decreases in conflict are likely to be correlated with decreased rainfall because there is little to fight for because the gains to be had from conflict do not justify the costs of conflict;

3. Increases in political violence will follow periods of higher than average rainfall as agricultural abundance spurs greed; and

4. Political violence is less following increases in rainfall because agricultural abundance breeds contentment and self-sufficiency (Raleigh & Kniveton, Come Rain or Shine: An Analysis of Conflict and Climate Variability in East Africa, 2012, p. 54).

In this example, climatic variables are theorized to have positive and negative influences on the likelihood of conflict, further highlighting the methodological critiques. Prevailing public argumentation on the issue has all tended in the same direction, but the variances in the intervening variables can generate alternative outcomes.

Careful examination shows these critiques persist in the studies subsequent to Gleditsch’s review. Combined, they cast doubt on the explanatory power of the central claim and undermine the generalizability of the argument.

**The Connection Between Climate Change and Conflict is Weak**

The empirical literature examining the causes of conflict offers little support for the notion that environmental issues, generally, or climate change, specifically, will lead to armed confrontations. A recent review of the literature offers this summary assessment: “Taken together, extant studies provide mostly inconclusive insights, with contradictory or weak demonstrated effects of climate variability and change on armed conflict” (Theisen, Gleditsch, & Buhaug, Is Climate Change a Driver of Armed Conflict, 2013, p. 613). “… the climate-conflict literature suffers from a lack of theoretical connections between its main driver (climate) and its possible consequence (conflict),” observed Raleigh and Kniveton (2012).
The preponderance of the empirical literature still suggests little to no linkage between environmental variables and civil war. Slettebak (2012), for example, looks at whether natural disasters offer explanation for civil wars since 1950. His analysis encompasses a range of environmental impacts that are frequently associated with rising temperatures in the climate-conflict argument, notably storms, droughts, floods, landslides, wildfires, and extreme temperatures. As previously discussed, these kinds of environmental shocks are asserted to breed the conditions for conflict within states by generating insecurity, dispossessing populations, creating competition over scarce resources generally and amongst particular groups, and breaking down law and order (see (Homer-Dixon, 1999) and (Nel & Righarts, 2008), for example). Slettebak tests six different models incorporating a host of socio-economic and environmental variables and reaches a startling conclusion:

“I set out to test whether natural disasters can add explanatory power to an established model of civil conflict. The results indicate that they can, but that their effect on conflict is the opposite of popular perception. To the extent that climate-related natural disasters affect the risk of conflict, they contribute to reducing it. This holds for measures of climate-related natural disasters in general as well as drought in particular” (Slettebak, 2012, p. 174).

Slettebak’s work, along with Homer-Dixon and Nel & Righarts, focuses predominantly on the breakdown of social structures or the manipulation of resources by groups as the explanations for the environment-conflict argument. Another approach contends that as climate change produces more powerful and more frequent storms, floods, and other disasters, the effect will be slow and reduced economic growth in the impacted area. With declining economic prospects, the outlook for civil conflict is said to increase as individuals lack opportunities, are subject to repression by other groups, and as states lose the ability to maintain order. Bergoldt & Lujala (2012) test the climatic disaster-economic growth-conflict relationship over the period 1980-2007 covering 171 independent countries and over 4,000 country-year observations. While natural disasters certainly slow economic growth, they conclude that “climate-related natural disasters do not have any direct effect on conflict onset,” nor did they find evidence that “economic shocks caused by climate-related disasters have an effect on conflict onset” (Bergholt & Lujala, 2012, p. 148). Climate can impact economic growth in ways other than the onset of a natural disaster or storm. Koubi et al (2012) test how deviations in precipitation and temperature trends from their long-run averages relate to economic growth rates and civil conflict. Examining the 1980-2004 period, they conclude: “climate variability … does not affect violent intrastate conflict through economic growth,” (Koubi, Bernauer, Kalbhen, & Spilker, 2012).

Two studies examined the long-run relationship between temperature and precipitation and violent conflict in China and Europe (Zhang, Brecke, Lee, He, & Zhang, 2007) and (Tol & Wagner, 2008). Both reach conclusions that contradict the basic premise of the climate conflict argument. Zhang et al (2007) looked explicitly at the relationship between climate change and violent conflict in China and determined that conflict was
more common during cold periods, with food scarcity being the likely reason. Tol and Wagner (2008) use climate data for Europe to replicate the Zhang work, concluding there is some evidence for the increased incidence of European conflict in cold periods, but not warm. Both studies suggest the rise of conflict in cold periods is associated with famine. Tol and Wagner (2008) find that the relationship between temperature and conflict is declining over time. One could speculate that the introduction of modern agriculture and more responsive state structures mitigate the effect of temperature and climate over time. Famine remains a problem, but largely not in the developed world where modern agriculture provides stronger crops and food storage and management systems preserve food supplies more effectively. If this is true, it is strong evidence in support of adaptation (via technology) as a means to respond to changing climatic conditions.

So, how then do Hsiang et al. famously perform a meta analysis of the climate-conflict literature and conclude that “past climatic events have exerted considerable influence on human conflict” (Hsiang, Burke, & Miguel, 2013) and again reinforced in (Hsiang & Burke, 2014)? The explanation is the methodology chosen. Hsiang, Burke and Miguel “bundle apples and oranges” in their comparison across studies, blending multiple dependent variables (measures of violence ranging from wars to fist fights), temporal and geographic units and climatic indicators and thereby raising concerns about whether the causal processes connecting climate and violence is understood (Salehyan, Climate Change and Conflict: Making Sense of Disparate Findings, 2014). A more thorough methodological critique is offered by a group of authors in Climatic Change wherein they note that “well-justified modifications” result in a “different conclusion” from that drawn by Hsiang (Buhaug, 2014, p. 393).

Will Climate Change Increase the Risk of Future Conflict?

One way in which proponents of the climate-security argument have responded to the lack of empirical support is to suggest that climate-induced change will cause future conflicts because the problems will be so much worse than anything that has been experienced previously. This logic enables the dismissal of the lack of empirical evidence in support of the causal linkages because the argument is purely concerned with the prospects for future conflict. Environmental factors are an additive fuel to a combustible mixture. Statements like that offered by President Obama’s 2010 National Security Strategy, “The change wrought by a warming planet will lead to new conflicts over refugees and resources,” are deterministic and predictive, but ultimately not testable.

The deterministic interpretation artificially assumes limits on the adaptability of the actors involved or other institutions that can play stabilizing roles. The countries and groups impacted by an environmental phenomenon may not react in a manner consistent with the assumed response or the mediating effects of other nations or non-governmental organizations can diffuse a crisis. Internally, cooler heads may prevail. These dynamics are nearly impossible to model, or incorporate into a testable model, and yet experience shows that they exist and they are important.
The literature on environmental conflicts routinely overlooks and discounts the moderating role that international agreements and institutions can play in averting future conflicts (Salehyan, From Climate Change to Conflict? No Consensus Yet, 2008). Failure to account for these institutions and the moderating roles they play guarantees that tension and conflict are the outcome of the analyses. As one analysis observed: “Forecasts that do not account for the important conflict management potential of international institutions will produce overly pessimistic scenarios regarding the impact of climate change on international security” (Tir & Stinnett, 2012). Those agreements and institutions provide a means to seek reconciliation and adjudication of interests before conflict escalates to violence and offers a venue for the appropriate expression of tension. The conflict scenarios all presume these elements fail or are not present.

Is Water a Source of Conflict?

Water, whether too much or too little, is a main variable in the climate-conflict argument. An Intelligence Community Assessment published in February 2012 by the Office of the Director of National Intelligence asserts as its “bottom line” that “during the next 10 years, many countries important to the United States will experience water problems—shortages, poor water quality, or floods—that will risk instability and state failure, increase regional tensions, and distract them from working with the United States in important U.S. policy objectives” (Intelligence Community Assessment, 2012, p. iii). “Tensions” over water were cited as a source of conflict by CNA (Center for Naval Analyses, 2007). Podesta and Ogden claim that “increasing water scarcity due to climate change will contribute to instability throughout the world … water scarcity also shapes the geopolitical order when states engage in direct competition with neighbors over shrinking water supplies” (Podesta & Ogden, 2008, pp. 104-105). The Obama Administration says water scarcity and floods will exacerbate tensions and risks of flooding can harm U.S. bases and installations at home and abroad (Executive Office of the President, 2015).

The empirical evidence strongly refutes these claims. A thorough analysis of 412 crises during the period 1918-1994 reveals only seven where water was even a partial cause (Wolf, 1999). “As we see, the actual history of armed water conflict is somewhat less dramatic than the water wars literature would lead one to believe … As near we can find, there has never been a single war fought over water,” Wolf concluded.

Writing in the pages of International Security, a preeminent security studies journal, three scholars examined the linkages between water scarcity, drought, and incidence of civil wars. Factors other than the environment were much more significant in explaining the onset of conflict. They conclude:

“The results presented in this article demonstrate that there is no direct, short-term relationship between drought and civil war onset, even within contexts presumed most conducive to violence … Ethnopolitical exclusion is strongly and robustly related to the local risk of civil war. These findings contrast with efforts to blame
violent conflict and atrocities on exogenous non-anthropogenic events, such as
droughts or desertification. The primary causes of intrastate armed conflict and civil
war are political, not environmental” (Theisen, Holtermann, & Buhag, Climate

Examine civil conflict, which is defined as confrontation between organized, armed
groups as well as terrorism, new research confirms the absence of a positive relation-
ship between water scarcity and conflict. The authors summarize the work:

“Most importantly, we have shown that analysts and policy planners should not look
for significant increases in armed violence during periods of acute water scarcity.
Climate change may cause certain regions of the world to be more drought-prone,
but such droughts are not likely to cause fighting to erupt—at least in the short term.
It would be more appropriate to focus on humanitarian concerns, capacity building,
and development needs in order to assure that drought-stricken communities are
able to adapt to a more uncertain climate” (Salehyan & Hendrix, Climate Shocks

A war over water is difficult to imagine. A downstream state may have high motivation
to secure greater supplies, but unless they could exert control over the entire watershed,
they would be continually subject to manipulation by upstream sources. The costs of
ensuring complete control would be quite high with little guarantee of success in either
the short- or long-run.

In fact, precisely the opposite result—peaceful cooperation to manage a shared resource
—is the more likely consequence of water scarcity. International cooperation over
transboundary water sources is much more common than conflict over the same
resources (Yoffe, Wolf, & Giordano, 2003). Tir & Stinnett (2012) tested whether the
pressures exerted by climate change will weaken transboundary river treaties and
encourage non-compliance. By testing historical data on water availability between
1950 and 2000, they found that the slightly increased risk of military conflict was offset
by institutionalized agreements. The length of time over which the effects of climate
change will be felt offers sufficient time to strengthen and institutionalize international
treaties governing use of rivers (Tir & Stinnett, 2012).

Of course, treaties and agreements that have limited conflict in the past may not do so
in the future. Climate-security proponents imply that states would ignore those agree-
ments and move to protect their interests by any means necessary. Proponents of the
“water wars” view appeal to the future and contend these past trends will be over-
whelmed by the enormity of the problems to come; they point to specific hot-spots
where water-induced conflicts seem most probable. Podesta and Ogden (2008) viewed
the Middle East as the primary location where a water conflict could emerge, as have a
number of others (see (Trondalen, 2009) and (Brown & Crawford, 2009)). CNA (2007)
pointed to water as a source of interstate tension in the region, but also alludes to water
scarcity as a source of intrastate instability and a contributor to terrorism.
Feitelson et al (2012) test these claims using four different scenarios of climate change, along with varying assumptions about refugee return, in the Israeli-Palestinian context out to 2030. They conclude:

“… based on analysis of extreme scenarios, we find that the likely direct effects of climate change per se are limited. While climate change may affect the livelihood of Palestinian farmers and semi-nomads, particularly in remote areas, it is unlikely to affect the welfare of the urban population substantially if some water re-allocation occurs, even under extreme scenarios” and “climate change does not seem to pose a major direct security risk in the Israeli-Palestinian context” (Feitelson, Tamimi, & Rosenthal, 2012, pp. 253-254).

They do note a danger in characterizing water as a security problem. “However, the framing of water issues and of climate change as security issues, and the subservience of water and environmental issues to the ‘high politics’ of conflict may hinder the ability to undertake adaptive measures that may mitigate the effects of climate change” (Feitelson, Tamimi, & Rosenthal, 2012, p. 254). Adding a security dimension to environmental or shared resource concerns, when other factors have created conditions of mistrust and tension amongst the parties, is expected to greatly reduce the probability of an amicable resolution. As Feitelson, Tamimi and Rosenthal’s survey shows, water shortage is not a sufficiently robust condition to generate conflict on its own. Ironically, the climate-security literature may do more to militarize environmental crises by characterizing them as security challenges, and thereby prompting decision-makers to turn from cooperative or diplomatic solutions and towards military options.

In Central Asia, the Syr Darya river basin is cited as another area where a transboundary dispute over water could spark conflict (see (Swarup, 2009) and (Hodgson, 2010)). In this case, the region is comprised of poor, undemocratic states with weak international water management agreements. It is a perfect test case for the claim that the introduction of new supply pressures borne out of climate change will incite conflict and tension. Bernauer & Siegfried (2012) test this proposition using IPCC climate models out to 2050. They conclude that even though climate change is expected to make water supplies scarcer in the region, not a surprising fact given the previous discussion of the IPCC modeling approach, “such shifts are likely to occur only in the medium to long term” (Bernauer & Siegfried, 2012, p. 237). Rather than precipitate conflict, which they judge as “unlikely,” Bernauer and Siegfried believe the countries in this region will respond by strengthening the international agreements governing water; a response consistent with past experiences, globally and regionally (Deudney, The Case Against Linking Environmental Degradation and National Security, 1990).

Examining the relationship between precipitation, temperature, and drought on the incidence of civil war in Asia, (Wischnath & Buhaug, 2014) find that climatic events play only a “trivial role” in explaining the risk of conflict.

Africa is frequently cited as a case where rainfall and changing water patterns could elicit greater risk of conflict. Darfur was called the first climate conflict by former United
Nations Undersecretary General for Humanitarian Affairs Jan Egeland and U.N. Secretary General Ban Ki-Moon (see Mazo, 2010) and (Salehyan, From Climate Change to Conflict? No Consensus Yet, 2008). A strong relationship between rising temperature and civil war has been suggested to exist in Africa (Burke, Miguel, Satyanah, Dyekema, & Lobell, 2009). A subsequent analysis shows that Burke et al.’s findings are not supported when tested using different methods, notably a different set of armed conflict data (Buhang, 2010).

Raleigh and Kniveton (2012) look at the Africa case from the perspective of small-scale conflict, rather than interstate conflict. Since a major hypothesis of the climate-security literature is that changing water dynamics create conditions within states that weaken social structures and government institutions, their examination of rainfall variability on rebel and communal violence is highly informative. Most studies that have examined the causes of civil wars have shown little statistical significance for environmental variables when other standard political and economic variables are controlled for (see Nordas & Gleditsch, 2007) and (Raleigh & Urdal, Climate Change, Environmental Degradation, and Armed Conflict, 2007)). The detailed examination of rebel and communal conflicts in East Africa shows that rainfall patterns emerge as an explanation for conflict only when other socio-economic conditions exist. Then, the outcome that emerges is one where communal violence has a tendency to increase during wet periods: when the abundance of resources provides the motives and opportunities for inter-group violence. In contrast, during dry periods, communal violence is suppressed and the conditions for rebel conflicts emerge (Raleigh & Kniveton, Come Rain or Shine: An Analysis of Conflict and Climate Variability in East Africa, 2012). The Raleigh and Kniveton (2012) results are significant and warrant careful consideration as well as replication in areas other than East Africa.

Other examinations of climate variability’s impact on social unrest and conflict in Africa show less connection between the two. Looking at the Sahel, which under climate change scenarios will become drier as rainfall is reduced through the effects of rising temperatures, a team of researchers from the Peace Research Institute in Oslo studied land use conflicts in the region using both statistical and case study approaches. Both methods “provide little evidence supporting the notion that water scarcity and rapid environmental change are important drivers of intercommunal conflict in the Sahel” (Benjaminsen, Alinon, Buhang, & Buseth, 2012). They judge political and economic forces as more significant than climate variability. Similarly, an examination of the Kenyan range found that drought conditions suppress conflict and actually encourage groups to share resources (see Butler & Gates, 2012) and (Eaton, 2008)), further reinforcing the finding of cooperation rather conflict arising out of environmental pressures.

Examining Kenyan armed conflict below the common civil conflict level, Theisen (2012) determined that years with below average rainfall were generally more peaceful, concluding that: “Tests of the hypotheses on resource scarcity lend most support to those that argue that resource scarcity does not fuel violence and seems even to favor those that see droughts as temporarily cooling tensions” (Theisen, Climate Clashes? Weather Variability, Land Pressure, and Organized Violence in Kenya, 1989-2004, 2012, p. 93).
Is There a Connection Between Famine and Conflict?

Famine is another frequently referenced source of social instability, refugee flows, or spark for civil or interstate war. Worldwide, food production has “never been higher than it is today, largely due to fertilizers, pesticides, irrigation and farm machinery” (Goklany, 2011, p. 168). Food production outpaced population growth during the last century, with production per capita rising along with significant increases in world production of maize (203%), wheat (122%), rice (131%), vegetables (251%), cassava (146%) and soybeans (431%) between 1969 and 2009 (Hofstrand, 2011). Most climate scenarios suggest these positive trends are unsustainable because the combination of rising temperatures and water shortages will stress crop development or render areas unusable. Even if they are true, these projections discount the adaptive capacity of modern agriculture that can ameliorate some of the effects over time (Goklany, 2011). Further, the conclusion generally discounts the beneficial impacts of CO2 on crop productivity and food production (Wittwer, 1995).

More directly, if food shortages are a potential source of conflict and a societal stressor, then the solutions generally advocated to address greenhouse gas emissions may well worsen the problem. Energy use, principally fossil fuels like oil, coal, and natural gas, is the key human activity driving CO2 and other greenhouse gas emissions. Climate change policy responses generally would cap or otherwise raise the price of using these energy sources, which would have significant effects on the agricultural sector worldwide and poorer countries would be particularly harmed. Goklany notes that crop yields and food production are rising as a result of expanded energy use in agriculture. Each of the four items cited as contributors to agricultural productivity are derived directly from petroleum (fertilizers and pesticides) or use energy generated primarily from fossil fuels (irrigation, operating machinery, and manufacturing/transporting fertilizers and pesticides). Refrigeration, plastic packaging, and rapid transport from farm to processor to consumer are all key enablers of greater food system productivity and reduce food waste and spoilage, but each are energy-intensive. Raising the price of energy will make it harder for poorer countries to develop and sustain the modern agricultural practices necessary to keep food yields and aggregate production expanding, further reduce the rates of food spoilage, and ensure the means to deliver food in a timely manner. Adaptation offers another way to address food shortages should they ever occur. The Swedish Institute for Food and Biotechnology found that 1.3 billion metric tons of food produced annually is never consumed. The crops are never harvested, or it is wasted or simply thrown away (Gronewold, 2011). Improved distribution systems and agricultural techniques have the potential to dramatically expand the supply of available food.

Other research suggests there is a strong positive linkage between cheap energy, the economic growth it enables, and international stability. A report commissioned by the U.S. Agency for International Development surveyed 93 countries to test a model attempting to show the relationships between energy consumption, gross domestic product, life expectancy, and probability of stability (Vasudeva, Siegel, & Mandrugina, 2005). Access to cheap, affordable energy and economic growth were found to increase
the odds of peace by a factor of 2.5. By raising energy consumption, “the occurrence of peace is now 1.5 times more likely than the occurrence of instability in any given country,” the study found (Vasudeva, Siegel, & Mandrugina, 2005, p. 32).

These findings profoundly alter the argument. Indeed, they suggest that policies to pursue controls on energy use will increase the prospects of instability and conflict. Earlier cited research showed no connection between environmental effects and economic growth, but there is a connection to conflict through the rising price of energy. Without overstating the conclusion, the Goklany and Vasudeva et al. work suggests policymakers and others should pause, as the claimed relationships do not appear to exist, and the policies recommended may prove ultimately counterproductive.

**Do Refugees Lead to Increased Conflict?**

Flows of environmental refugees are another source of concern raised by the climate-security argument. These migrations of displaced peoples, driven from their homes out of necessity because of drought, flood, or famine, or driven out intentionally by more powerful groups looking to secure greater shares of scarcer resources for themselves, is regularly cited. The CNA (2007), for example, warns of unwelcomed migrations in Africa, Asia, Europe, and North America. Fingar (2008) cites migration concerns as well.

The most widely cited figure for the number of ‘environmental refugees’ is 200 million people who could be forced from their homes by 2050, of which 150 million would be ‘climate refugees’ (Environmental Justice Foundation, 2009). Furthermore, the climate-induced refugees claim appears overstated. Earlier, the United Nations endorsed the prediction of 50 million environmental refugees by 2010; a claim subsequently discredited by reality (Atkins, 2011).

Like conflicts over water, the environmental refugee problem is a future one, conditioned on the assumption that things will be worse than ever observed. A recent review of the literature summarizes the state of affairs:

> “Thus far, the debate about climate-induced migration has been dominated by its futurology. It has led to the question of whether or not predictions about climate-induced migration are true, how many climate-induced migrants will have to be expected and how the consequences of climate change will interact with other drivers of flight and migration” (Baldwin, Methmann, & Rothe, 2014, p. 121).

While it is certainly possible to speculate about scenarios wherein displaced peoples create conflict, directly or indirectly, the empirical evidence suggests that is highly unlikely (Salehyan, Refugees, Climate Change and Instability, 2005). The research shows “there are few, if any, cases of environmental refugees leading to violent conflict in receiving areas and while there are certainly examples of sporadic violence, such violence is generally small-scale, interpersonal and disorganized” (Buckland, 2007, p. 9).
After examining the environmental refugee claims, Bruno Tertrais concludes:

“Such are the reasons why experts of environmental migrations generally agree that climate change in itself is rarely a root cause of migration. Major population displacements due to environmental and/or climatic factors will remain exceptional except in the case of a sudden natural disaster. And most importantly for the sake of this analysis, they are rarely a cause of violent conflict” (Tertrais, 2011, p. 24).

The present situation with Syria will reveal much about how large-scale refugee flows are handled and whether refugees serve as a source of instability within host states or between states.

**Will There be Conflict in the Arctic?**

The Arctic appears to be a particularly challenging case favoring the climate-security hypothesis. The Obama Administration singles out the Arctic for specific treatment in its recent discussion of climate change and security. The Administration’s take takes a practical bent: the more the Arctic shipping lanes are used, the greater becomes the potential for emergencies necessitating Navy or Coast Guard response (Executive Office of the President, 2015). Other scholars have examined the geopolitical implications of increased activity in the Arctic and find reasons for concern. For example, Russia, Canada, and the U.S. all are looking to secure their interests in the resource-rich region, leading many to agree that “the Arctic is … a bellwether for how climate change may reshape geopolitics in the post-Cold War era” (Huebert, Exner-Pirot, Lajeunesse, & Gulledge, 2012).

Clearly, there are important economic issues to be worked out amongst the affected nations, particularly if the demand to operate in and exploit the Arctic continues. But, are these points of disagreement sufficient to raise tensions or lead to conflict? Likely not. The U.S. and the Soviet Union both engaged in active military operations in and through the Arctic for decades during times of global tension that were much higher than will likely be seen in the future Arctic. Certainly, the potential for more nations acting in the region creates the potential for disputes, but those disputes are likely to be economic in nature and be resolved through negotiation or the courts rather than through armed conflict, especially since the affected nations have a long diplomatic history with each other.

A recent assessment of military activities in the region finds those efforts consistent with policing actions, rather than power projection. “While governments of the five Arctic states (Canada, Denmark, Norway, Russia and the United States) have made protection of their Arctic territory a priority, the military buildup is limited,” the Stockholm International Peace Research Institute (SIPRI) said. Military efforts to date are primarily aimed at border demarcations as the coastal countries vie for territorial claims to get their hands on the vast oil, gas and mineral resources expected to be made accessible by climate change, it said. “Rather than projecting power over the Arctic as a whole, the increased military capabilities… are generally limited to forces and equipment for policing and protection of recognized national territories and territorial waters,” SIPRI concludes (Wezeman, 2012).
Does Resource Scarcity Lead to Conflict?

But, as was noted, the framework that gives rise to the climate-conflict hypothesis is resource scarcity. Barnett & Adler (2007) argued that the effects of climate change are reduced access to natural resources needed to sustain economies, individual livelihoods and the capacity of states to provide opportunities and services. “Within the current debate on how environmental factors may affect the risk of conflict, scarcity of important resources holds a prominent place. Acute scarcities, caused by reduced supply, increased demand or skewed distribution, are suggested as a significant current and future source of violent conflict,” another review argued (Slettebak, 2012).

That resource scarcity might lead to instability, state collapse, civil strife, or international conflict is hardly a new argument in international security affairs. Under the resource war framework, nations are said to fight over territory, raw materials, energy, water, and food (Gleditsch, Armed Conflict and the Environment: A Critique of the Literature, 1998). Deteriorating environmental conditions create resource scarcity and competition, thus creating conditions conducive to violence, the argument goes. Therefore, to the extent that climate change contributes to deteriorating environmental conditions, it is viewed in this framework as yet another causal element.

These perspectives became popular in the 1970s and gained prominence with the end of the Cold War. The first Gulf War seemingly offered an excellent case supporting the view that the United States would go to war to secure a vital resource—petroleum (see (Klare, 2001)). Most recently Colin Kahl argued that resource scarcity can result in the collapse of a state’s ability to operate effectively, thereby undermining social structures and the cohesion of the state. He also identified another possible outcome—cooption of the state by particular groups which exploit the power of government to disperse resources selectively (Kahl, 2006).

Is there empirical support for the framework argument that resource competition will lead to instability and conflict? Much of the argument, critiques, and evidence are the same as that presented in climate-conflict literature. A recent review of the literature provides a nuanced view of the scarcity-conflict hypothesis. Conflicts over minerals do occur, but they are dependent upon the existence of other social factors (weak rule of law, inequitable distribution of revenue) and not the depletion of the supply. In fact, “in modern times, no interstate conflicts have been driven by depletion,” the review concludes (Shields & Solar, 2011, p. 261).

Four critiques of the resource war hypothesis have been advanced. Human inventiveness and technological innovation enhance agricultural output and improve resource extraction abilities. International trade enables the reallocation of resources that are plentiful in one location to those areas where they are scarcer. Many raw materials can be substituted for other cheaper or more plentiful materials. Under conditions of scarcity, prices will rise, which in turn encourages innovation, trade, and incentives to substitute (Simon, 1986). Indeed, since the resource scarcity argument grew into prominence during the 1970s, actual experience shows the concerns to be entirely overstated. The
Limits to Growth, for instance, predicted aluminum, copper, gold, lead, tin, zinc, and many other materials would be exhausted by the 1990s-2000s. All remain in widespread production today. Further illustration of the absence of predictive foresight were the expectations that natural gas supplies would be exhausted by 1994 and petroleum by 1992. The application of new technologies has greatly expanded known supplies of both natural gas and petroleum in recent years.

Others contend that scarcity gives rise to cooperation, rather than conflict. Deudney argues that “analysts of environmental conflict do not systematically consider ways in which environmental scarcity or change can stimulate cooperation” (Deudney, Environmental Security: A Critique, 1999). As discussed, water scarcity is shown to give rise to more cooperation than conflict (Dinar, 2011).

The logic behind cooperation, trade, or innovation as the preferred strategy for addressing resource scarcity is simple and compelling. The costs of military action are always high, the probability of success (in either the short or long-run) is not guaranteed, and the costs of holding the gains from military action undermine the benefits of securing supplies of the desired resource. The German and Japanese experiences during World War II are instructive for these purposes. Both nations were strongly incentivized to secure supplies of resources before the onset of conflict and during the course of the war. Neither succeeded—at great cost. Institutions, international markets, and diplomatic solutions offer options short of conflict for resolving transboundary disputes. Trading on the international market expands supply options, as does investment in efficiency or substitutions.

**Implications for Force Planning and Strategy**

If climate change does not breed conflict, what other security effects may it produce? The CNA and others claim the U.S. military will be asked increasingly to respond to humanitarian crises. Indeed, Defense Secretary Panetta specifically foreshadowed the growth of this mission area (Panetta, 2012). The CNA has explored this notion in two influential reports (see (Center for Naval Analyses & Oxfam America, 2011) and (McGrady, Kingsley, & Stewart, 2010)). The increased frequency and diverse challenges of these operations, these reports predicted, will require defense officials to train, equip, and prepare U.S. forces differently to fulfill these missions.

The Defense Department’s 2014 Climate Change Adaptation Roadmap illustrates the acceptance of this view. Defense planners are anticipating conditions where the U.S. military will be called upon to provide disaster relief and humanitarian assistance on an ever increasing basis, considering how to alter force plans, training and acquisition strategies, and contemplating alterations and adaptations in DOD’s bases and physical infrastructure to accommodate expected environmental challenges. The DOD Roadmap does not question the causal elements of climate change. It simply asserts these changes are occurring and at increasing frequency and intensity. But it does acknowledge that the effects are “projected” and thus subject to some uncertainty.
“Strategy is the most important guide for force planning,” Dr. Richmond Lloyd, then Director of the Strategy and Force Planning course at the Naval War College, observed (Lloyd, 2000). In an ideal world, national military strategy emerges from objectives established by national strategic goals. Force planning is the product of appraising the nation’s security interests, strategic goals, and resource or other limitations. Of course, reality is more complicated. These choices also reflect strong inertial forces within the defense budgeting and planning process. The long lead times required to design, develop, and manufacture a particular capability (a tank, a ship, a gun, a satellite) mean that the nation has invested considerable resources into those systems. Cancelling an established program is rare. Political support, established industrial interests, and local economic concerns among other factors combine to protect defense programs from cancellation. Given these factors, the selection of national strategic goals should be done carefully so as to prioritize resources efficiently and effectively.

Specifically considering the climate-security issue, expanded use of the U.S. military in humanitarian relief operations seems the most probable outcome. The question for defense planners is whether they alter force structure and budgeting choices to provide for more of the systems used in those missions, or find other means to acquire those capabilities when they are demanded. Humanitarian missions draw most heavily on logistical assets and readily deployable personnel. Logistical assets, such as cargo planes, transport vessels, trucks, and helicopters, are purchased and leased from private sources both as needed and to provide a baseline internal capacity.

The United States is a generous nation. Natural disasters generally elicit an outpouring of money and assistance from U.S. citizens, philanthropic organizations, and the government, but, not for every disaster, and not in every circumstance. Even today, choices must be made about when and how extensively to respond. In a world where such demands on U.S. resources might increase, policymakers and defense officials will need to be more selective. That is not a security challenge; rather, it is a matter of prioritizing the use of resources. Employing the U.S. military for humanitarian and disaster relief missions is an explicit choice motivated by the desire to do right, but also to be seen as doing right. Such actions improve world opinion of the U.S. and, in so doing, may enhance U.S. leadership. Not every instance of humanitarian need requires an American response.

How and when the U.S. elects to respond to such challenges ought to be informed by its strategic goals and informed by the anticipated outcomes.

Another often mentioned security concern is the direct effect of climate change on U.S. military installations. Sea level rise or the increased probability of intense storms may damage U.S. bases, requiring the diversion of resources to repair them (McGrady, Kingsley, & Stewart, 2010), (Center for Naval Analyses and Oxfam, 2011) and (Busby, 2007)). The Obama Administration has embraced this view completely. Both the Department of Defense and the Department of Homeland Security identify domestic security threats from climate change. Notably, these are threats to physical infrastructure. “Installations near the coastlines are threatened by coastal erosion and sea level rise, damaging infrastructure and reducing the land available for operations” (Executive Office of the President, 2015, p. 9).
The observed trends in sea level rise and storms fail to support this concern (George C. Marshall Institute, 2015). The prospect of damaging sea level rise is overstated, both for U.S. military installations and the world population generally. Most estimated sea level rise under varying climate scenarios point to increases on the order of 2-6 millimeters per year. Over the course of a century the cumulative impact of such an increase may prove to be a problem if one accepts the finding as valid. U.S. defense planners and facility maintenance concerns do not operate on such time scales. The year-to-year change is barely noticeable. More frequent or more intense storms can become a concern. Again, the question is one of adaptation. If U.S. military installations are already in areas where large-scale storms are frequently seen, then one presumes these facilities already are prepared to handle such storms. The marginal enhancement foreseen to the power of any individual storm by climate change is unknowable and attributing damage from the incremental enhancement of a storm’s power is impossible.

Further considering the climate-security argument shows a mismatch of planning horizons. As one defense analyst noted: “...any changes in the climate, for better or for worse, will occur gradually over decades. Thus, there will be ample time to adjust national security and humanitarian assistance instruments to accommodate future demands” (Carafano, 2009). Defense planning and budgeting cycles operate on five-year defense plans, with long-run research or development programs sometimes having timelines out to a decade. The assessments of the security implications of climate change envision impacts emerging in 2030 or beyond, and even then the scope and severity of impacts are uncertain, and the impact on mission needs or operational requirements is essentially unknowable. Projecting those implications onto force structures or budget allocations is an exercise in guess work with the choices resting entirely on assumptions about how the future will evolve.

**Conclusion**

The evidence in support of the claim that climate change will undermine U.S. national security is, at best, ambiguous and, most probably, non-existent. Dire scenarios of refugees crossing borders because of floods or civil war erupting out of famine-induced crises make for stimulating discussion, but assessments of the underlying propositions prove the scenarios unfounded. Put simply, the security consequences of environmental factors do not cause conflict and, in fact, are more likely to induce nations to work cooperatively. Combined, this recent research casts great doubt on the specific climate-conflict argument. The reliance on case studies and expert extrapolation can only take the argument so far. Actual experience suggests none of the intervening conditions (droughts, floods, storms, famine, or refugees) contribute significantly to intrastate or international conflict. Indeed, some scholarship even shows that rather than creating conflict, environmental issues result in cooperation among groups and states as they work to adapt to water shortages or famine. “On the whole, however, it seems fair to say that so far there is not yet much evidence for climate change as an important driver of conflict,” one recent survey of the empirical literature concluded (Gleditsch, Whither the Weather? Climate Change and Conflict, 2012).
But, yet, senior policymakers and reputable think tanks continue to advance the claim. Why? The intentions behind these efforts to link climate and security are clear—to motivate action on climate policy. Linking the environment with security is intentionally pursued as a way for organizations and government agencies to secure attention and resources (Dabelko & Simmons, 1997). The Brookings Institution is even clearer: “Our diverse group undertook a scenario exercise in hopes of reaching a better understanding of the consequences the world could realistically face from climate changes across the range of plausible effects. Our intention was to influence the public debate about climate policy” (Campbell & Weitz, 2008). Former Secretary of State George Schultz offered even blunter support for the notion of appealing to national security to gain Republican support for climate legislation. Emphasizing the national security case for controlling emissions and shifting energy use away from petroleum would rally support of those otherwise unconcerned with the environmental issue, he argued (Sullivan, 2011).

By casting climate change as a security issue, proponents of greenhouse gas controls believed they could secure support from constituencies who otherwise were apathetic or opposed to climate mitigation policies. If policymakers, and the public concerned most about security affairs, were convinced to view climate as a national security threat, then the political coalition in favor of immediate action on climate policy would be greatly strengthened. As it is, the climate policy debate is generally viewed in economic and moral terms and breaks along partisan lines. The national security argument is an attempt to shift the focus of the debate by enabling proponents of mitigation policies to claim the added benefit of forgoing the envisioned military operations, humanitarian interventions, and general security consequences to their economic arguments as well as the intrinsic value of avoiding those problems. Speaking before a defense conference, Christiana Figueres, Executive Secretary of the United Nations Framework Convention on Climate Change, characterized the issue as a trade-off between investment in “a traditional global military budget” versus an increase in “a preventive military budget” consisting of adaptation and mitigation efforts intended to avoid the security consequences of climate change (Figueres, 2011).

As this review shows, that calculation fails. Natural climatic events make environmental calamities inevitable. So, if U.S. national interests are triggered by floods or droughts, then the U.S. will need to prepare to address those as they occur, regardless of cause or frequency, resulting in no savings in materiel or planning. Perhaps even more significant, the policies recommended to mitigate greenhouse gas emissions will contribute to greater risk of instability, tension, and conflict. By increasing the cost of energy, mitigation approaches, such as the Kyoto Protocol or cap and trade, reduce economic prosperity. Affordable energy is strongly and positively associated with the incidence of peace in the international system and intra-state stability. The risks to U.S. national security interests potentially worsen.

In summary, the climate-security argument is dangerously overstated and designed to serve a domestic political purpose more than filling a void in strategic thinking.
Bibliography


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