

Strategic Defense Impacts of Climate Change

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Executive Summary

The primary purpose for defense forces is to maintain peace and security for their nations. In this context, peace means not just the absence of war, but the ability of governments to provide for the basic human requirements of their people. Within this definition of security, climate change is a growing threat to peace for many nations. The overarching impact of climate change on the security environment is an accentuation of the existing inability of a large and growing number of the world population to satisfy their basic human needs: food, shelter, clean water, and human safety provided in a sustainable way. Food and water resources are already threatened by climate change and the risk is projected to increase. Disease, damage to infrastructure from natural disasters, flooding and storm surges compounded by sea level rise are additional threats for large numbers of people.

The human-related impacts of climate change have the potential not only to overwhelm the resilience of many of the world's less stable nations, but also by the nature of the globalized world to impact on the national security of more developed countries. The ultimate threat of the combined impacts of resource scarcity, mass migrations, and weakened governments is armed conflict. Most experts believe the most likely threats from the physical changes in the environment due to climate change may be felt in the economic losses caused by the changing environment and the impacts to the overall health of people. This paper describes how the impacts of climate change will go beyond economics and create threats to security for many nations of the world.

Introduction

This paper examines the impacts of climate change from the perspective of peace and security in the world. The overall purpose is to establish an understanding of how climate change is a threat to national security for most nations and to discuss in strategic terms, what nations should do in order to address threats posed by climate change. This paper recognizes that climate change impacts are seen across the political, economic, and social structure of a nation, and therefore require whole of government efforts to address. This effort specifically focuses on analyzing those components of climate change which most directly impact the defense sector. The paper applies the recently-released data and analyses from the United Nations Intergovernmental Panel on Climate Change (IPCC) 5th Assessment Report (AR5) to

document the science of climate change. There are two main target audiences: 1) Governmental policy makers with a special focus on members of the defense and security sectors, and 2) Anyone in the general public interested in better understanding how climate change has the potential to adversely affect peace and security in the world.

This discussion starts with recognition that, for modern governments, the primary purpose of military forces is to secure and maintain peace for their nations. Peace in this context is not simply the absence of war, but the maintenance of geopolitical stability, which underpins the basic needs of people. A basic assumption is that people, speaking through their government, determine the national priorities for safeguarding the security of the nation. It is a premise of this paper that governments will not act forcefully in addressing climate change until the public mandate drives change. Threats may come from conditions inside the nation or may be caused by pressures from outside its borders. Climate change is creating both internal and external threats for most countries and this threat is growing. For example, the United States recently released a comprehensive analysis of the expected impacts of climate within the United Statesⁱ. Unfortunately, this report only examines internal risks and omits considerations of climate change that can impact external security. It is important for the general public to understand the relationship between their own national security and the exterior threats posed by climate change.

One example should help illustrate this concept. The Nile River basin consists of more than a dozen countries with a current total population of nearly 300 million, which is projected to grow to over 700 million by 2050ⁱⁱ. Water is a preciously scarce resource in this region and climate change has the potential to make the situation worse. There are fears that the building of dams in Ethiopia will result in even less water for downstream countries such as Sudan and Egypt. Climate change has the strong potential to make these countries, many already embroiled in conflict, more dangerous and unstable. The direct climate impact is not enough water to meet basic human needs. The major secondary impacts are on food security, epidemic waterborne disease, and economic decline. It is the complex interactions of all of these impacts within the political and cultural landscape of the countries relying on the waters of the

Nile that will determine if conflict ultimately results. Even without outright war, the region will be less stable and more vulnerable to human suffering. As we continue to observe, instability in this region can spill over to create global consequences. (specific details are provided in a case study that follows)

Security Analysis of Climate Change

Military and defense analysts must examine the science of the IPCC AR5 in order to construct the climate change chain of events which generate risks to security and peace. The IPCC AR5 provides more than sufficient data to conduct a strategic assessment of the security threats posed by climate change. From a security standpoint, the IPCC AR5 represents a tremendous source of well-researched intelligence data. The challenge is to collect the pieces to the puzzle from the three major working group reports and assemble them into a coherent picture. The IPCC has not ignored the idea that climate change generates security concerns, but has rightfully focused on the broader issues of defining the most probable climate changes and then describing the direct impacts these changes will produce globally and regionally. There are sections of AR5, such as the Human Security Chapter of Working Group II (WGII) report, which directly relate to security and defense, but in general, this paper draws from all parts of the IPCC AR5 for its data.

Climate change is altering the security landscape by generating new threats that must be addressed by governments and the defense sector. The most fundamental purpose for any government is to provide for the basic human needs of its people; and without the basic human needs of food, shelter, clean water, and human safety provided in a sustainable way, peace and security cannot be maintained. This concept is presented with simple clarity in the *National Security Strategy of the United States* which aspires for a global goal to, “*Promote dignity by meeting basic human needs*”.ⁱⁱⁱ

There are now more than 7.2 billion people on Earth, which is 5 times more than occupied the planet in 1950. A large number of these people live in conditions where obtaining basic human needs is a

day-to-day struggle. These people and their governments are most threatened by the impacts of climate change because, as the AR5 report highlights numerous times, they are least able to adapt and mitigate the impacts of climate change. For security analysis, it is also important to recognize that people living in regions already imperiled by conflict are at the very highest risk.

The most important concept of this paper is-- *the developed nations of the world must recognize that assisting the nations and people most at risk from climate change is in their critical national security interest.* This assistance needs to come in two forms, 1) Acting to reduce GHG emissions in order to minimize the global adverse effects of climate change, and acknowledging through action that further climate induced change/stresses are already locked into the system for at least the next 30 years, 2) Providing assistance (as described later in Table 1) to those people and nations who are most damaged by climate impacts. In this context, climate change presents a major shift in security thinking. Most nations consider defense strategy as an internal activity where plans are made within their political structures to respond to threats to peace. Climate change cannot be solved by any single nation, or said another way, no nation acting alone can protect itself from the risks posed by climate change. Nor is there a security solution to climate change. Addressing the risks posed to national security by climate change requires action by all sections of society; climate change is truly one of a few extreme threats where everyone wins or everyone loses (the threat and deterrent of global nuclear arms and conflict is a similar example)^{iv}.

Science of Climate Change

WGII Table SPM.1^v is the single most important resource within the IPCC AR5 addressing the links between climate change and security. It is there that AR5 translates the science of WGI into the ‘climate-related drivers of impacts’ of: **warming trends, extreme temperatures, drying trends, extreme precipitation, precipitation, snow cover, damaging cyclones, sea level rise, ocean acidification,** and carbon dioxide concentration. It is not an exaggeration to suggest that all of these drivers have impacts on security, but it is more helpful to focus on those impacts with potential to cause the greatest harm; these

risks are in **bold** above and placed in the left column of Table 1 below. Selected highlights from the scientific data of AR5 are also included in Column 1 of this table. These data illustrate that climate change is ongoing, and further indicates the range of impacts based on different levels of GHG emissions in the future. AR5 rigorously accounts for the sources of climate change and the evidence overwhelmingly confirms that the major causation is anthropogenic produced GHGs. The second column of Table 1 below presents an assessment of the key risks posed by each of the climate-related drivers. These risks are derived primarily from the information developed for WGI Table SPM.1., but also draw from other sections of AR5, the Human Security chapter of WGII, for example.

Column 2 represents the damage to human security from each of the discrete climate-related drivers of impacts. The AR5 data also reinforces the idea presented earlier that the true impact on any particular location results from the cumulative effects of each of the key risks. What WGI data does not account for is how cultural, political, or physical factors further add to the overall risk for a region. These factors add significant complicating factors to assessing and developing mitigation for the security risks.

Summarizing what can be learned from Columns 1 and 2 of Table 1 in one sentence-- **the results of climate change are likely to greatly increase human suffering in many places in the world.**

TABLE 1: Major Impacts of Climate Change

Climate-Related Driver	Key Impacts	Security and Defense Impact
Temperature warming: 0.85 °C in 2012, 1.0 – 3.7 °C by 2100 (WGI, SPM-3)	Increase of disease (vector and water-borne), stress on water resources, loss of arable lands, reduced food production, increase in salinity, degrading of coral reefs, loss of fish stock and livelihoods	Increase of humanitarian support missions, refugee support, medical resources to respond to epidemic disease, potential for conflict
Extreme temperature: highest in Asia, Europe, Australia, (WGI, SPM-15, 23)	Increased mortality and health and well-being issues, stress water resources, reduced crop production	Medical logistics support, increase of humanitarian support missions, security operations (ops) and potential for conflict
Drying trend: global, highest in mid-latitudes (WGI,SPM-23)	Food security threats, water resource stress,	Support migrations, humanitarian ops, potential for conflict.
Extreme precipitation: highest in mid-latitudes and wet tropics by 2100. (WGI, SPM-16)	Flood damage to infrastructure, loss of life, increased infectious and vector borne disease	Increase of humanitarian support missions, large-scale logistics support, medical ops in respond to epidemic disease, security ops.
Precipitation: More in the high latitudes and at the equator. Drier in mid-latitudes and sub-tropics (WGI, SPM-17)	Water resource stress, loss of arable land, public health issues, water quality degradation	Increase of humanitarian support missions, logistics support, medical support to respond to epidemic disease, security ops, potential for conflict, engineering support.
Snow and ice cover: Ice – 15 -85 % reduction by 2100. Snow- 7- 25 % loss by 2100 (WGI, SPM-17)	Loss of snow and ice stresses water resources, increased rate of warming, flooding and droughts	Increase of humanitarian support missions, large-scale logistics support, medical resources to respond to epidemic disease, border security ops.
Damaging cyclone: most likely in Western North Pacific and North Atlantic, (WGI, SPM-23)	Loss of life and property damage, extreme flooding, increased disease following disaster	Increase of humanitarian support missions, security ops, engineering reconstruction support, disaster medical relief, logistics support
Sea level: 0.19 M in 2010, 0.4-.63 by 2100 (WGI, SPM-18)	Flooding/property damage, loss of coastal and island settlements, reduced food production, water quality damage	Refugee support, large scale logistics support, security ops,

Table references specific sections in the AR 5 Summary for Policy Makers, 2014.^{vi}

Climate Impacts on Security

The next and most critical step in this security threat analysis requires that military judgment be applied to the established climate change impacts (Column 2, Table 1) in order to assess the impacts on the military and defense sectors. Column 3 of Table 1 has been constructed by the authors based on military experience from: 1) responding to natural and manmade disasters 2) operations in support of mass migrations and large refugee populations 3) conducting security operations in areas of conflict, and 4) other missions which offer similar challenges to what can be expected from climate change.

These types of operations may not present precisely the same challenges, but they represent a ‘best guess’ of what the future might look like based on past experience with ‘military operations other than war’. One frightful point of this analysis is seen if the relative scale of past operations is compared to the range of emerging risks from climate change. Our historical operations data comes from responses to disasters such as the 2011 tsunami in Japan; cyclones in India and Bangladesh; hurricanes, earthquakes, volcanoes and floods in the Caribbean; droughts in Sudan; refugee relief in Rwanda; and more. These missions were of limited scale and generally of short duration. **The scale of disasters that could result from the higher estimates of the impacts of climate would far exceed, in scope and duration, any previous military operations short of major conflict.** In examining Column 3 of Table 1, the major security/defense implications of climate change can be summarized as:

- Direct threats to human health from disease and other acute (heat related) injury
- Mass migrations of people driven by water and food security issues, disease, or conflict
- Loss of food production and arable lands for people who do not or are unable to migrate
- Increased rate and intensity of natural disasters producing death, destruction of critical infrastructure, and the epidemic to pandemic disease that can follow major disasters.
- Large-scale and continuing logistics support to people threatened by the cumulative impacts of climate change.

- Peacekeeping operations in failed or fragile states suffering the impacts of climate change.
- Conflict over resource scarcities generated by climate change.

Options for Adaption

Several additional factors must be considered to fully understand the impacts of climate change in any particular country or region. AR5 emphasizes that the actual impacts of climate change will be unevenly distributed across the globe. A key to security risk analysis is assessing the ability of communities of people and governments to adapt or mitigate the adverse impacts of climate change. It is fair to conclude that many nations of the world are not capable of adapting to large-scale climate change threats. Going further, the most vulnerable nations will not be able to defend themselves from even moderate impacts without considerable assistance. To better address this point, Table 2 presents a list of the countries at the very top of the Failed States Index^{vii} (countries least capable of accomplishing the basic requirements of government). It is relevant to note that an environmental analysis of these countries also places them at the top of the list of countries with worst environmental conditions.^{viii} Failed governments and failed environmental conditions together assure that any significant climate-driven environmental degradation will deepen human suffering in these countries. An example from the Nile River basin which follows later will further illustrate this idea. In summary, defense and security issues are most likely in those countries unable to adapt and mitigate the major effects of climate change, and it is at this point that climate change becomes a defense and security issue.

Table 2

Top 10 Failed States in 2014^{ix}

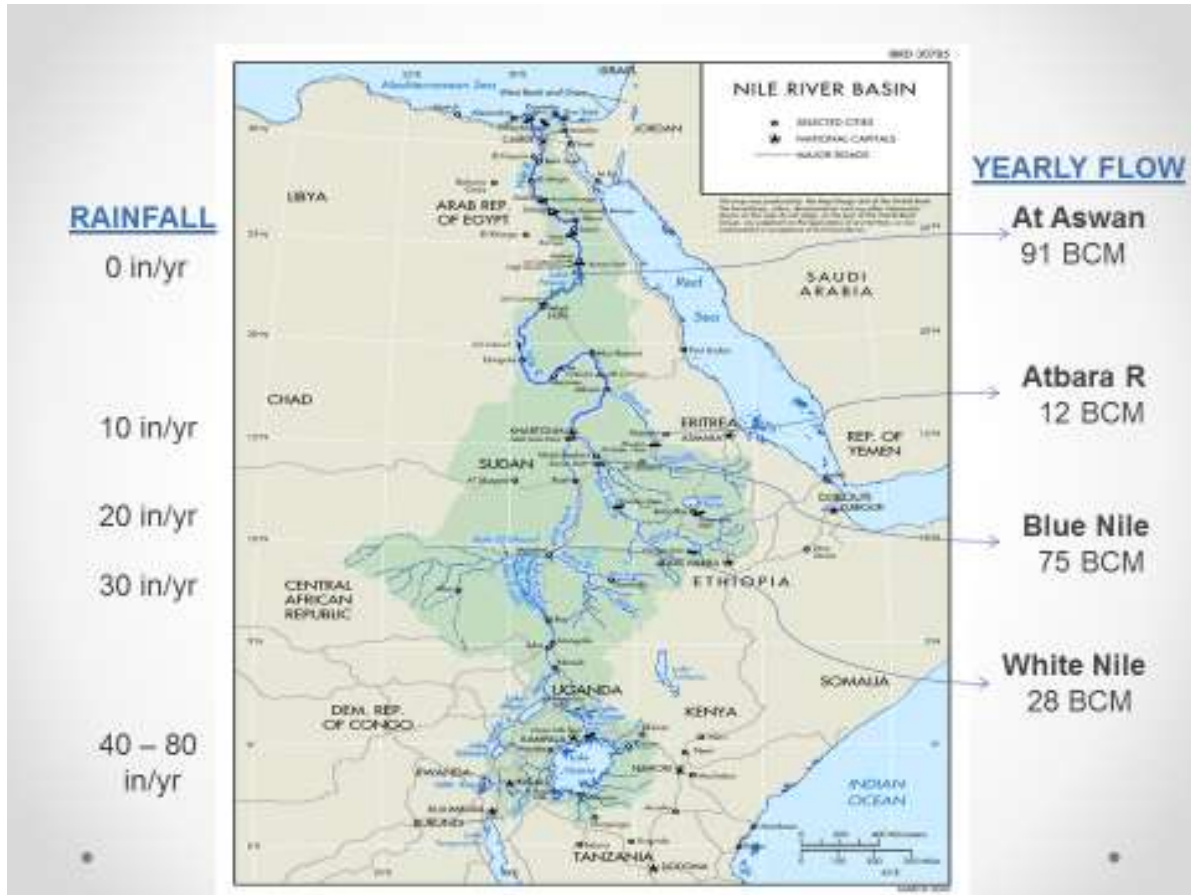
Nation	Defense/Security Status
1. Somalia	Unstable
2. Democratic Republic of the Congo	Unstable
3. Sudan	Unstable
4. South Sudan	Unstable
5. Chad	Conflict
6. Yemen	Conflict
7. Afghanistan	War
8. Haiti	Unstable
9. Central African Republic	Conflict
10. Zimbabwe	Unstable

Regional Case Studies

Thinking about the security implication of climate change in abstract ways is difficult to grasp for even seasoned security analysts. However, looking at specific examples of places where impacts of climate change are visible threats to security brings these abstract ideas into focus. For this purpose, this paper offers two case studies to illustrate the environmental security risks posed by climate change; first in the Nile River watershed, and second, the countries within the Tibetan plateau watersheds.

WGI data offers a coarse scale geographic analysis of the impacts of climate change. While a worldwide analysis is well beyond the scope of this paper, it is possible to utilize the data of WGI to

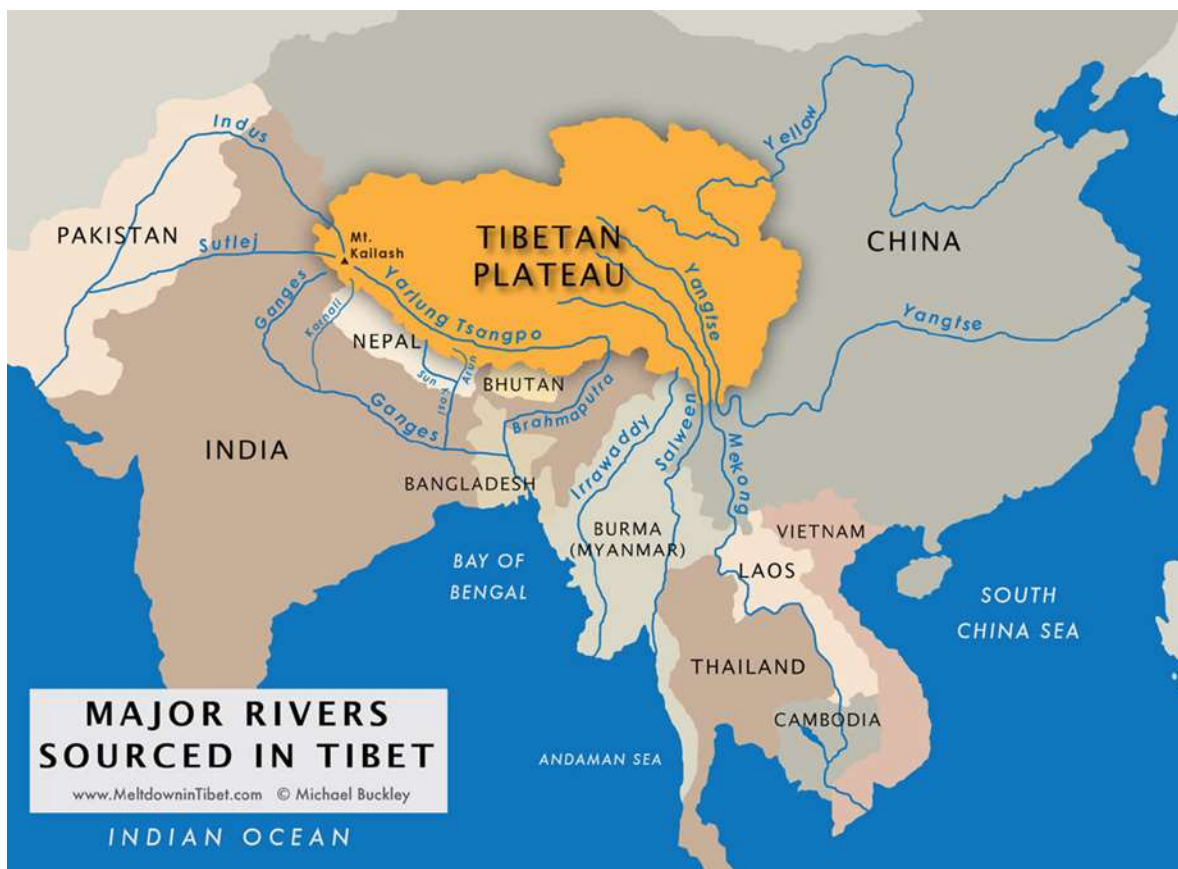
examine selected areas of special concern. The nations at the Top 10 failed states index (Table 2) immediately draw attention to Sahara region and Northern Africa (note: many more than just the top 10 nations of this region are high on the failed states index). The data from the AR5 indicate that the cumulative impacts of warming, drying, and changes in precipitation in this region will have a significant impact on the people and the ecosystem. The overall assessment of this region is achieved by summing



SOURCE: Data compiled from various sources by the author and represent best estimates. Flow rate is in BCM, billion cubic meters per year.

the impacts of climate change, with the effects of political instability (shown in the Failed States data), high population growth rates, and other socioeconomic factors. The result is an overall security threat risk that is **high to extreme**. As discussed earlier, few options for mitigation or adaption will be available for these countries, and the potential for even more conflict will be significant. A major exacerbating factor

critical to fully appreciating this example is seen by examining the population trends within the watershed. For the seven countries most reliant on the Nile water, the population is predicted to grow from 265 million in 2011 to 700 million by 2050. At current use rates this would require three times as more water than the watershed can provide. Any solution will require great diplomacy and significant changes in water use particularly for Egypt and Sudan, who now consume the largest portion of the existing resources. And this all occurs before predicted reductions and increased demands that would be attributed to climate change. The security risks for this region are clearly significant.



A second example of an area where climate change will create major security concerns is with the countries within the Tibetan plateau watershed. The impacts of climate change predicted to impact this region by 2100 represent threats to the security of almost half of the world's population (more than 3 billion). The climate change stressors predicted to impact this region include; warming, extreme heat,

drying, and extreme weather such as more frequent and severe cyclones. However, the most significant are those stressors that impact water resources, mainly altering precipitation patterns (how much and when it occurs) and changes in snow cover. The Tibetan ice and snow system represents the primary water resource for eight of the major rivers of the world as shown above and provides water for countries with more than 3.2 billion people. This, like the previous example, is also a region with a rapidly expanding population which will further exacerbate the region's ability to adapt and mitigate the impacts of climate change. Climate change is predicted to make water resources worse, possibly much worse by 2100. Table 1 can be examined to assess the security risks posed by the stressors predicted to impact this region and even a conservative estimate depicts dire conditions. Any security assessment also must recognize that three of these nations are nuclear powers with large military forces. This is a region with a history of sporadic outbreaks of military conflict and, at best, a fragile balance of power. A more stable peace in this region would bring benefits for all nations. Water security risks driven by climate change can become a major destabilizing factor and major threat to peace in this region.

Conclusions and Final Thoughts

The evidence that climate change will impact peace and security in the world is irrefutable. In the near-term it will be our ability to adapt to the climate impacts which will determine the magnitude of the security threats. The metric defining the level of the security impact of climate change will be in the increased human suffering in the world. In the long-term, the impacts will be determined by our ability to reduce greenhouse gas emissions and thus limit the direst consequences. The highest probability and most damaging impacts on the security and defense sector are:

- ✓ Loss of sustainable food production for many regions of the world.
- ✓ Increased epidemic disease from polluted water, disease following natural disaster and famine.
- ✓ Reduction of sufficient potable water to support basic human needs.

- ✓ Increased number, intensity, and areas impacted by natural disasters.
- ✓ Loss of living space caused by sea level rise and changes in ecosystems.

The message that the governments must take away from this assessment is:

- Whilst there is no security solution to climate change the risks posed by climate change represent threats to the national security of all nations. An important finding from this work is to clearly establish that – Developed nations of the world must recognize that assisting the nations and people most at risk from climate change is in their critical national security interest^x. This help needs to come in two forms, 1) Acting to reduce GHG emissions in order to minimize the adverse effects of climate change, and 2) Providing assistance to the people and nations who are most affected by climate impacts.
- Climate change must become a component of national security policy for all nations.
- The risks are cumulative depending on geography and time, and must be considered with other factors that affect security.
- Existing processes for conducting security analysis are excellent tools for nations to apply in understanding how to respond to climate change.

The goal for this paper is to advance the dialogue concerning the security implications of climate change. It establishes the value of the science in AR5 to the security community. National security organizations spend large amounts of money to collect intelligence information of all types in efforts to identify threats and develop strategies for defense. The defense community has never been ‘given’ a body of scientific intelligence as well studied as the data and analysis presented in the IPCC reports. This evidence presents a most clear and urgent call to action for the defense sector, but more, for all governments of the world.

References and Notes

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- ⁱ U.S. Global Change Research Program, “Climate Change Impacts in the United States,” May 2014.
- ⁱⁱ King, W. C., Water Security Conference, Oxford University, 2010.
- ⁱⁱⁱ The President of the United States, National Security Strategy, page 39, 2010.
- ^{iv} Barack Obama, State of the Union Address, 2015.
- ^v IPCC, AR5 WGII, SPM pages 17-19.
- ^{vi} IPCC, AR5 WGI, SPM.
- ^{vii} Fund for Peace Website, 2014.
- ^{viii} King, W. C., Water Security Conference, Oxford University, 2010.
- ^{ix} This reference is from the Fund for Peace. It is very similar to a Failed States Index published each year by Foreign Policy Magazine. This list is based on analysis of population, migration, internal strife, poverty and economics, public service, security forces, basic governance capacity, and external actors.
- ^x U.S. Department of Defense, “2014 Climate Change Adaptation Roadmap, June 2014.

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