



Risk Mitigation Consulting Inc.

Intelligence and Analysis Division

WHITE PAPER SERIES

Climate Change and Global Security

INTENT

This white paper is designed to provide analysis of relevant, publicly available information on threat and hazard events/trends and their potential impacts to the interests of the United States, both at home and abroad. This product is not intended to be an all-encompassing assessment of the subject.



Climate Change and Global Security

Introduction

Climate change is projected to lead to a hotter globe, more frequent days of extreme heat, and warmer oceans. Global annual average temperature measured over both land and oceans has increased by about 1.8°F (1.0°C) according to a linear trend from 1901 to 2016. Without significant changes in global emissions, annual average global temperatures could increase by 9°F (5°C) or more by the end of this. Sea levels are expected to continue to rise, and the frequency and intensity of extreme weather events will also most likely increase over time. These events include droughts, wildfires, heavy rainfalls, floods, storms, and storm surges. Previous RMC White Papers have discussed the impact of climate change on several hazards, including extreme weather events, infectious disease, hazardous materials release, and train mishaps.¹

In 2015, the U.S. Department of Defense identified climate change as a security risk to the United States: aggravating pre-existing issues such as poverty, social tensions, environmental degradation, ineffectual leadership, and weak political institutions that threaten stability in a number of countries. Officials stated that climate change degrades living conditions, human security, and the ability of governments to meet the basic needs of their populations. Since then, climate change has continued to threaten global security. It has led to resource scarcity, increased disease outbreaks, civil unrest, and mass migrations. By examining the security and threat-related impacts of climate change, a better understanding of the wide-ranging future trends and consequences of climate change can be assessed and understood.²

Resource Scarcity

Climate change is leading to resource scarcity across the globe. More frequent extreme weather events, ranging from droughts to intense rainfall, would significantly threaten agricultural production and increase food price volatility. As the climate changes, disputes over water and access to arable land are likely to grow, prompting local conflict. The growing global population is expected to demand 35% more food by 2030. Furthermore, the types of food sought after by high income countries (i.e. vegetable oils, dairy, meat, fish, and sugar) have a particularly high impact on energy and water. The long-term climate effects of increasing heat and changing precipitation patterns will compound land, water, and energy constraints, raising food prices.^{3, 4, 5,}

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Heatwaves and reduced precipitation threaten livestock directly and reduce fertility, pasture yields, milk production, and disease resistance. Increasing temperatures on the planet and more variable rainfalls are expected to reduce crop yields in many developing tropical regions. By the 2080s, land unsuitable for agriculture in sub-Saharan Africa due to severe climate, soil or terrain constraints may increase by 30 to 60 million hectares. It is estimated that climate change could reduce agricultural productivity by up to a third across large parts of Africa over the next 60 years. Additionally, rising global sea levels will reduce the amount of arable land available for agriculture. Ocean warming is likely to adversely affect marine fish populations, particularly in East Asia and in the North Sea - populations that rely heavily on fishing for food or income.^{3, 4, 5, 10}

Resource scarcity disproportionately affects vulnerable, under-developed countries, as it frequently builds on preexisting social and political grievances. Disputes over these resources have already triggered violence and internal conflict. While resource scarcity does not inherently lead to civil unrest in all cases, incidents of violence related to resource scarcity are likely to continue over time.^{3, 4, 5, 10}

In addition to increasing demand for water and energy, inflating food prices, negative impacts on agriculture, and reduced arable land, access to fresh water will likely become increasingly challenging in the future. Water use has been increasing worldwide by about 1% per year since the 1980s, driven by a combination of population growth, socio-economic development and changing consumption patterns. Currently, about 4 billion people experience severe water scarcity during at least one month of the year. About a half of the global population could be facing water shortages by 2030 when demand would exceed water supply by 40%. According to the World Bank, current climate change trends will likely result in water scarcity in regions where it is currently abundant, such as Central Africa and East Asia. On the other side of the spectrum, water scarcity is likely greatly worsened in regions such as the Middle East and the Sahel in Africa, where water is already in short supply.^{4, 6, 7, 8, 9}

Higher temperatures and more extreme weather events are projected to affect availability and distribution of rainfall, snowmelt, river flows and groundwater, as well as causing deterioration of water quality. Low-income communities are likely to be worst affected. Current trends indicate that half of the world's population will be living in water-stressed areas by 2025. Water scarcity has the potential to hinder economic growth, impact health, spur migration and spark conflict. With the existing climate change scenario, by 2030, water scarcity in some arid and semi-arid places will displace between 24 million and 700 million people.^{4, 6, 7, 8, 9}

Biological Impacts of Climate Change

As noted in previous RMC White Papers, the timing, intensity, and location of infectious disease outbreaks is directly related to climate conditions. Studies have found that long-term climate warming tends to favor the geographic expansion of several infectious diseases. These warming trends, combined with greater rainfall and flooding, are likely to increase the frequency of water-borne diseases and diseases transmitted by insects and snails. The transmission seasons of vector-borne diseases may also extend, occurring across a potentially larger geographic range.



Increasingly frequent incidents of extreme heat will likely lead to deaths from cardiovascular and respiratory disease, particularly among the elderly.^{1, 10, 11}

Additionally, extreme weather events have the potential to increase the number of disease outbreaks or cause outbreaks at unusual locations and times. For example, annual cases of West Nile neuroinvasive disease in the United States are projected to more than double by 2050 due to increasing temperatures. Not only does climate change exacerbate existing health threats, it can create new challenges, exposing more people to hazardous weather and climate conditions. Climate change affects human health by altering individuals' exposure to heat waves, floods, droughts, and other extreme events; vector-, food- and waterborne infectious diseases; changes in the quality and safety of air, food, and water; and stresses to mental health and well-being.^{1, 10, 11}

Civil Unrest

Civil unrest due to climate change can come in a variety of forms and sizes, from peaceful marches, to violent conflicts. Marches across Australia were held in 2019 to protest climate inaction by politicians, prompted in part by the massive wildfires occurring that season. In 2018, water protests in southern Iran turned violent when security forces opened fire on demonstrators. Also, in 2018, disputes over access to water and grazing land were a factor that fueled conflict between farmers and herders in Mali that reportedly killed 25 people. Water crises have exacerbated social unrest in Syria and Libya. In 2000, privatization of the drinking water in Cochabamba, Bolivia incurred violent protests and escalated into the so-called 'Water War of Cochabamba', which killed at least nine people. The water was renationalized but is currently heavily strained by global climate change, over-consumption and technological deficiencies. As more and more countries suffer the effects of climate change, the risk of unrest increases.^{10, 12}

The potential for conflict increases where there is a history of civil violence, conflict elsewhere in the region, low GDP or economic growth, economic shocks, weak governance, and lack of access to basic needs. Countries with weak political institutions, poor economic conditions, or where other risk factors, such as political strife are already present probably will be the most vulnerable to climate-linked instability or migration and the hardest pressed to respond to and recover from a crisis.^{1, 10}

It should also be noted that resource scarcity has been utilized by terrorist groups to gain support and recruits in Iraq, Nigeria, Pakistan, Somalia, and Syria. It is likely that an increase in civil unrest and resource scarcity will allow terrorist groups to exploit the most affected and boost recruitment. For example, the record-breaking drought in 2011 led to Somali herders having to sell larger amounts of livestock. Prices fell and poverty spread. The militant Islamist group Al Shabaab offered cash and benefits to fighters, and their ranks grew as desperate herders joined.^{10, 12}

Displacement and Migration

Resource scarcity, civil unrest, environmental changes, or a combination of these climate change related factors can force individuals to migrate. Changes to the physical environment have forced large scale migration in the past. One example of this is the Great Irish Famine of the mid-19th century. Climate change is now leading to mass migration on a global scale. While climate change



affects all nations, there are disproportionately negative impacts on vulnerable countries the UN identifies as *Least Developed Countries*, *Landlocked Developing Countries*, and *Small Island Developing States*. These countries are disproportionately affected by the negative impacts of climate change and are often least able to cope due to structural constraints and geographical disadvantages. At the same time, these countries are contributing the least to climate change. Within the poorest and most vulnerable countries, climate change pressures can exacerbate pre-existing development-related challenges and security issues.^{3, 10, 11}

As extreme weather phenomena such as floods, heatwaves, and severe tropical storms become more frequent, so too will the number of displaced people increase. Furthermore, 150-200 million people may be forced to move from land that will be under water by the end of century due to rising sea levels. The combination of those factors will continue to lead to the displacement or migration of people fleeing vulnerable countries. Additionally, some countries may be experiencing climate change related issues of their own, while also experiencing an influx of refugees from nearby nations, further compounding the situation. The World Bank estimates that significant levels of warming could push tens of millions of people in Sub-Saharan Africa, South Asia, and Latin America to migrate within their countries by 2050. In the future, these massive migrations may overwhelm host nations and lead to additional political unrest and resource scarcity.^{3, 10, 13}

Conclusion

Climate change is not the only cause of resource scarcity, civil unrest, or migration. However, the predicted trends from climate change, such as rising heat and sea levels and more frequent extreme weather events, are likely to impact these areas, effecting every country. Some of the countries that are most vulnerable to climate change are the same countries that are unable to adapt due to political structure, economic status, or geographic location. Should the current climate change projections continue, it is reasonable to assess that there will be major impacts across the globe in access to resources (to include food, water, and energy), health trends, triggers for and types of civil unrest, and migration patterns. The primary and secondary effects of these climate change related changes will be unavoidable in the future. The impact of climate change on global security is far-reaching. Effects spread across borders and economies, challenging countries to plan for future trends that will change the way safety and security is understood. This also potentially leads to an environment where U.S. interests abroad may experience impacts to operations or increased security concerns, as well as contribute to evolving security issues here in the Homeland.

¹ Fourth National Climate Assessment: Summary Findings. (2018). Retrieved May 01, 2020, from <https://nca2018.globalchange.gov/>

² National Security Implications of Climate-Related Risks and a Changing Climate. (2015, July 23). Retrieved May 1, 2020, from <https://archive.defense.gov/pubs/150724-congressional-report-on-national-implications-of-climate-change.pdf?source=govdelivery>

³ Megatrends Climate Change and Resource Scarcity. (n.d.). Retrieved May 01, 2020, from <https://www.pwc.co.uk/issues/megatrends/climate-change-and-resource-scarcity.html>



⁴ Climate Change: UN-Water. (n.d.). Retrieved May 01, 2020, from <https://www.unwater.org/water-facts/climate-change/>

⁵ The Central Sahel: Scene of New Climate Wars? (2020, April 27). Retrieved May 01, 2020, from <https://www.climate-diplomacy.org/news/central-sahel-scene-new-climate-wars>

⁶ Water scarcity by 2030: True for every second person on earth, UN says. (n.d.). Retrieved May 01, 2020, from <https://www.rt.com/news/water-shortage-un-population-901/>

⁷ World Water Development Report 2019: UN-Water. (n.d.). Retrieved May 01, 2020, from <https://www.unwater.org/publications/world-water-development-report-2019/>

⁸ Carr, A. (2016, May 05). Water Scarcity Due to Climate Change Will Have Severe Consequences, World Bank Warns. Retrieved May 01, 2020, from <https://weather.com/science/environment/news/world-bank-climate-change-water-scarcity>

⁹ Drinking Water. (n.d.). Retrieved May 01, 2020, from <https://www.who.int/news-room/fact-sheets/detail/drinking-water>

¹⁰ Kiemel, P. (2019, June 5). Statement for the Record for a Hearing On "The National Security Implications of Climate Change". Retrieved May 1, 2020, from https://www.odni.gov/files/ODNI/documents/2019-6-05_Statement_-_HPSCI_Climate_Change_Hearing_-_APPROVED_converted.pdf

¹¹ Impact of climate change on human infectious diseases ... (n.d.). Retrieved May 1, 2020, from <https://www.sciencedirect.com/science/article/pii/S0160412015300489>.

¹² Editor's Pick: 10 Violent Water Conflicts - World. (n.d.). Retrieved May 01, 2020, from <https://reliefweb.int/report/world/editor-s-pick-10-violent-water-conflicts>

¹³ Climate Change and Migration in Vulnerable Countries - United Nations Sustainable Development. (n.d.). Retrieved May 01, 2020, from <https://www.un.org/sustainabledevelopment/blog/2019/09/climate-change-and-migration-in-vulnerable-countries/>