

## Climate Risks, the Economy, and National Security\*\*

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### Summary

Whether in the public or private sector, long-term economic planning rarely takes climate change into account. Yet a warming climate will significantly affect many sectors of the economy, including those related to our national security infrastructure and operations. Just within the United States, recent work by the Risky Business Project has found that sea level rise and the resulting storm surges will result in the destruction of billions of dollars of coastal property by mid-century. At the same time, extreme heat will decrease crop yields, undermine labor productivity for outdoor workers, increase energy demand, and significantly increase violent crime. Updated analysis built on the Risky Business model shows that the same kinds of impacts will be felt even more strongly overseas, especially in the Middle East and the global South. These models show serious implications for our military installations and operations both at home and abroad. But these outcomes are not inevitable: they can be minimized through granular climate risk analysis that takes into account potential impacts across military operations (e.g., from potential heat-related impacts from drought and wildfire in destabilizing populations). Ultimately, physical climate risk analysis, including detailed plans for addressing these risks, need to become a routine part of national security planning.

### Current realities

In September 2016, the U.S. federal government took an important step in mandating that climate change be incorporated into national security plans through the creation of a Climate and National Security Working Group that focuses on coordinating climate security planning among federal agencies. Climate risks, however, are still not a regular part of federal budgeting, infrastructure investment, or national security planning.

Part of the reason for this omission is that climate impacts can be complex, uncertain, and difficult to translate into actionable strategies for public policymakers and the private sector. The Risky Business Project has worked to fill this gap by modeling the physical and economic risks climate change poses to specific sectors and regions of the U.S. The Climate Impact Laboratory has taken a similar approach to address overseas issues. By providing decision makers with the best science on sea level rise and extreme heat as well as insight into the specific types and locations of economic risks that may occur (e.g., increased crime, decreased workforce productivity), these efforts are designed to enable more informed planning at the organizational level regarding how to best model and manage climate risk. From a national security perspective, these risks run the gamut from physical impacts on military bases and other installations, to increased heat stress on soldiers and contractors, to the real threat of drought and other climate-related impacts on destabilizing entire populations. In general, analyses break climate risk into three categories:

- **Physical Climate Risk:** The risk that climate change alters the physical environment in a way that jeopardizes the operational viability of a program.
- **Financial Climate Risk:** The socioeconomic risks that climate change may pose to a program, especially concerning policy changes that could result in stranded assets (e.g., an aggressive price on or regulation of carbon).
- **Associated Climate Impact:** The program's contribution to climate change, like the greenhouse gas footprint on the program or product versus low-carbon alternatives.

Of these, physical climate risk is the most straightforward to model and to incorporate into long-

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range military planning (though the others are important to monitor, especially as they relate to the economy security of oil-dependent states). In the original Risky Business Project the impact of sea level rise and extreme heat was modeled within the U.S. on five specific areas: coastal property value, agricultural output, outdoor labor productivity, crime rates, and energy demand. This work provides important lessons for military planners.

At the most basic level, sea level rise poses a significant physical climate risk to U.S. coastal military installations. Sea level rise is largely caused by thermal expansion of the oceans, melting glaciers, and non-climatic effects such as groundwater depletion (these effects are all modeled in Risky Business Project projections). If we continue on our current path, by 2050 between \$66 billion and \$106 billion worth of existing coastal property will likely be below sea level nationwide, with \$238 billion to \$507 billion worth of property below sea level by 2100. An analysis by the Union of Concerned Scientists of 18 coastal military bases in the eastern U.S. found that by 2050, most would experience more than 10 times the number of floods they experience today. By 2070, half of these sites could experience the equivalent of more than one flood daily. By 2100, four installations — Naval Air Station Key West, Joint Base Langley-Eustis, Dam Neck Annex, and Parris Island — could lose between 75% and 95% of the land they currently occupy.

Rising seas are in large part the result of rising air temperatures. By mid-century, the average American will likely see 27 to 50 days over 95°F each year, more than three times the average annual number of 95°F days observed during the past 30 years. The higher frequency of extremely hot days will have important economic and social effects. Perhaps most important to military planners is that these temperatures will increase energy demand on bases and other installations both in the U.S. and abroad, while making the current energy grid less reliable due to heat stress on power lines and power plants. In the U.S., our models show that global warming will likely necessitate the construction of up to 95 gigawatts of new power generation capacity over the next 5 to 25 years (equivalent of about 200 average coal/natural gas-fired power plants).

Higher air temperatures will also affect the health and productivity of soldiers and contractors. Under a warmer climate, labor productivity of outdoor workers could be reduced by as much as 3% by the end of the century, with larger losses in the southeastern U.S. Over the longer term, extreme heat during some parts of the year could actually surpass the threshold at which the human body can maintain a normal core temperature without air conditioning. During these periods, anyone whose job requires them to work outdoors, as well as anyone lacking access to air conditioning, will experience severe health risks and potential death. Such extreme impacts are likely even greater in warmer climates in the Middle East and global South.

Another set of climate impacts that may be less obviously related to national security affect the agricultural sector, as higher temperatures threaten to reduce crop yields. As extreme heat spreads across the middle of the country, some states in the Southeast, lower Great Plains, and Midwest risk up to a 50% to 70% loss in average annual crop yields (corn, soy, cotton, and wheat) by the end of the century. These changes could threaten our domestic food supply, though it's not likely given the size and climate variability of the U.S. Similar or more severe changes occurring overseas, however, could almost certainly lead to food insecurity, migration, and overall societal instabilities where heavily agricultural economies exist. For example, many experts believe recent conflicts in Syria to have been rooted in a drought caused by climate change that exacerbated water shortages and failed crops, displacing millions of farmers.

Rising temperatures are also strongly correlated with violent crime. Under a business-as-usual scenario, violent crime is likely to increase 0.6% to 2.1% by mid-century and 1.9% to 4.5% by late century. By 2080, a 1-in-20 year violent crime rate could become commonplace. These

numbers pose a domestic security challenge to our National Guard, and if occurring overseas, a serious impact on international stability and U.S. personnel abroad. Although this potential outcome was not explicitly modeled, it can be imagined that declining Middle East oil revenues (due to new constraints on carbon) combined with increased crime from extreme heat could lead economic desperation and destabilization in an already-tenuous region.

### **Scientific opportunities and challenges**

The availability of “big data” to model complex problems has made physical climate risk analysis far easier than it was only a few years ago. Modeling political prioritization remains a larger challenge. How can military planners prioritize the impacts of climate change, which may occur over the course of decades, against shorter-term threats? Ultimately climate risk analysis must become a routine component of national security planning so that a sustained effort can be made to address the impact of a changing climate rather than reacting only to specific climate events.

The military has an important opportunity to lead the country in applying risk analysis to climate change as a priority in fulfilling its national security missions. Climate change needs to be an important element in the well-recognized military approach to threat analysis and response, and as such, can provide leadership for other aspects of public and private sector policy.

### **Policy issues**

The Risky Business Project analysis of climate change impact suggests that military planners need to:

- Incorporate granular, asset-specific climate risk assessments into all future military infrastructure planning, especially in relation to sea level rise and extreme heat.
- Protect military bases from power outages through the installation of on-site, backup generation and microgrids that can meet, or be expanded to meet, future cooling needs.
- Develop technologies that allow service members to work outdoors in extreme heat for extended periods of time (e.g., ice vests to keep core temperature low).
- Determine how increased violent crime from extreme heat will impact domestic national security plans with specific focus on how extreme heat could affect low-frequency, high-severity events like riots.
- Improve coordination among national security agencies, climate scientists, and overseas development agencies to better understand the potential impact of climate change on foreign economies, especially involving at-risk commodities such as agriculture and oil.
- Formulate options for mission priorities in foreign regions where climate changes have contributed to destabilizing economies and to creating failed or at-risk societies.

### **References**

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*\*\* A policy position paper prepared for presentation at the conference on Climate Impact on National Security (CINS), convened by the Institute on Science for Global Policy (ISGP) in partnership with the U.S. Army War College (USAWC), Nov. 28 – Dec. 1, 2016, at the USAWC, Carlisle, Pennsylvania, U.S.*