

## Report: Implications of Climate Change for National Security\*\*<sup>1</sup>

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### Summary

Long-term changes in the climate will produce increasingly more extreme weather events and put greater stress on critical Earth systems such as oceans, freshwater, and biodiversity. These in turn will almost certainly have significant effects, both direct and indirect, across social, economic, political, and security realms during the next 20 years. These effects will be all the more pronounced as people continue to concentrate in climate-vulnerable locations, such as coastal areas, water-stressed regions, and ever-growing cities.

### Current realities and foreseeable challenges

Beyond offering platitudes stating that climate change is a growing threat to national security, it is perhaps worthwhile to break down the pathways through which this may occur. It is important to note from the outset that national security doctrine generally encompasses a shorter timeframe — from weeks to one or two decades — than that typically discussed in climate science. As such, the following three<sup>2</sup> classes of stresses may operate within this “national security window:”

- a) *Single extreme weather events*, such as heavy precipitation events, heat waves, storms, and droughts. These events could trigger crop failures, infrastructure breakdown, supply chain disruption, energy blackouts, infectious disease outbreaks, etc.;
- b) *Clusters or sequences of extreme weather events* that occur within a short time or region. It is posited that multiple events of modest severity may cause more damage than powerful single events;
- c) *Diffuse climatological stresses*, such as sea-level rise, ocean acidification, air quality degradation, changes in cloud cover, and sustained shifts in temperature and precipitation.

Academic research on the impacts of climate on political and security outcomes is sparse and far outpaced by work on climate dynamics. However, it is posited that the climate will affect United States national security interests over the next 20 years through several pathways discussed in turn.

**Threats to the stability of countries.** Many countries will encounter climate-induced disruptions (e.g., weather-related disasters, drought, famine, or damage to infrastructure) that stress their capacity to respond, cope, or adapt. Climate-related impacts will contribute to increased migration, which can be particularly disruptive if, for example, demand for food and shelter outstrips resources available to assist those in need.

When climate-related effects overwhelm a state’s capacity to respond or recover, its authority can be so undermined as to lead to instability. Countries with weak political institutions, poor economic conditions, or where other risk factors for political strife are already present will be the most vulnerable to climate-linked instability. In the most dramatic cases state authority may collapse partially or entirely. Climate-related instability is likely to create strong pressure for foreign aid, disaster assistance, or military responses. Even if climate-related disruptions do not undermine stability, some governments could be so preoccupied with managing the effects that they have little time, energy, or resources left to engage on broader policy issues.

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<sup>1</sup> This report does not consider impacts on the U.S. homeland.

<sup>2</sup> A fourth class of stress, not developed in this paper, is the adverse effect that projections of a gloomy future climate may produce in near-term human and societal behavior

**Heightened social and political tensions between populations.** Decreases in water and disputes over access to arable land will increase the risk of conflict between people who share river basins, aquifers, or land areas. Although water disputes between states have historically led to more water-sharing agreements than violent conflicts, it is judged that this trend could change over the next 20 years as water scarcity and variability intensifies. Although environmental stress is rarely the sole cause, disputes between groups within countries over land and water resources are increasingly common as triggers for social violence and internal conflict, particularly when social and political tensions already exist.

Even if climate-induced environmental stresses do not lead to conflict, they are likely to contribute to migrations that exacerbate social and political tensions, some of which could overwhelm host governments and populations. Sudden extreme weather — such as from floods, droughts and severe storms — almost certainly will increase the number of displaced people, particularly in regions that are unaccustomed to or unprepared for such events. Rising sea levels and unexpectedly large storm surges could threaten small island states and low-lying coastal regions — including many megacities — with flooding and saltwater intrusion of freshwater. Over 20 years, the net effects of climate change on the patterns of global human movement and statelessness could be dramatic, perhaps unprecedented.

Unilateral efforts by countries or groups to test or deploy geoengineering would almost certainly heighten regional or international tensions, especially in the absence of multilateral frameworks or institutions to govern such activities. Some forms of geoengineering experimentation are probably within the financial and technical capacity of some major powers and individuals, although there are fundamental scientific uncertainties about the efficacy and possible unintended consequences of such methods.

**Adverse effects on food prices or availability.** More frequent extreme weather events ranging from droughts to extreme rainfall would significantly threaten agricultural production. Moreover, long-term climate trends — such as greater numbers of very hot days, changing precipitation patterns, and poleward shifts of tropical clouds — along with constraints on land, water, and energy also put pressure on food. It is judged that in countries with weak political institutions, climate-induced threats to food security sharpen the risk of social disruption, migration, or large-scale political instability.

Heat waves threaten livestock directly and also by reducing fertility, decreasing milk production, and making them more vulnerable to disease. Droughts, wildfires, and extended periods of reduced precipitation threaten pasture and food supplies that indirectly threaten livestock. Increased ocean temperatures and more frequent and more intense storms will increasingly threaten fisheries, many of which are already under stress from overfishing and pollution. As oceans become more acidic as they absorb atmospheric carbon dioxide, ecosystems on which fish and other sea life depend are further jeopardized.

**Increased risks to human health.** Extreme heat will increasingly contribute directly to deaths across the globe from cardiovascular and respiratory disease, particularly among the elderly. High temperatures also increase the level of ozone and other air pollutants that exacerbate cardiovascular and respiratory disease. Rising sea levels and severe weather events will increasingly threaten medical infrastructure and other essential services. Elevated temperature, and in some regions, more rainfall and flooding are likely to increase the frequency of water-borne diseases and diseases transmitted through insects, snails, and other cold-blooded animals in those areas. Extended transmission seasons of significant vector-borne diseases, such as dengue fever, are expected across a potentially larger geographic range, although more research is required.

***Stress on military operations and basing.*** Globally, more frequent and intense natural disasters will strain the capacity of U.S. and allied armed forces to deliver humanitarian assistance and disaster relief. The U.S. military may be called upon more frequently to respond to foreign crises if their counterparts in affected countries are overstretched, unable to handle their own crises or those in their neighborhood. It is also judged that rising sea-levels, flooding, droughts, higher temperatures, and more frequent extreme weather events will increasingly threaten military capabilities and facilities on both U.S. and foreign territory, including military bases and training ranges.

***Implications for investments and economic competitiveness.*** Past and anticipated extreme weather events may discourage investments in regions deemed particularly vulnerable. Expectations of future losses will almost certainly increase insurance premiums and payouts, and insurance rates may increase well before real effects are felt in regions deemed vulnerable. The financial burden of responding to emergent climate trends and severe weather events, including the cost of efforts to mitigate greenhouse gas emissions, will reduce financing available for other investments, except in cases where those climate investments lead to green-growth opportunities. Increasing heat stress is likely to adversely affect agriculture, manufacturing, and other sectors requiring physical labor and could significantly contribute to gross domestic product (GDP) loss.

***Potential climate discontinuities and secondary surprises.*** While current climate models project long-term increases in global average surface temperatures, climate scientists warn that more sudden, dramatic shifts could be possible given the complexity of the system and analogs in the climate record. Many climate scientists warn that the risk of abrupt climate change — which is currently thought to be low — will increase over the next several decades and beyond. It is posited that the possibility of abrupt climate change cannot be discounted over any timeframe because research has not identified the indicators to forecast potential tipping points and other thresholds. Even if sudden shifts in the climate do not materialize, gradual shifts in climate could nonetheless spark surprising secondary effects — such as a massive release of gases from melting permafrost, persistent megadroughts, extreme shifts in critical ecosystems, emerging reservoirs of new pathogens, or the sudden breakup of immense ice sheets. The national security implications of such changes could be severe.

## **Policy issues**

- The U.S. government has few tools to adequately characterize the climate vulnerability of human populations and systems worldwide. The vulnerability of infrastructure, for example, is largely unknown. Tools to anticipate weather and climate impact on global supply chains, including the global food system, are also largely absent.
- The U.S. intelligence community — with some exceptions — has, at best, an ad hoc relationship with the U.S. federal science agencies that perform climate modeling and observation. Most analysts rely on Intergovernmental Panel on Climate Change (IPCC) findings rather than direct engagement with U.S. partners.
- No early warning system exists in the U.S. security community to anticipate, identify, or respond to climate discontinuities.

*\*\*Adapted from a previously published unclassified National Intelligence Council report and presented 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.*