

Climate-forward defense

Adding a climate lens to decision-making can help militaries better understand the operational environment and uncover opportunities to enhance mission success.



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Introduction

The military's job is to protect national security, not tackle climate change. But climate change can be both a risk and an opportunity to achieve mission goals.

Temperature extremes, drought, sea-level rise, and extreme weather events inflict costly harm on military installations and degrade key military capabilities. Climate change is also a threat multiplier that aggravates poverty, political instability, and social tensions around the globe.

The US Department of Defense (DoD) is prioritizing action on climate change to support its missions. In 2021, Secretary of Defense Lloyd J. Austin declared global climate change an existential threat to US national security, using language normally applied to threats such as nuclear attacks.¹ DoD has developed an aggressive [*Climate Adaptation Plan*](#) that calls for “future-proofing” military installations, building a climate-ready force, securing supply chains against extreme weather events, and pursuing climate-informed decision-making.²

These measures are important but largely reactive. DoD’s current climate strategy primarily focuses on *resilience*; on protecting installations and operations from extreme weather events. But climate change may also create new opportunities and entirely new missions. For example, rising sea levels can affect potential amphibious landing zones in Pacific islands; overfishing in contested waters may create new opportunities for information operations (IO); and food shortages in nations dependent on imports may require military intervention. While resilience is crucial to mission success, DoD’s climate approach should also include the identification of *new military advantages*.

By seeing climate change as an inextricable part of the operational environment, military leaders can consider how to use it to further their missions. Our adversaries have already begun thinking about climate in this way; If we don’t, we may miss a vital opportunity.

The shift from a reactive to a proactive approach to climate doesn’t require billions in new investments. With relatively minor changes to internal processes, DoD can create a military that is both more resilient and more *effective* in the face of climate change.

Climate as an integral part of the operational environment

Just as weather is an essential part of tactical operations, climate is integral to the strategic operating environment. By expanding the scope of defense analysis to see climate as a central part of any operational environment, in much the same way military leaders consider political, military, informational, and other factors, DoD can discover new means of achieving its missions (figure 1).

FIGURE 1

Seeing climate as part of the operational environment can yield strategic advantages



Source: Deloitte analysis.

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Climate change is beginning to open up entirely new missions. Melting ice caps, for example, are making the Arctic more accessible each year. Retreating ice has increased human activity in the region, making transport, tourism, and the exploitation of natural resources feasible for the first time.³ To gain control of these natural resources and new trade routes, several nations are steadily increasing their military presence in the Arctic.⁴ DoD has begun enhancing its ability to operate in harsh Arctic conditions; for example, it's working with the Department of Homeland Security to expand the US Coast Guard's icebreaker fleet.⁵

But the Arctic isn't the only area in which climate change is enabling new missions. In some cases, these will be familiar missions in new geographies, such as naval operations along altered coastlines. In other cases, entirely new missions may emerge—new targets for IO, new military support for diplomatic or economic efforts, and even new avenues for warfare.

The US military doctrine emphasizes a thorough understanding of the strategic and operational environment.⁶ Climate change calls for an entirely new approach to the operational environment, one that considers how it will affect each mission. By doing so, planners can obtain a broader, more accurate understanding that can reveal additional factors affecting adversary or neutral behavior, shift perceptions of adversary center of gravity, and determine new

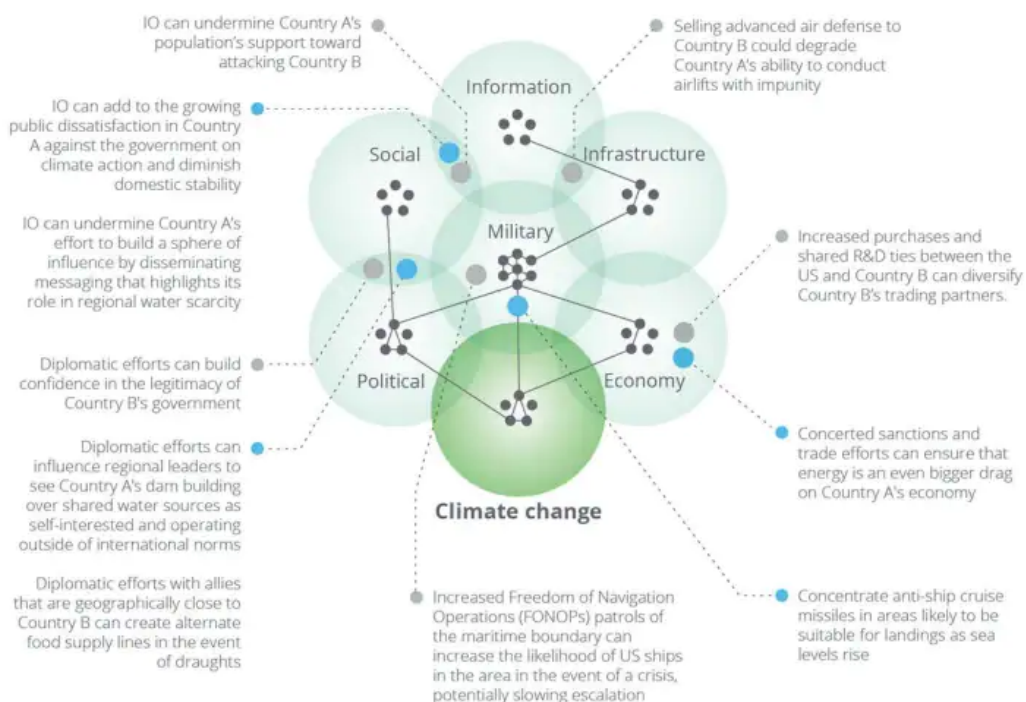
ways to achieve objectives. Adding a climate lens to operational environment assessments can help increase mission effectiveness, a missing dimension that held back support in many previous climate efforts.

Imagine, for example, that a near-peer competitor is threatening a key US trade partner in its region (figure 2). A traditional analysis of the situation would analyze the political, military, economic, social, infrastructure, and information dynamics between the two nations. By adding a climate lens, leaders can develop an even more comprehensive picture of the operational environment. The more detailed picture can uncover previously hidden relationships in causal factors that can, in turn, show new interventions that can achieve the desired end state.

FIGURE 2

Climate-informed operational assessment supports a deterrence mission

- Interventions uncovered via PMESII (political, military, economic, social, infrastructure, and information)
- Interventions uncovered via PMESII-C (political, military, economic, social, infrastructure, information, and climate change)



Source: Deloitte analysis.

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For example, adding a climate lens might reveal the tension between the adversary's need for regional legitimacy and its demand for water, which it

secures by building dams on shared water sources. The dams severely limit water supplies to neighboring nations, worsening the impact of shifting rain patterns. With that tension understood, military IO messaging could help influence the regional population to see the adversary's actions as self-centered and outside international norms.

A climate lens can support operational effectiveness as well. Changes in sea level will significantly alter the number and location of sites suitable for large-scale amphibious attacks. By projecting future sea-level trends, the US military can help partner nations concentrate defenses such as anti-ship missiles in areas most vulnerable during the window of attack.

A sole focus on resilience can deter progress

Adding a climate lens to operations can introduce new requirements, new costs, and new frictions to military processes. But looking at climate solely as a resilience issue won't help improve mission effectiveness and may hinder progress on climate goals as well.

Resilience is a necessary goal, of course. Hurricanes and severe storms, for instance, routinely damage coastal military bases, rendering them inoperable for long periods and causing billions in damages. In 2018, Florida's Tyndall Air Force Base was hit by Hurricane Michael, which damaged or destroyed numerous structures on the base and left hangars shredded and roofless.⁷ And such damage isn't limited to coasts; in 2019, floods destroyed a third of Offutt Air Force Base in Nebraska. The reconstruction will take years to complete and is expected to cost nearly US\$5 billion.⁸

This explicit link between adverse weather events and mission assurance has led DoD toward a resilience framework intended to protect its installations and weapons systems against extreme weather, secure supply chains, and build a "climate-ready" force.⁹ The Air Force, for example, has developed a geospatial supply chain risk identification and monitoring (Geo-SCRIM) tool that monitors adverse weather events such as wildfires or hurricanes and alerts organizations in their path.¹⁰ DoD's 2023 budget request includes more than US\$2 billion to improve the resilience of military installations, with US\$553 million of that intended to help bases weather power disruptions via microgrids and renewable energy and US\$322 million to help them survive extreme weather events.¹¹

But while resilience is critical, it shouldn't be the sole focus of DoD's climate action. Instead, it should be the first step toward making DoD a *climate-forward* agency that can use climate change to its advantage.

If climate isn't a fundamental part of the operational environment, it can be difficult to see sufficient mission benefits to justify the investments needed to scale climate solutions. Consider aviation biofuels, for example. Both the Air Force and Navy are at the cutting edge of biofuel use in jet engines.¹² Yet, more than a decade into their efforts, the adoption rate is still slow, largely because biofuels are more expensive than traditional fuels, and in shorter supply.¹³ The expense of biofuel use could be justifiable if they improved mission outcomes, but jets fly just as far and as fast on conventional fuel but at a lower cost and greater ease of access.

The military has produced important climate-related innovations but has seen relatively slow adoption of them. To reduce its reliance on diesel generators for power—and the often-targeted fuel convoys that feed them—the Marine Corps has moved into the forefront of tactical solar power generation. In 2018, the Marines even fully fielded a mobile solar power array designed to power an entire battalion command post.¹⁴ In the absence of an operational focus on climate, however, progress has been slow; the program required nearly a decade to move from first experiments to full fielding.¹⁵ Compare this with more obviously operationally relevant tools such as metal detectors. At about the same time as the first battalion-level solar experiments, improvised explosive devices using little or no metal began to emerge in Afghanistan, making their detection extremely difficult.¹⁶ But while it took nearly a decade to field the solar experiments fully, it took mere months to get thousands of new combo-metal detectors and ground-penetrating radar units in the hands of troops.¹⁷

The clearer the connection between an activity and an operational outcome, the faster organizational processes work. To improve progress on climate projects, DoD *must* begin to see mission opportunities in climate and embed them in training, planning, and acquisition. In a recent speech at the Naval War College, Kristina O'Brien, principal deputy director of the joint chiefs' Strategic Logistics J-4 organization, spoke about "operationalizing" climate factors: "There are opportunities that go along with these challenges, but very key here is how do we need to be considering this in our operational plans, into our campaign plans, and into our logistics plans."¹⁸

Threats and potential innovations both offer motivation

The effort needed to change how DoD creates plans can be significant, and benefits to mission effectiveness may not be enough to overcome bureaucratic inertia. In such cases, adversaries' actions and new innovations both may offer additional motivation.

Adversaries are already adapting

Our adversaries will use whatever leverage is available to achieve purely military goals. Since climate change is an *extremely* important issue for China's neighbors and adversaries, for instance, it has become a key factor influencing Chinese decision-making and actions. In 2022, a Chinese influence campaign unsuccessfully attempted to mobilize US protests against an Australian rare-earths mining company planning an expansion in Texas, in an effort to defend Beijing's dominance of the market. The campaign deployed various social media accounts, some implying they were owned by locals, to claim that the Texas facility would cause environmental damage.¹⁹

Yet our adversaries also are vulnerable to climate issues. A recent trade and security cooperation pact between Pacific islands and China was derailed over the island nations' concern about climate issues.²⁰ From dirty coal plants in Africa to water shortages created by the Belt and Road Initiative, China's security goals are often complicated by its own actions.

Like any other part of the operational environment, climate is a contested space with both opportunities and vulnerabilities. Keeping climate action outside the operational sphere and limited only to resiliency comes with significant risks. To ignore the military implications of climate change is to cede control of that part of the environment to adversaries.

Military innovations can catalyze economic transformation, which builds military power

Adding a climate lens to military decision-making also can spur economic growth. It can create operational needs such as new algorithms to crunch massive climate data, new materials to reduce corrosion due to sea-level rise, and new means of generating power for small teams at advanced bases. The cost-benefit analysis for developing solutions and even completely new technologies for military applications is fundamentally different from that for the commercial

sector. As the military works with industry to create these solutions, new breakthrough opportunities can emerge that wouldn't have been developed by the private sector alone.

In the past, military-specific innovations often have had significant impact on the broader economy. The global positioning system (GPS) is an excellent example. The impetus for early GPS research was the Navy's need to provide accurate locational information to Polaris missiles aboard constantly moving ships.²¹ Similar requirements among the Air Force and Army led to the development of GPS in the late 1970s. At the time, commercial industry hadn't expressed any analogous need.²² Yet, once the technology became commercially available in 1983, it had a transformative impact, spawning new uses and even entirely new industries.²³

The economic impact of GPS is hard to overstate. Researchers estimate that it has contributed more than *US\$1.4 trillion* to the US economy alone since its release for public use.²⁴ Given the scope and scale of climate change, climate-related technology may have an even greater commercial impact.

What could defense-driven climate innovations look like?

We're not suggesting the military invest in climate innovations out of altruism. Creating them is in the military's best interest, both directly and indirectly—directly, as it provides warfighters with solutions that address important facets of the operational environment, and indirectly, by catalyzing commercial innovation and giving the military increased national economic power.

For example, extreme weather and rising sea levels are increasing the concrete degradation rate. To keep runways and piers mission-capable, the military is investing in finding innovative solutions to this problem, such as self-healing concrete.²⁵ The annual worldwide cost of metal and concrete corrosion has been estimated at more than *US\$2.5 trillion*—more than 3% of global GDP per year—and any innovation that helps solve the problem could have a massive economic impact.²⁶

But such innovations aren't limited to resilience. New missions also can spark transformational innovations. For example, rising sea levels may offer increased opportunities for submarine-based intelligence collection along coastlines. Such missions will prioritize stealth above other considerations, perhaps making air-independent propulsion systems (which rely on energy-efficient fuel cells) even more useful than nuclear propulsion in some cases.²⁷ With more investment, such technologies could develop into forms that may provide cheap, clean energy in small packages to the wider world.

When innovations such as these have spilled over to the commercial industry in the past, the impact has been transformational. GPS, the internet, radar, lidar, integrated circuits, touchscreens, artificial intelligence assistants—the list of military innovations that fundamentally transformed commercial industry is lengthy.

And economic growth, in turn, supports military performance. A body of research argues that increased economic power correlates not only with military strength but even success on the battlefield.²⁸ DoD's investment in climate will continue to pay for itself along several different paths leading to increased mission effectiveness.

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Institutionalizing the change

Seeing climate as an inextricable part of the operational environment calls for a significant mindset shift, and institutionalizing that viewpoint will likely require changes to core DoD processes, including training and education, planning, and procurement. Recommended steps along the way include:

Training and education

- Adjust the training curricula for both officers and enlisted personnel to reflect climate as an inextricable part of the operational environment.
- Develop wargames with climate-related themes to hone the skills of general and flag officers in identifying scenarios in which climate change may offer strategic opportunities.

Planning

- Revise [Joint Publication 5-0 Joint Planning](#) to institutionalize viewing the operational environment through a climate lens along with political, military, economic, social, information, and infrastructure. Changing the acronym PMESII to PMESII-C (see figure 2) can succinctly capture this shift.
- Create an interagency IO working group dedicated to climate themes. Leaders and populations around the world are increasingly sensitive to climate impacts; climate-themed messaging may be increasingly useful in strategically important regions.

Procurement

- Identify the climate-related military needs the new innovations can help answer. For example, adding climate impact as a consideration for milestone A decisions in the Joint Capabilities Integration and Development System can help climate-related needs compete with traditional mission parameters such as speed, payload, and range.
- Create a climate innovation fund specifically to fund the research and procurement of innovative climate-related technologies. Such a fund could accelerate the development of new technologies and help DoD establish important working relationships with partners in industry and academia.

To be ready to deter and win wars, the military must be ready for a range of possibilities. Often, that readiness comes at the cost of billions of dollars in new weapons systems. But the changes needed to take advantage of climate change's impacts on the operational environment often require little more than a new mindset. New curricula, new edits to familiar processes and new tools for collaboration are small changes that can have big results. It's a step any leader should take for a more resilient *and* more effective military.

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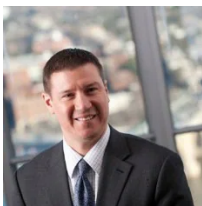
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