

# THE CCASCOE BRIEF

Volume 1, Issue 3  
September 2026



## Featured Article

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Capstone Concept: An Analysis  
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NATO Climate Change  
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# Climate Change and the NATO Warfighting Capstone Concept: An Analysis

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## Introduction

In January 2026, Canadian Prime Minister Mark Carney stated, “We are in the midst of a rupture, not a transition” (Carney, 2026). Mr. Carney was speaking about the increasingly unstable world order, but his words ring true in a climatological sense. The world is facing at least two degrees centigrade of warming (The Guardian, 2025). This summer, wildfires in France and Spain broke modern records, forcing the largest peacetime evacuation (The New York Times, 2026a; Fortune, 2026) of citizens since World War II. A summer drought shrank the Rhine River to its lowest level, drastically reducing riverine transport and weakening the German economy at the same time the Bundestag is increasing defense spending (The Independent, 2026a). Speaking at a US Military Academy Conference on Sustainable Infrastructure, Resilience, and Climate in 2023, then Deputy Secretary of Defense, Kathleen Hicks, advised that, “Nations that are most resilient and best able to manage the effects of climate change will gain a strategic advantage” (U.S. Department of Defense, 2023). Even today this observation remains a prescient insight into how climate change must be seen as a strategic resilience imperative.

The NATO Warfighting Capstone Concept (NWCC) provides insight into NATO’s current approach to building resilience (NATO ACT, 2021). A product of NATO Allied Command Transformation (NATO ACT), the NWCC is the future-focused complement to the 2020 Concept for Deterrence and Defence (NATO, 2020).

It is structured around five Warfare Development Imperatives (WDIs), each a pathway to address capability gaps in the “Military Instrument of Power (MloP).” And were the climate not changing, the NWCC would be a sound yardstick. As written, however, the missing climatological context devalues the NWCC as a guide. This article examines why – and what can be done about it.

## The Warfare Development Imperatives

### WDI 1: Cognitive Superiority

Cognitive superiority is defined as “understanding the operating environment and potential adversaries relative to the Alliance’s own capabilities, capacities and objectives” (NATO ACT, 2021). As such it is arguably the foundational Warfare Development Imperative on which the subsequent four rest. Indeed, the NATO Chief Scientist Report on Cognitive Warfare states as much, saying, “Efforts to build better situational awareness and understanding with a view to achieving cognitive advantage over potential adversaries is a priority for the alliance” (NATO, 2026). Professional Military Education (PME) is one of the primary means in which those abilities are developed.



As of this writing, however, climate change is not systematically included in American or European PME, training, or exercises – despite relentless proof that climate change produces and multiplies security shocks (Council on Strategic Risks, 2026a). Thus, the current preparatory regimen for military officers falls short of ensuring their future dominance of the 2040 battlespace.

PME is a long-term investment in the architecture of how one thinks, not just what one knows (War on the Rocks, 2025). In the US, PME struggles to align curricula to a shifting strategic environment and to determine which among the ballooning topics tagged as “national security” to include in a crowded course catalogue (Drezner, 2024). Moreover, climate change is mischaracterized as a political topic or one not worthy of integration (Breaking Defense, 2024; E&E News, 2025). For NATO PME, efforts suffer from a lack of standardization; some member states are in the vanguard while others lag behind (Government of Canada, n.d.-a; NATO, 2021), and standardized learning outcomes are not an institutionalized best practice (NATO, 2023). Regarding training and exercises, work by prior US administrations to incorporate climate change has stalled or been reversed (U.S. Department of Defense, 2024a). In Europe, the EU’s 2022 update on including climate change in trainings, specifically at the operational and tactical level, had not clocked much progress, and the 2025 update did not mention this gap (Council of the European Union, 2022; Council of the European Union, 2025). Research conducted by CCASCOE Fellow, Spencer McMurray, found that the lack of climate change within NATO’s exercises demonstrates “the exercise system functioning exactly as designed” (McMurray, 2026).

Education, training, and exercises are not a panacea. However, these gaps in the foundation of the kind of cognitive superiority envisioned by WDI 1 cause fissures in the strata above. What this WDI needs to produce is a force that knows to procure equipment able to withstand weather extremes, incorporate intelligence on adversaries’ preparations for fighting in all conditions, and include an adversary’s climate resilience in their assessment of the future operating environment. Such a force would be well positioned to execute the subsequent WDIs.

## WDI 2: Layered Resilience

Layered resilience is defined in the NWCC as “the ability to absorb shocks and fight-on, across all layers, military, civil-military and military-civilian.” Although NATO’s 2024 Climate Change and Security Impact Assessment highlights the readiness and resilience drain of natural disasters on militaries, the NWCC does not incorporate extreme weather as a shock despite member nations living this tension (NATO, 2024a). The US National Guard, which maintains readiness for domestic civil support and overseas military missions, has found that an increase in demand for the former can erode the latter (Military.com, 2025). Said one Guardsman, “it is a categorical readiness and training loss for those units to conduct domestic operations at the expense of their operational mission training” (JAMS, 2022). Yet they are becoming an enduring feature; Section 314 of the FY25 National Defense Authorization Act mandates the National Guard receive wildfire response and prevention training (U.S. Congress, 2025).



Other NATO members' militaries have lived experience from using the military for missions outside of core tasks and the hard choices that forces (World Economic Forum, 2025). In 2023 alone, the Canadian Armed Forces (CAF) deployed to support three overseas operations and also carved out 2,100 troops out of the force to battle the "worst fire season in 30 years" (Government of Canada, n.d.-b; n.d.-c; Government of Canada, 2023; Government of Canada, 2024). In 2022, Major General Robert Glavaš, then Chief of the General Staff of Slovenia's armed forces, admitted that using military personnel to respond to their own extreme wildfires challenged their ability to train for potential armed conflict with an adversary (The Washington Post, 2022). "In this situation with Ukraine and wildfires, we are in a dilemma about how to balance. At one point, you need to decide what is important, this or that."

NATO's ability to balance this tension more effectively than its adversaries' will determine the strength of its layered resilience. China's "holistic national security" concept includes "environmental security" and "resource security," making it easier for the Chinese government to direct its military to incorporate climate change into its operations (Government of China, 2025; Sikorsky, 2025; Council on Strategic Risks, 2023). Russia's 2021 National Security Strategy mentions climate change nine times, and Russia has devoted significant capital to strengthening its position in the Arctic in order to maximize any advantage created by a warming climate (The Barents Observer, 2021; Conley, 2021). NATO has an opportunity to press its advantage through not only the sophistication of its weaponry but the resilience of its entire MloP.

If NATO's adversaries become more capable of maintaining their own combat readiness during - or despite - prolonged deployments for natural disaster relief, then NATO has lost a crucial advantage that only climate-informed layered resilience can mitigate.

### WDI 3: Influence and Power Projection

Influence and Power Projection relates to the ability to "[shape] positively the environment to the Alliance's strengths, including generating options and imposing dilemmas on adversaries." The degree to which NATO can project power and influence directly relates to its climate resilience, but even today its militaries rely on rail that is vulnerable to sun kinks, sea level rise, and coastal erosion (World Economic Forum, 2025; U.S. Army, 2024; CNBC, 2026; Scientific American, 2024; Defense News, 2025; The New York Times, 2023). Aircraft carriers can't use hot seawater to cool the refrigerant that keeps the carrier's radar and weapons systems operational (Associated Press, 2023; DVIDS, 2017). Exquisite platforms like the F-35, built to fly in a range of conditions, are nonetheless vulnerable on the ground, and ultimately their deployability is only as strong as runways' resilience to heat (The National Interest, 2024; The Independent, 2022). Helicopters can't provide the same degree of heavy lift and close-air support in hotter, wetter air because thinner air reduces carrying capacity (24th MEU, n.d.; USA Today, 2024).



Climate change is also eroding the influence afforded by nuclear and missile defense (Carnegie Endowment for International Peace, 2024). Naval Submarine Base Kings Bay is facing navigability issues from sea level rise and ecological degradation. Minot Air Force Base, home to the B-52H Stratofortress and the Minuteman III ICBMs, faces flood risk, and Whiteman Air Force Base, the only location for US B-2 stealth bombers, faces a doubling of days above 90°F over the coming decades, which could weaken the resilience of the base's cooling systems, limit training days, reduce aircraft carrying capacity, or ground the planes outright (U.S. Navy, n.d.; U.S. Army Corps of Engineers, 2024; Minot Air Force Base, 2011; U.S. Department of Defense, 2021).

Shaping the environment through influence and power projection depends upon credibility. Per Thomas Schelling's theory of coercion, adversaries and allies must have confidence in a country's ability to follow through on its plans (Texas National Security Review, 2020). Whatever undermines the military's ability to project power - to respond with force at a time and place of its choosing - weakens its influence. This is the counterpart to WDI 2: the additional readiness preserved through increasing layered resilience is void if the military cannot deploy from a washed-out air strip or a damaged seaport.

#### WDI 4 & 5: Cross-Domain Command and Integrated Multi-Domain Defence

Technology undergirds WDIs four and five. Cross-Domain Command, which powers multi-domain operations, enables commanders to have "cross-domain understanding" and the "ability... to operate in a complex operating environment simultaneously across physical and non-physical domains" (NATO ACT, 2021).

Integrated Multi-Domain Defence provides a framework for the "integration of sensors, shooters, and command and control systems" (NATO ACT, 2024). However, today's technology and its supporting infrastructure is too vulnerable to climate change to provide the resilience needed to execute the NWCC tomorrow.

More than 60% of the National Aeronautics and Space Administration's (NASA) launch facilities are close to sea level and have already weathered damage from hurricanes (Union of Concerned Scientists, 2026; Spaceflight Now, n.d.). Once aloft, satellites connect to ground stations already dealing with structural integrity issues from permafrost thaw, wildfires, and floods (U.S. Department of Defense, 2023; Just Security, 2023; Cybersecurity Institute, 2023). Meanwhile, the proliferation of greenhouse gases has shrunk the carrying capacity of low-earth orbit (LEO), the band where some of the US military's ISR satellites reside. NATO's fleet of E-3 AWACS has already weathered damaging extreme heat at home and abroad (MIT News, 2025; RAND Corporation, 2025; Air & Space Forces Magazine, n.d.; Clean Energy Wire, 2019). Floods near Offutt Air Force Base in Nebraska created a training bottleneck that slowed down qualifying airmen for the RC-135s (Defense Technical Information Center, n.d.; Military.com, 2019). And the propagation of greenhouse gases has also begun to degrade communications (the signal propagation) that operate in High Frequency (HF) and Very High Frequency (VHF) ranges (Physics World, n.d.), not the equipment itself.



The MloP will fail to achieve operational capability for the 2040 battlefield unless its technology and supporting infrastructure keeps pace with the changing climate. Unmanned ISR aircraft that can't take off, and satellite ground stations that can't track or command assets in orbit, leave allied forces blind and provide opportunities that adversaries can exploit. Anything that imperils this capability should be treated as seriously as if an adversary stole Western sonar technology to protect its submarines (Interesting Engineering, 2025).

NATO has a consequential opportunity to use climate change as the forge by which the Alliance becomes even more resilient and interoperable over the long term. And it has no time to waste.

### Conclusion and Recommendations

In a time of unprecedented geopolitical turbulence, the NATO alliance needs to shore up its resilience to a multitude of strategic shocks. Making the best investments possible, fully informed by an accurate assessment of the future strategic and climatological environment, is non-negotiable. This is where a climate-informed NWCC could assist. However, the NWCC is the downstream result of upstream guidance, planning, and decision-making, as are the flaws within it. Simply adding climate realism to the NWCC does not address gaps in acquisition and procurement strategies, operational concepts and plans, or the design of weapons systems. Drafting high-level concepts in an ecosystem lacking a systems-level understanding of climate change does not produce useful products. Those who work within those systems, therefore, have the responsibility to effect those changes in a synchronized way.

The ten recommendations that follow are intended to address deficiencies in NATO's current state of climate readiness and resilience. They are geared towards NATO defense planners and policymakers whose jobs give them oversight over procurement, education and training, infrastructure and logistics, and technology.



## Cognitive Superiority

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <b>Formalize and standardize climate change in military education.</b> For the US, add climate change to the list of Special Areas of Emphasis within Joint PME (U.S. Joint Chiefs of Staff, 2024). For NATO Allies, standardize climate change education with established learning outcomes to add structure. Standardizing climate change through extant initiatives like EMILYO would similarly forge unified cognitive superiority (EMILYO, n.d.). |
| 2 | <b>Include climate scientists in training and exercise planning.</b> Consider mandating the inclusion of climate scientists in planning discussions for training and exercises to inform content decisions.                                                                                                                                                                                                                                            |
| 3 | <b>Capture and synthesize cognitive data.</b> Monitor the outputs of the classroom, training range, and field and assess climate-informed proficiency. NATO CCASCOE can serve as a data repository to maintain a library of lessons learned and best practices.                                                                                                                                                                                        |
| 4 | <b>Include climate change in performance management.</b> Include climate change in job descriptions to formalize the link between topical training and job performance and include an assessment of climate-informed decision-making tailored to a person's job function.                                                                                                                                                                              |

## Layered Resilience

|   |                                                                                                                                                                                                                                                                                                                                                                             |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5 | <b>Include climate change as a factor in military operations.</b> Consider updating the rosters of mission-essential training requirements - called in the United States the Mission Essential Task List (METL).                                                                                                                                                            |
| 6 | <b>Strengthen civilian and institutional capacity.</b> Include civilian capacity amidst the "layers" of layered resilience by offloading legitimate response capabilities to civilian-led organizations. Grounded in NATO Article 3 (NATO, 2024b), it could build upon the work undertaken by the Nordic Ministers for Regional Policy (Nordic Council of Ministers, 2023). |



### Influence and Power Projection

|   |                                                                                                                                                                                                                                                                                                                                                                                                      |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7 | <b>Stretch military spending to satisfy multiple needs.</b> Consider creating a potential NATO Climate Security Fund that could support climate-informed approaches to resilient power projection and missile defense (Diplomatic Courier, 2025). Leverage defense innovation ecosystems to engineer efficient and climate-resilient technological capabilities (Council on Strategic Risks, 2024b). |
| 8 | <b>Generate a public affairs strategy for climate readiness.</b> Militaries should publicize mobilizing and deploying in harsh conditions to bolster their image of being a climate-resilient force, and press outlets should cover these exercises as explicitly climate-informed.                                                                                                                  |

### Cross-Domain Command & Integrated Multi-Domain Defence

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|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9  | <b>Measure interoperability.</b> NATO's lack of a coherent, data-driven assessment framework for interoperability and interoperable risk management presents an opportunity to incorporate climate-informed risk assessment and resilience metrics into these frameworks while they are under development (U.S. Army War College, 2025; Scandinavian Journal of Military Studies, 2025). |
| 10 | <b>Harmonize capability development with climate realism.</b> NATO CCASCOE should take the lead in generating a climate overlay onto the updated Defence Production Action Plan, the first NATO Commercial Space Strategy, and Rapid Adoption Action Plan. (NATO, 2025a; NATO, 2025b; NATO, 2025c)                                                                                       |



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## About the Author

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Caroline Baxter is the Director of the Converging Risks Lab at the Council on Strategic Risks. From 2021 to 2024, she served as Deputy Assistant Secretary of Defense for Force Education and Training within the Office of the Secretary of Defense, in which capacity she served as the principal senior authority on the development of DoD policy relating to the cognitive and physical preparations required by the Joint Force.

In this role, Baxter created and led numerous high-visibility coalitions charged with addressing foundational challenges facing the armed forces. Through her leadership, these coalitions forged a path-breaking methodology to strengthen operational resilience through deepening mission-centric knowledge of climate change; identified and secured billions of dollars of funding to close critical training gaps inhibiting mission success; and devised the means by which to track and support the learning outcomes of military education.

For her work in DoD, Baxter was awarded the Department of Defense Medal for Distinguished Public Service, the highest award presented by the DoD to political appointees. Previously, Baxter spent over a decade conducting research on operational strategy, military doctrine, and operational readiness at the RAND Corporation. Over the course of her time at RAND, Baxter was detailed to DoD twice—first to the Air Staff, and then to the Office of the Under Secretary of Defense for Personnel and Readiness where she served as Special Assistant to the Under Secretary.

Baxter holds a B.A. with honors in International Relations from the University of St. Andrews, Scotland, and an M.A. in International Security Policy from the Columbia University School of International and Public Affairs.



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# The CCASCOE Brief – Volume 1, Issue 3

## September 2026

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