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Warfare Development for Operational Effectiveness in a Changing Climate

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WARFARE DEVELOPMENT FOR OPERATIONAL EFFECTIVENESS IN A CHANGING CLIMATE

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CLIMATE CHANGE & (IN)SECURITY PROJE CT[II]

EXECUTIVE SUMMARY

The NATO Strategic Concept 2022[iii] declares climate change to be a defining challenge of our time. The NATO Climate Change and Security Action Plan (CCSAP)[iv] requires NATO to integrate climate change considerations into force and capability development, to review and develop military standards for climate and security as necessary, and to upgrade and design new fixed and deployed assets according to climate hazard resilience principles.

Within the context of warfare development and the Washington Treaty, this paper examines how NATO can mitigate and adapt to climate change while also maintaining operational effectiveness. It is beyond the boundaries of this paper to fully examine the 'pathways' and 'integrated cascade risks' that lead to war and armed conflict beyond the introduction below. Instead, this paper centres on how to resolve tension between climate change considerations and warfare development.

Using the DOTMLPFI Lines of Development as an indicative framework (rather than expounding upon a single capability development), this paper highlights sample suggestions for integration of climate change considerations. The first section considers how new doctrine can be modelled on relevant legislative frameworks to create a Charter for Climate and Security Rules of Engagement. In terms of organization, training, materiel, and the context of the NATO Warfighting Capstone Concept, this paper recommends that NATO would benefit from a dedicated Climate Intelligence and Security Fusion Unit within the NATO Joint Intelligence and Security Division in order to harness diverse perspectives and skillsets across the Alliance. This new unit would coordinate and collaborate with the relevant climate and environment groups, teams, and centres across NATO. Also recommended is a bespoke training syllabus designed to inform and deepen the understanding of the climate and security nexus. Related to this, pre-deployment training and local assessment reports specifically targeted to theatre and climate hazards are recommended. This paper also highlights how civil preparedness could be enhanced domestically by the establishment of national civilian units to support military taskings relating to emergency responses. This preparedness could be enhanced internationally by post-deployment planning for, and transfer of, fixed assets designed to support long-term climate change adaptation strategies. Final recommendations include ways to strengthen human security, biodiversity, and organogram updates.

In terms of warfare development, climate change mitigation and adaptation strategies can support NATO's role of maintaining the Alliance's collective security by making installations and operations more resilient and more responsive to the environmental challenges ahead. However, there are times when the realities of warfighting, and the training for it, will take priority over climate change considerations. To reduce this tension, when building on existing platforms such as DIANA, NATO should increase investments into research and development, develop methodologies for increased public-private partnership, and engage relevant subject matter experts in order to facilitate collaboration and cooperation. The goal of NATO should be to maintain operational effectiveness at the collective level without compromising climate change commitments.

KEYWORDS

Climate change, warfare development, operational effectiveness, resilience, mitigation, adaption.

[1] *As quoted in Bi-Strategic Command paper highlights sample suggestions Directive 085-001, Capability Package: April 2017.*

INTRODUCTION

Operational effectiveness is founded on planning and preparation, as well as the ability to coordinate and communicate strategic, operational and tactical level actions, at a cadence that maintains momentum and advantage. As such, warfare development must be centred on developing capabilities relating to anticipation, cooperation, and agility in advance of operational deployment. Within the context of climate change, this requires an understanding of, and relevant responses to, climate hazards[v] and the impacts, risks[vi], and implications they cause.

The climate (in)security chain of causation below highlights the link between climate change and defence and security implications[vii].

A relatively united front has developed in response to climate change and security. While a United Nations Security Council Resolution on 'Integrating Climate-Related Security Risk into Conflict-Prevention Strategies' was blocked by the veto vote of Russia[viii] in December 2021, it otherwise had a clear majority in terms of support from 113 member states[ix]. This resolution had aimed to build on the UN Climate and Security friendship launched by Germany and the Republic of Nauru in August 2018[x].

NATO's Climate Change and Security Action Plan: Compendium of Best Practice[xi] collates the initiatives undertaken across the Alliance, from a prominent report published by UK Ministry of Defence[xii] which outlined the British military's 'strategic approach to climate change', to Türkiye's 'The Zero Waste Project' which is implemented by all Turkish Armed Forces units. Canada, with holistic and integrated initiatives across its government ministries, is host to the forthcoming NATO Climate and Security Centre of Excellence[xiii].

This collective cadence mirrors the military and political prioritization that led to the founding of NATO in 1949 as a cooperative organization with a mission to maintain security during the global 'Cold War'. The hot phoenix rising from cold ashes, climate change is the current incarnation of our most significant collective security challenge. NATO already defines climate change insecurity in strong terms, stating that:

"The implications of climate change include drought, soil erosion and marine environmental degradation. These can lead to famine, floods, loss of land and livelihood, and have a disproportionate impact on women and girls as well as on poor, vulnerable or marginalized populations, as well as potentially exacerbate state fragility, fuel conflicts, and lead to displacement, migration, and human mobility, creating conditions that can be exploited by state and non-state actors that threaten or challenge the Alliance." [xiv]

In the Vilnius Summit Communique[xv], NATO declared that it is, "committed to becoming the leading international organisation when it comes to understanding and adapting to the impact of climate change on security…while ensuring military effectiveness and a credible deterrence and defence posture."[xvi] As such, the central questions for NATO are how to fulfil core objectives to deter and defend while also maintaining climate change mitigation commitments at the collective and individual member-state levels, and how to shape warfare development for future tensions.

The NATO Defence Planning Process (NDPP) [xvii]aims "to provide a framework within which national and Alliance defence planning activities can be harmonised to enable Allies to provide the required forces and capabilities in the most effective way." In this regard, the increased cooperation between the EU and NATO utilizes the DOTMLPFI[xviii] (Lines of Development) concept to express the transition from theoretical abstract to practical capability. Within both the EU and NATO contexts, common capability building is vital. Within the context of climate change specifically, this requires creating consensus as to the urgency of any threat posed. In the case of NATO, this spans across 32 individual member states.

(credit Louise Selisny)


HUGO GROTIUS

DOCTRINE AS A FOUNDATION FOR BUILDING CLIMATE AND SECURITY CAPABILITIES

In terms of warfare development, there is a potential tension in maintaining both climate change mitigation commitments[xix] and operational effectiveness – for example, reducing the collective carbon bootprint within the context of warfighting without reducing military advantage. Specific defence 'mission and objectives' across the world vary, but at their core is the focus on protecting the lives and interests of citizens at home and abroad. In terms of NATO specifically, Article 5[xx] of the Washington Treaty (as supplemented by Article 6[xxi]) mandates collective self-defence in the event of an attack against a member state.

Self-defence incorporating armed force is inherently destructive. Within the context of NATO, the 'conflict continuum'[xxii] seeks at first to deter aggressors without recourse to lethal force. However, Article 5, obliges all member states to defend another (with armed force as necessary) who is the subject of an attack by an aggressor. The threat to any Ally must be destroyed and effectively neutralized by the Alliance as a whole. In short, NATO is centred on the collective defence of member states, through war as necessary.

Hugo Grotius' conception of war as "the condition of those contending by force,"[xxiii] is most widely utilized by legal and diplomatic practitioners. For clarity, force here refers to armed force, and within the context of this paper specifically, will refer to military, naval or air force. General Carl Von Clausewitz defined war as, "an act of violence intended to compel our opponent to fulfil our will."[xxiv] Translating from history books to modern reality, this invariably means: lives lost and maimed, buildings reduced to rubble, natural resources destroyed. The Russia-Ukraine War has provided the most recent example of this reality. It is important to underscore that warfare is brutal and destructive, albeit justified under certain conditions. The issue of why deterrence is an important climate change consideration within this context will be expanded on shortly.

The Russia-Ukraine War also serves to remind us that, while climate change poses a serious threat to lives and interests, other 'conventional' threats persist. Forced to focus on responding to Russian aggression, Poland's military intends to scale rapidly [xxv], expanding its Force capability to 300,000 by 2035. It has also signed a $4.9 billion deal to purchase 250 Abrams tanks and a $4.6 billion deal for 32 F-35 fighters from the US. This is in addition to a $12 billion deal to purchase 180 K2 Black Panther tanks, 200 K9 Thunder howitzers, 48 FA-50 light attack aircraft, and 218 K239 Chunmoo rocket launchers[xxvi] from South Korea. This large increase in 'conventional' equipment, while a welcome reinforcement for a Ukraine-bordered nation, raises difficult questions for NATO in terms of near future transition to equipment with climate change considerations 'built-in.' It also requires consideration of the potential for 'stranded assets' from a financial, and indeed, environmental perspective. Relatedly, it also raises important questions as to consensus within the context of some Alliance members, such as Poland, now forced to focus on Russian aggression as a priority. This example highlights the interconnected nature of geostrategic warfare development. In this instance, it illustrates how the international inability to support Ukraine more directly following Russia's annexation of Crimea in March 2014 has undermined NATO's climate change agenda from February 2022[xxvii], as providing Ukraine with the necessary means to support itself militarily has been prioritized in terms of procurement and personnel.

Arguably, today 'success' and 'proportionate response' require climate change mitigation considerations to be factored into decisions to justify war - leading us to the concept of 'Just War Theory in Age of the Anthropocene'. Twelfth Century monk, Gratian, introduced the concept of Just War into modern international jurisprudence by combining the works of Augustine and Roman Law in his volume entitled Concordia Discordantium Canonum[xxviii] (Concord of Discordant Canons). This work has been continuously built upon, creating justifications for war and the provisions that are encapsulated in Article 5. Namely, that war is only justified if there is:

- just cause;
- a competent authority to initiate it;
- an undertaking to restore comparative justice;
- a 'right intention' that avoids unnecessarily destructive acts;
- no other option (i.e. war is the last resort);
- a balance of probabilities to show that it will be successful; and
- a proportionate response.[xxix]

As well as the considerations on whether going to war is just, scholars and practitioners have also developed prescriptions for conduct during war. This is particularly important for warfare development within a climate change context because it will shape how operations will be conducted and what capabilities will be acceptable. For example, The Green House Gas (GHG) emissions created during warfighting contribute significantly to global heating. As such, NATO must develop an internal methodology for determining if and when it would override commitments to, for example, the UN Framework Convention on Climate Change[xxx] and the Paris Agreement \[xxxi]. In operational terms, NATO will need to examine whether equipment that is more polluting than is permitted in civilian industry is acceptable for use in military engagements. Related here is how current procurement in response to current threats will impact future capabilities development. For example, the Slovak commitment to build a heavy mechanized brigade by 2026[xxxii] (under its 2017 NATO Capability Targets) is to deter Russian aggression and support NATO's collective security[xxxiii] today. Knowing that these vehicles are not aligned with future military 'greening aspirations', will this expensive equipment be mothballed early and replaced with greener technology as it is developed? Will having this equipment, and equipment like it across the Alliance, (inadvertently) delay increased investment into 'green technology'? Will NATO seek derogations from legislative commitments so as to use such

equipment, if necessary, indefinitely? Will there be a 'tapered response' to legislative derogations in terms of operations, with an 'Article 5 operation' permitting more derogations? Will a member state subject of attack by an aggressor be permitted to suspend (all) climate change obligations? Will the neighbouring member states around them? What suspensions would there be for geographically distant members states, perhaps the US and Canada – will they be expected to maintain climate change commitments? If so, what would that mean for interoperability?

Provision for derogation of legislative requirements during war and emergencies has precedent. For example, Article 15 of the European Convention on Human Rights[xxxiv] states that:

1."In time of war or other public emergency threatening the life of the nation any High Contracting Party may take measures derogating from its obligations under [the] Convention to the extent strictly required by the exigencies of the situation, provided that such measures are not inconsistent with its other obligations under international law

2. No derogation from Article 2, except in respect of deaths resulting from lawful acts of war, or from Articles 3, 4 (§ 1) and 7 shall be made under this provision"

As such, there are models which allow war, and effective pursuance of warfighting, to be prioritized over other important legislation – in this example, Human Rights Law. However, even within derogations, limits remain in terms of conduct.

Developed from ancient codes of conduct relating to chivalry and honour, military response during war is bounded by limits set by international norms. The first Geneva Convention of 1864[xxxv] prescribed the treatment for those wounded in war and the protection of the medical personnel attending to them. Subsequent Conventions in 1907, 1929, 1949, and 1977[xxxvi] covered the treatment of prisoners of war and the protection of civilians, forbidding actions such as deportations, torture, hostage taking and collective punishment. In terms of warfare development, there is now a more complete understanding of the causal link between climate change and security implications. Expanding on existing standardization agreements (STANAGS) and Allied Joint Environmental Protection Publications (AJEPP), and in conjunction with the Environmental Protection Working Group (EPWG) and the Specialist Team on Energy Efficiency and Environmental Protection (STEEEP), NATO must consider how to standardize green technology and conduct, and encourage individual member states to do the same, while maintaining capabilities within the current context.

In July 2023, in the US, "the final sarin nerve agent-filled M55 rocket was destroyed…at the Blue Grass Army Depot, Kentucky"[xxxvii], thereby fulfilling its obligations under the Chemical Weapons Convention (CWC), which prohibits the development, production, acquisition, stockpiling, retention, transfer or use of chemical weapons by all members. This convention highlights the legal limits on munitions, that is, the boundaries on warfighting capabilities in terms of acceptable ordnance. The use of chemical weapons by a member of the Alliance is now something that would be unthinkable, despite the loss of potential operational and tactical advantage. In short, this powerful capability was sacrificed in order to align with evolving international mores in relation to warfare. This example also highlights the long period between when a convention comes into force, April 1997 in the case of the CWC, and when signatories must comply. In this way, legislative frameworks can be created in order to project 'hard stops' into the future, thereby focusing governments on ensuring that adaptive responses are prioritized because a fixed date has been determined.

As well as conventions relating to treatment of people and the limits on munitions, there are legal safeguards for cultural property protection in acknowledgement that warfighting activity, "influences actors in the battlespace and beyond, affords reputational and stabilization dividends, reduces harm to people as much as things, and denies propaganda opportunities to conflict actors and peer adversaries."[xxxviii] Legal protections here go back to the 17th Century; however, the most significant, the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict, requires signatories to 'prohibit, prevent…pillage or misappropriation of, and any acts of vandalism directed against, cultural property.' Similarly, the 1998 Rome Statute designates the destruction of historic buildings without cause a war crime. For example, Ahmed al-Faqi al-Mahdi was indicted, convicted, and sentenced to nine years for leading the wanton destruction of mausoleums and ancient manuscripts in Timbuktu, Mali[xxxix]. This example

serves to highlight the increasingly holistic approach to warfare development in terms of expanding the scope of legitimate considerations.

Refreshing the 'Military Principles and Policies for Environmental Protection', NATO could develop an internal 'Charter for Climate and Security Rules of Engagement' for warfighting that explicitly proscribes unnecessary environmental impacts. The Charter could also include minimizing the impacts of operating bases, with mitigation for energy provision, water extraction, and physical footprint. This would build on the work of the Smart Energy Training and Assessment Camp (SENTAC)[xl] which focused on reducing the military reliance on fossil fuels and transitioning to renewable energy. Katarina Kertysova's extensive work on NATO's climate and security agenda integration into Force and Capability Development provides important analysis from the shift from single fuel policy[xli] to increasing climate and security literacy across the Alliance[xlii]. It is worth noting here that the possibility of derogations from climate change commitments should not be used as a reason to delay or reverse climate change mitigation and adaptation strategies. Outside of operations, and in preparation for them, NATO should pursue climate change mitigation and adaptation obligations and opportunities relentlessly.

Preparation of the Charter should also consider what climate and security-related actions constitute an attack on Alliance members and the proportionate responses to such actions. Such actions could include the aggressive acquisition and stockpiling of rare earth minerals[xliii] (necessary for renewables[xliv] and military technology[xlv]) and food staples (particularly grains[xlvi]). The weaponization of essential resources such as water constitutes an immediate threat. Energy too was recently weaponized by Vladimir Putin[xlvii] in response to economic sanctions against Russia following his unprovoked invasion of Ukraine. Further, NATO would benefit from advanced consideration of how to respond to tensions over transboundary resources, particularly between non-allied and allied states. De-escalation and sustainable resolutions here will become more important as global temperatures spike and extreme weather events compromise the ability of states to maintain adequate food and economic security without diplomatic platforms for cooperation.

Ultimately, there are times when armed conflict and war, with the environmental and human destruction it creates, is the best of 'bad solutions', the Ukrainian defence and counter offensive against Russia being a recent example. Environmentally destructive actions within the context of a climate changing world are actions that should be minimized in terms of frequency and scale, with strict rules of engagement modelled on the legal conventions above. Maintaining operational effectiveness within the context of armed conflict and war is essential, but limits on engagement have been accepted for nearly 1000 years. Balancing the climate and security agenda with operational effectiveness should be prioritized by NATO in order to avoid the potential for ad hoc and reactive responses during active campaigns.

ORGANIZATION, TRAINING, MATERIEL, AND PERSONNEL REQUIREMENTS

A key aspect of operational effectiveness is predictive capability, specifically the ability to absorb, process, and respond to actionable intelligence. In short, warfighting resilience and agility are enhanced when emerging threats are acknowledged and planned for. Intelligence Preparation of the Battlefield (IPB)[xlviii] is a military methodology for considering and analysing relevant variables, tangible and intangible, so as to develop an informed course of action. So, within the context of climate security, climate hazards, impacts, and risks (as detailed in the climate insecurity chain of causation above) become directly relevant to warfare development.

In addition to the most current Climate Change and Security Impact Assessment (CCSIA)[xlix], NATO would benefit from producing pre-deployment localized assessments[l] that articulate the local 'Pattern of Life' in relation to climate impacted activities such as cattle grazing, agriculture, and seasonal migration[li]. Features of the assessment could include, for example, how fresh water resources are shared and whether there are existing or historic tensions or conflicts relating to distribution[lii]. Fertile land and land suitable for cattle grazing are similarly important primary resources[liii]. Linked here in terms of 'compound cascade risks' would be baseline levels of socio-

economic inequity and positive public sentiment, leading to how these levels are impacted by resource scarcity. These assessments should then be used as the basis for targeted and bespoke pre-deployment training. Such assessments will provide relevant and up-to-date information on the drivers of conflict related to resource scarcity and competition. It will also provide baselining and benchmarking data that can be used to inform (defence and security) policy and resource allocation.

Strong links and information sharing between the military and police forces are even more important within the context of climate change. Serious organized crime networks commandeer, for example, the distribution of resources such as water and charcoal[liv], undermining both local security and local governance. This means that as indigenous locals feel more insecure, the less legitimacy they attach to governance structures, so 'the rule of law' breaks down across society, including amongst officials. These officials become more susceptible to corruption and grift as the power of the crime networks expand and political stability becomes more fragile. A vicious cycle of insecurity ensues.

NATO's CCSIA 2023 utilizes a methodology that combines the quantitative strengths of the Coupled Model Intercomparison Project (CMIP) with the qualitative approach of NATO security analysis. This is an important development and iteration since the preceding 2022 report. Given that the assessment relates to defence and security implications, future iterations would benefit from including reduced biodiversity as a separate hazard category. For example, a 2°C rise in temperature would kill 99% of coral reef, a species that directly supports 500 million people in terms of food and livelihood – biodiversity is integral to climate and security[lv]. In relation to this, local biodiversity is also changing as new climatic conditions arise[lvi], thus reducing native species and/or replacing them with different ones. Reduced and altered biodiversity has the potential to undermine food security, economic security, and cultural heritage. These factors can drive and exacerbate conflict as well as increase the internal and international displacement of peoples, thereby undermining national and collective security (spending) across the Alliance.

The development of NATO's Climate Change and Security Risk Management Framework (CCSRMF) will incorporate 'human security'[lvii] considerations, which will further enhance predictive capabilities in relation to potential conflict hotspots and escalation. This will be an invaluable resource in terms of warfighting and operational effectiveness of non-combat advisory and capacity-building missions such as the NATO Mission Iraq (NMI). Arguably, 'human security' factors will provide a clearer roadmap for both potential conflict

and capacity building. Josh Busby examines a number of case studies where similar sets of environmental factors have different outcomes[lviii] – to opposite extremes of peace and war – depending upon respective human dynamics and social patterns of response. For example, Busby analysed why famine followed drought in Somalia, but not Ethiopia in 2022[lix]. His analysis pointed to increased state capacity and political inclusion as well as to the judicious use of foreign aid to support targeted humanitarian assistance that focused on food security. Busby also highlighted how early warning systems reduce mortality and overall exposure to climate hazards, as well as the importance of locally led, internationally supported, mitigation and adaptation initiatives.

The NATO Warfighting Capstone Concept (NWCC)[lx] aims to carve a path that "pulls forward the most important warfare development work" with a focus on supporting efforts to build military advantage within the context of respective strengths across the Alliance. It aims to expand "the decision space for political authorities" and "offer a new, forward-looking multi-domain (land, maritime, air, cyber, and space) and cross-instruments of power approach to military thinking, organizing and acting." Climate Intelligence is the bridge that unites the aspirations of the NWCC and the CCSAP.

Designed as a tool to manage the aforementioned risk, Climate Intelligence provides historic, current, and predictive information on natural (primary) and human (secondary) systems, thereby facilitating informed decision making for climate security mitigation and adaptation. In 2022, General Richard Nugee et al[lxi] outlined the potential for an enhanced UK military offering in relation to Climate Intelligence, with a focus on widening the breadth of indicators reported on, as well as increasing collaboration with academic institutions in order to enhance climate security forecasting and predictive analysis.

In terms of NATO specifically, in 2023, Erin Sikorsky[lxii] outlined other areas where intelligence on climate could be usefully collected and incorporated into existing NATO intelligence programmes. These include integrating climate and environmental change data into analysis, evaluating and developing climate security risk assessment frameworks, and refining climate security intelligence education for member nations and their intelligencers. Selisny et al[lxiii] develops the concept further and incorporates collaboration with the British Army's Long Range Reconnaissance Group (LRRG) that deployed to support the United Nations Multidimensional Integrated Stabilization Mission in Mali (MINUSMA).

Military responses are often reactive, deployed to stabilize (potential) insecurity and end conflict; however, the necessity of adaptation to the forecasted operating environment remains central to warfare development. Sustainability, operating in harsher conditions, and responding to the impacts of climate change through activities such as international and domestic emergency response, as well as augmenting military installations, are commonly cited as ways in which Defence will have to adapt. Climate Intelligence would be an additional resource in this battle. As a military offering, in terms of deployed assets, climate intelligence collation could be incorporated into patrol taskings and liaison engagements. In terms of fixed assets, military bases could be utilized to support relevant studies, with the potential for (limited) 'dual use' with relevant civilian subject matter experts who could lead research and interpretation.

NATO would also benefit from a dedicated 'Climate Intelligence and Security Fusion Unit' within the NATO Joint Intelligence and Security Division, coordinating the recommendations of and collaboration with the Joint Intelligence, Surveillance and Reconnaissance (JISR) system, the Science for Peace and Security (SPS) Programme, Strategic Foresight Analysis (SFA), the Science and Technology Organization (STO), the Environmental Protection Working Group (EPWG), the Specialist Team on Energy Efficiency and Environmental Protection (STEEEP), and relevant NATO Centres of Excellence (specifically the Climate Change and Security Centre of Excellence). This unit could also coordinate with Alliance member agencies and domestic counterparts. In terms of reporting structure, this unit could report directly to the NATO Situation Centre (SITCEN) with a view to enhancing climate and security situational awareness of the North Atlantic Council (NAC) and the Military Committee (MC). Through the Situational Awareness Integration Team (SAIT), relevant intelligence could be distributed across the Alliance and its stakeholders.

As well as a unit to coordinate the climate and security agenda across the Alliance, NATO should create a 'Green Tree' organogram that highlights environmental divisions and individuals across the Alliance command structures. This would map both capability and gaps, as well as providing an informational aid that facilitates collaboration within the Alliance and with external stakeholders. This 'NATO Green Tree' could network with others from organizations such as the UN, the EU, and BRICS (the international organization made up of Brazil, Russia, India, China, South Africa, Iran, Egypt, Ethiopia, and the United Arab Emirates), with a view to supporting a coordinated network of related climate security effort and focus.

Training is a vital part of preparation for warfighting and emergency response, particularly from the changing climate perspective. Joint training exercises are important within the NATO context as they provide the opportunity for military personnel of Allies and partner nations to interact, thereby testing the interoperability of kit and culture. 'Practicing how they'll fight, and fighting how they practiced' is an important element of this training and testing as it allows the learning and developing to take place in the safest possible environment. It also allows a 'stress test' to take place in an environment where lessons can be learned without losses being sustained. At the tactical level, this will include how extreme heat effects night vision and communications equipment as well as aircraft lift and thrust[lxiv], thereby requiring additional training techniques.

NATO's warfare development must include a re-evaluation of training programmes to incorporate relevant operational risks such as extreme heat. This will include extra emphasis on hydration, as well the need to reduce patrol times and distances in order to maintain the health and safety of personnel. This training will also inform necessary developments in materiel requirements. For example, in 2003 during the Iraq campaign, Lieutenant General (ret) Richard Nugee (then Commanding Officer of 40th Regiment Royal Artillery) requested an airlift of bananas to address the reduced potassium levels of personnel due to increased water intake[lxv] in response to the extreme heat.

As well as ordnance, other materiel considerations would include how 'greener' equipment could enhance operational effectiveness. The word constraints of this paper do not allow for full descriptions of the efforts of military and civilian engineers in creating a range of equipment that delivers robust capabilities with built-in climate change considerations. Of note, however, is that there is often an 'added bonus' of specifically adapted equipment. For example, there are enhanced stealth and tactical advantages facilitated by emission-free Electrified Vehicles (EVs) in terms of audio and thermal profiles, as well as improved control and manoeuvrability. The positive impacts in relation to increased situational awareness and reduced fatigue due to

less vibration and noise also improve the working effectiveness and environment for personnel. This highlights the issue of energy supply, namely electricity, to combat zones. However, it should be noted that the standard provisioning of diesel also has a number of risks, including to life. Renewable energy increases both self-sufficiency and sustainability potential.

Such 'win-win' improvements require investment in research and design (R&D) in order to develop capabilities that maintain operational effectiveness without compromising climate change considerations. This may involve public-private partnerships in terms of funding and procurement. This incorporation of commercial relationships may raise concerns in relation to undue influence and value for money, creating other potential points of tension. However, the ability to scale at pace requires funding that is beyond that available to most nation states, particularly when other expensive priorities such as health, education, and cost of living support is also factored in. Notably, in advance of the Vilnius Summit, while in Lithuania to observe the 'Blauen Express' Field Training Exercise at the invitation of General Valdemaras Rupšys (Lithuanian Chief of Defence), Admiral Rob Bauer (Chair of the NATO Military Committee) reiterated how the NATO Regional Plans enabling collective defence, "go hand-in-hand with increased capacity of defence industries."[lxvi] Methodologies to facilitate public-private collaborations, as well as collaborations with academia, would strengthen finance and research capabilities for military equipment development and procurement.

In addition to maintaining an effective defence capability through training, NATO also enhances its deterrence capabilities too. Training exercises demonstrate a 'show of strength' for potential competitors and aggressors, often taking place near to strategically selected borders. This also mirrors strategic forward presence, such as NATO has extended along the Alliance's Eastern flank following Russia's unprovoked invasion of Ukraine. Existing battlegroups were reinforced and four more made up of personnel from Bulgaria, Hungary, Romania and Slovakia[lxvii] added, thereby demonstrating readiness and capability. This 'information' aspect is also a very important part of warfare development as it deters and reduces armed conflict, thereby reducing loss of life and other associated physical and environmental destruction. As mentioned previously, warfighting exacerbates climate change, while also undermining the focus on mitigation and adaptation measures. Deterrence is the cornerstone of peace in a volatile world – particularly an increasingly hotter volatile world.

LEADERSHIP DEVELOPMENT, FACILITIES, AND INTEROPERABILITY SETTING THE STANDARD

As highlighted in the NATO CCSIA, militaries are more likely to be tasked for emergency responses. Effective warfare development requires consideration of competing priorities and how to respond to them. Climate hazards will continue to increase the need for domestic responses to emergencies such as wild fire and floods, which is also true of the international emergency (Humanitarian Assistance and Disaster Relief, HADR) responses. In the past 12 months, militaries have been involved in flood and wildfire response[lxviii] in the Emirates, South Korea, Uganda, Iran, Pakistan, the US, Slovakia, Slovenia, Türkiye, Germany, Spain, France, China, Portugal, Canada, Morocco, Mexico, Croatia, Greece, and Australia. This is an escalatory trend. Summer 2023 saw 'threat to life' heat-domes and wildfires across North America, unprecedented heatwaves and flash floods across Europe, and broken heat records and overwhelmed power-grids across Asia.

As civil emergency response taskings amplify[lxix], more attention, resources, and equipment become diverted from the core business of deterrence and warfighting. This strains military force and capability. Active deployment is only the tip of the iceberg in terms of warfighting; readiness is built on training, practice, and rest. This necessary cycle needs to be factored into leadership decisions about recruitment and procurement. For example, the UK Armed Forces' numbers are the lowest since the Napoleonic Wars[lxx] despite being engaged in dozens of theatres across the globe to tackle terrorism and reinforce humanitarian assistance and also deploying domestically to a range of emergency responses including floods[lxxi], Covid-19[lxxii], and strikes by essential workers[lxxiii]. Planned leave, including Christmas 2022 leave, for military personnel was cancelled by the UK government to cover Military Aid to the Civil Authorities (MACA). This creates an unsustainable pattern based on 'emergency response' rather than planned adaptation to a changed climate. Within a NATO context this undermines Article 3[lxxiv] "national responsibility and collective commitment"[lxxv] to maintaining resilience and preparedness.

Relevant adaptation here would include enhancing civil contingency planning with investment in infrastructure, such as flood defences and assets, including civilian helicopters to transport hoses and drop water over wildfires. Increasing capacity across civil platforms, such as local Fire Brigades / Departments, would reduce the pressure on the military and form part of future planning. 'National Civilian Units', made up of part-time volunteers led by a core of full-time specialists, could be provisioned with terrain specific training and resources, so as to constitute an effective first response / supplementary support for civil emergencies. Just as NATO requests a designated proportion of national spending on military provision, so to it could request, as per Article 3, resourcing for this vital avenue of adaptation in response to climate hazards and their inevitable impacts and implications.

In relation to this, as well as interoperability across Alliance military members, there should be a focus on interoperability with civil platforms in terms of 'kit and culture'. This would allow for a 'hybrid civilian-military' response to climate shocks and emergencies. This would also allow for a more effective dovetailing with relevant agencies, domestically and internationally, with the military maintaining clear distinction from humanitarian agencies, but liaising closely and coherently so as to provide comprehensive coverage. As observed by Rear Admiral (ret) Matthew Bell (Ted Stevens Center for Arctic Security Studies), the military is unable to respond to increasing demands in

isolation; collaboration with civilian agencies and industry is key[lxxvi]. Separately, but related in terms of agenda, investment in fixed assets designed to support long-term climate change adaptation strategies could be established during engagements and transferred to local ownership on withdrawal. Combined with integrated and tapered support for international developmental assistance agencies, such legacy provision could become an integral part of the climate and security agenda.

Defence spending across the Alliance varies considerably[lxxvii]. Consecutive US government administrations have stressed the importance of all individual member states meeting the 2014 pledge to "move towards" spending at least 2% of GDP[lxxviii] on defence annually. The second largest contributor to the UN as a whole[lxxix], Germany has led the drive to expand the traditional concept of 'collective security' to include a wider range of non-military expenditure. In line with the 'human security' agenda, Germany has advocated a financial focus on humanitarian and development support to fragile countries, including a number of NATO partners[lxxx]. This increases 'upstream capacity' building in relation to climate change resilience and adaptation, particularly in relation to preventing potential displacement due to climate hazards and conflict.

Directing financial support to projects that would facilitate coherent climate resilience would enhance climate security overall, and therefore the 'collective security' of the Alliance. As the cost of wars in Yemen[lxxxi] and Syria[lxxxii] demonstrates, the reactive and restorative costs of conflict are far higher in both humanitarian and military terms than proactive adaptation and resilience support. Further, this is also problematic because investing more on restoration than prevention does not reduce the likelihood of conflicts. Collective security in a climate-changed world should encompass pre-emptive action to mitigate the shaping threats and drivers of conflict. Novel responses are essential as the role of the military, domestically and within a multilateral organizational context like NATO, is to protect the lives and interests of citizens within its jurisdiction.

NATO's Climate Change and Security Action Plan: Compendium of Best Practice[lxxxiii] highlights contributions by member states as categorized by 'awareness,' 'mitigation,' 'adaptation,' and 'outreach.' On balance, Canada and the US are leading in terms of scale and integration of the climate change and security agenda. However, members such as Greece, with their Environmental – Energy & Climate Change Adaptation Policy (EECCAP)[lxxxiv], Slovenia with a multifaceted response across its civilian and military platforms,

and the Czech Republic with a holistic focus on the "triple nexus of humanitarian, development and peace cooperation in the context of fragility and climate change, with special attention to disaster risk reduction"[lxxxv] demonstrate the commitment to the climate change and security agenda across the Alliance.

In terms of climate change responses, much attention is given to military reporting of Green House Gas (GHG) emissions. The United Nations Conference on Environment and Development (Rio Earth Summit) in 1992 originally highlighted the need for military and peacekeeping operations to be excluded from UN emissions reporting, an exclusion still maintained by the United Nations International Panel on Climate Change (UNIPCC) today. NATO's current reporting methodology also excludes NATO led operations and missions[lxxxvi]. This has been the subject of criticism[lxxxvii]. While ostensibly a worthwhile dataset, the individual national military emissions for operations and missions public reports are largely irrelevant as they are simply a snapshot of current status, with no indication of trends, as they are dependent on deployments, thus fewer deployments mean lower emissions and more deployments mean higher emissions. A reliable average is also impossible as deployments will vary in terms of scale and intensity, as dictated by strategic and operational need. However, aggregate emissions data for NATO as a whole could be used to analyse variations based on deployment requirements in order to observe and record patterns and trends. NATO's current reporting methodology provides a balanced approach, given the contextual constraints.

Further, comparing individual militaries against each other is also a flawed concept. Even comparing 'relative reductions' is problematic, as different countries will be engaged in different deployments and to different levels. Some countries will be deployed to fewer theatres or with fewer military personnel, while some countries will deploy with military hardware and some will not. The joint / multilateral efforts of organizations such as NATO also make specific national disaggregation virtually impossible. As such, the focus on devising emissions reporting methodologies specifically for operations and missions is unnecessary and unhelpful, particularly given the need to protect sensitive information as to location, size, and deployed assets. The same concerns apply to international emergency response assistance where national militaries are deployed to assist foreign governments with humanitarian crises. In addition, if a standardized emissions reporting system for operations and missions were enforced, with penalties for missed targets, there is the potential for national governments to refrain from deploying militaries to support engagements or assist with emergency responses in order to improve reports.

Separate to operations and training emissions are the emissions of military estates / installations, which is where the thrust of climate change mitigation strategies should be focused. NATO already has six environmental protection standards (Standardization Agreements / STANAGs) that govern the administration of military camps, waste management, and the sustainability of military training areas. As well as forming a prominent part of the Strategic Concept, climate change mitigation and adaption is also integrated via the adoption of the Green Defence Framework [lxxxviii]. Commitments to environmental considerations are now standard throughout the design and build process for all NATO assets. As well as reducing environmental impact and increasing efficiencies, climate change considerations would protect estates and increase their longevity and effectiveness[lxxxix] by building in measures to mitigate against rising sea levels and extreme weather. Proactive investment would also reduce overall spending on fixing damaged equipment[xc] and overall whole-life costs. As highlighted with Slovak examples by Kertysova[xci], innovative solutions deployed in military forests and estates, as well as the rehabilitation of land degraded / contaminated by the Soviet Army, have supported NATO's climate security agenda at the domestic member-state level.

CONCLUSION

Considering NATO's role to maintain the collective security of the Alliance, there are many ways in which climate change mitigation and adaptation strategies can support warfare development, thus making installations and operations more resilient and more responsive to the challenges ahead. However, there are times when the realities of warfighting, and the training for it, will require operational success to be prioritized above climate change considerations. To reduce this tension and facilitate focused coordination, NATO should invest further in R&D, develop methodologies for increased public-private partnership, and engage relevant subject matter experts in order to facilitate collaboration and cooperation. The goal of NATO should be to maintain operational effectiveness without compromising climate change commitments.

KEY RECOMMENDATIONS FOR NATO

1. NATO should enact a 'Charter for Climate and Security Rules of Engagement' that would minimize environmental impacts while maximizing operational effectiveness during operations, missions, and training. This charter is to be modelled on legal conventions relating to conduct in war, proscription of munitions, and the protection of cultural property. The Charter would establish a methodology for determining if and when NATO would override commitments to climate change related legislation and collate relevant Alliance doctrine relating to installations.

2. As a way to bridge the aspirations of the NWCC and CCSAP, NATO would benefit from a dedicated 'Climate Intelligence and Security Fusion Unit' within the NATO Joint Intelligence and Security Division. The new unit would coordinate the recommendations of and collaboration with the Joint Intelligence, Surveillance and Reconnaissance (JISR) system, the Science for Peace and Security (SPS) Programme, the Strategic Foresight Analysis (SFA), the Science and Technology Organization (STO), the Environmental Protection Working Group (EPWG), the Specialist Team on Energy Efficiency and Environmental Protection (STEEEP), and relevant NATO Centres of Excellence (specifically the Climate Change and Security Centre of Excellence). This unit could also coordinate with Alliance member agencies and domestic counterparts. In terms of a reporting structure, this Centre could report directly to the NATO Situation Centre (SITCEN) with a view to enhancing climate and security situational awareness of the North Atlantic Council (NAC) and the Military Committee (MC). Through the Situational Awareness Integration Team (SAIT), relevant intelligence could be distributed across the Alliance and its stakeholders.

3. NATO should establish a 'NATO Green Tree' organogram that highlights environmental divisions and individuals across the Alliance command structures. This would map both capability and gaps, as well as providing an informational aid that facilitates collaboration within the Alliance and with external stakeholders. This 'NATO Green Tree' could network with others from organizations such as the UN, the EU, and BRICS, with a view to supporting a coordinated network of related climate security effort and focus.

4. A bespoke training syllabus designed to inform and deepen understanding of the climate-security nexus is recommended. This would include a core course, as well as rank and role dependant programmes designed to dovetail with operational priorities and requirements. Wargames and exercises that test the capabilities and culture in relation to climate and security specifically should be also developed and delivered. This will inform the gap analysis in terms of training and understanding, as well where improvements could be made to overall strategic vision, mission, and procurement.

5. NATO is advised to establish pre-deployment training and 'local assessment reports' specifically targeted to theatre, incorporating information on water, food, and land scarcity, as well as levels of socio-economic inequity and levels of positive public perception. Socio-cultural dynamics relating to (potential) tension would also be included in relation to competition for resources and the power to distribute resources.

6. As per Article 3, NATO should enhance civil preparedness and resilience, with investment in infrastructure and increased capacity across

domestic civilian platforms. Where not in place, Members should consider the establishment of national civil defence units and networks to supplement military responses and international civil emergencies.

7. NATO would benefit from a comprehensive methodology for public-private partnerships designed to facilitate financing and research collaboration. Related to this, investment in research and design is encouraged, with a view to developing 'win-win' improvements to equipment that maintain operational effectiveness without compromising climate change considerations.

8. NATO should plan for investments in fixed assets designed to support long-term climate change adaptation strategies that are established during engagements and transferred to local ownership upon withdrawal. This is to be combined with integrated and tapered support for international development assistance agencies.

9. It is recommended that NATO revise defence spending priorities to incorporate holistic 'human security' priorities. Considerations here include upstream capacity building and local resilience, with a focus on pre-emptive action to mitigate the shaping threats and drivers of conflict.

10. NATO is advised to incorporate 'reduced biodiversity' as a distinct category in the Climate Change Risk Tool (CCSRT) group of hazards. Considerations here also include changed biodiversity in terms of 'new indigenous' / invasive species, with a view to supporting sustainable adaptation responses.

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Also, paragraph 70 in full for context on Human Security and the Women, Peace and Security Agenda – "We are committed to integrating the Human Security and the Women, Peace and Security agendas across all our core tasks. We will continue to work towards fully operationalizing this objective, through robust policies and clear operational guidelines, in order to enhance our operational effectiveness and ensure synergies between the civilian and military structures. In doing so, we are working with partners, international organizations, and civil society. We reaffirm our commitment to an ambitious human security agenda. Our Human Security Approach and Guiding Principles allows us to develop a more comprehensive view of the human environment, contributing to lasting peace and security. Today, we endorse a NATO Policy on Children and Armed Conflict, and an updated Policy on Combatting Trafficking in Human Beings. Our ongoing work on human security also includes cultural property protection."

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xx The Parties agree that an armed attack against one or more of them in Europe or North America shall be considered an attack against them all and consequently they agree that, if such an armed attack occurs, each of them, in exercise of the right of individual or collective self-defence recognized by Article 51 of the Charter of the United Nations, will assist the Party or Parties so attacked by taking forthwith, individually and in concert with the other Parties, such action as it deems necessary, including the use of armed force, to restore and maintain the security of the North Atlantic area.

Any such armed attack and all measures taken as a result thereof shall immediately be reported to the Security Council. Such measures shall be terminated when the Security Council has taken the measures necessary to restore and maintain international peace and security.

xxi For the purpose of Article 5, an armed attack on one or more of the Parties is deemed to include an armed attack:

• on the territory of any of the Parties in Europe or North America, on the Algerian Departments of France, ** on the territory of Türkiye or on the Islands under the jurisdiction of any of the Parties in the North Atlantic area north of the Tropic of Cancer;

• on the forces, vessels, or aircraft of any of the Parties, when in or over these territories or any

other area in Europe in which occupation forces of any of the Parties were stationed on the date when the Treaty entered into force or the Mediterranean Sea or the North Atlantic area north of the Tropic of Cancer.

* Article 6 has been modified by Article 2 of the Protocol to the North Atlantic Treaty on the Accession of Greece and Türkiye.

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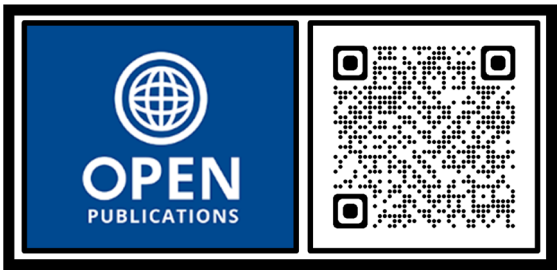

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