

**Navigating External and Existential Threats:
National-level Policy Responses to Climate Security**

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Abbreviations

ASEAN	Association of Southeast Asian Nations	NSSD	National Security Strategy Document
COFA	Citizens of Micronesia Compact of Free Association	OSCE	Organization for Security and Co-operation in Europe
ECOWAS	Economic Community of West African States	PCEI	Problem-centered expert interview
GHG	Greenhouse gas	PCI	Problem-centered interview
GUM	Guam	SIDA	Swedish International Development Cooperation Agency
HADR	Humanitarian assistance and disaster relief	tCO ₂ e	Tons of carbon dioxide equivalents
IPCC	Intergovernmental Panel on Climate Change	UN	United Nations
MoD	Ministry of Defence	UNFCCC	United Nations Framework on Climate Change
NATO	North Atlantic Treaty Organization	UNHCR	United Nations High Commissioner for Refugees
NDC	Nationally Determined Contribution	UNSC	United Nations Security Council
NGO	Nongovernmental organizations	US	United States
NORAD	North American Aerospace Defense Command	USD	United States Dollar
		VUT	Vanuatu

Abstract

Climate change is a dramatic source for a variety of insecurities. Slow and sudden-onset disasters harm populations and ecosystems alike and these immediate impacts have the potential to translate into further harm over time and distance. Climate change is also a highly unusual source of insecurity. Its truly planetary dimensions extend beyond metropolitan centers, it is not generated by a lucid adversary but instead results via long causal chains from anthropogenic activities, it thereby blurs the boundaries between the source of the harm and those who are harmed and it involves societal and biophysical processes into a daunting degree of complexity.

But the manifestation of climate-related insecurities is not inevitable. Research has identified political responses to climate change impacts as crucial intervening factor. Policies play an important role in preventing that the exposure to direct climate change impacts translates into vulnerability. Moreover, well-functioning, inclusive institutions and the sustainable, transparent management of natural resources contributes helps to reduce the risk of resource conflicts and other indirect consequences. Policies can, however, also be counterproductive if they rely too conventionally on tools of security policy or focus narrowly on symptoms instead of causes.

But these important policy responses to security-related climate impacts are underresearched. In particular, research has yet produced little systematic frameworks, taxonomies or typologies for systematic assessments that could comprehensively capture national-level institutions' climate security policies, let alone situate them in the respective institutions' wider entanglements in contributing to climate insecurity. This cumulative dissertation addresses these gaps. It asks: How are national-level civil and defense institutions approaching climate security and with what effects? The dissertation defines climate security policy as national level institutions' policies whose adoption they explicitly justify as means towards climate security. Importantly, the study looks beyond the narrow results of policy processes and instead focuses on awareness, assessment, planning, implementation and evaluation efforts as five conceivable modes of policy. In order to study these different aspects in turn, the dissertation develops and applies several related frameworks that gradually trade their applicability to broad samples for in-depth study.

Studying awareness and assessments, chapter 2 introduces a framework that differentiates climate security frames by their focus on direct and indirect impacts. The chapter draws on this framework to take stock of whether and how national governments consider climate change linked to security. To this end, it introduces a novel dataset of national security strategy documents. Published by 93 countries, these public high-level documents reveal that a large majority

of such strategies published after 2007 refers to climate security in various ways. These references, however, often characterize the direct impacts too narrowly, misrepresent indirect climate security impacts such as migration and climate-related violence, and also fall short of contextualizing climate change within its broader context of global environmental change.

Following on, chapter 3 adds a second investigation that takes a closer look at intragovernmental differences in approaching climate security. The chapter identifies different degrees of awareness and various assessments presented by defense departments and, respectively, non-defense (“civil”) ministries from the same country. To this end, the chapter develops another framework for the study of climate security framings depending on their reference to anthropogenic origins, their focus, the conveyed certainty, and temporality. By comparing defense and civil ministries’ documents, the chapter identifies notable differences in their approaches. In particular, the chapter finds that defense departments tend to approach climate change rather as long-term issue and focus particularly on its indirect consequences.

This observation motivates a closer look at defense-driven climate security policies in chapter 4. The chapter introduces a framework to the study of policy that looks at all five observable components of climate security policies directed at the three intervention sites of mitigation, preventive and responsive adaptation. The framework is applied in a mixed-methods study to military forces of states that are members in the North Atlantic Treaty Organization (NATO). The first three policy modes are assessed by document analysis for all member states with available strategies. Implementation and evaluation activities are then investigated by five case studies on selected member forces. The chapter finds indications of broad awareness and climate assessments but a more limited planning uptake. Regarding implementation and evaluation, the case studies highlight three additional insights: Militaries prioritize capacities over mitigation, they struggle to fulfill their announced contributions to disaster response and the Russian full-scale invasion of Ukraine has had various impacts on NATO member forces’ climate security activities.

Chapter 5 widens the scope to contextualize military forces’ climate security policies with their wider environmental entanglements. Drawing on the major streams of environmental peace and conflict research, the chapter develops a theoretical framework to comprehensively capture ecologically relevant military activities and to differentiate them by their directedness at the force itself or external recipients, and by the novelty of the means and purpose involved. This framework is then applied to structure the first review of academic literature on military ecological entanglements. The review organizes existing research into thematic clusters that speak to four

different military roles related to the environment. They conduct climate security policies but also remain complicit in environmental destruction, are engaged in Anthropocene geopolitics, and, at times, obstruct conventional climate policies.

The subsequent chapter contrasts these efforts at climate security policy with the ways through which climate-related human insecurity comes about. Chapter 6 presents insights from two interview-based case studies that study how insecurity on the Pacific island territories of Vanuatu and Guam is coproduced by the interplay of climate change, and respectively, environmental change, with local manifestations of economic inequalities and prevailing (post-)colonial legacies. The chapter does not develop another framework to the study of climate security policy but provides instead two snapshots capturing the climate-related pathways to human insecurity. These show the difficulty of designing policy responses to security-relevant climate change impacts.

Chapter 7 draws these findings together. In response to the research question, the chapter makes a threefold argument: (1) National level climate security policies are widely established but (2) often fall short both in fulfilling their own goals, (3) and in addressing the security-related challenges that arise from climate change and its embedding context of other global environmental change. After discussing these insights, the findings of the various chapters are linked to the wider study of environmental peace and conflict research are discussed. A closing section discusses the implications of the cumulative dissertation's chapters for the disciplines of Policy Studies, (Critical) Security Studies, and Foreign Policy Analysis and International Relations.

Zusammenfassung

Der Klimawandel verursacht dramatische Unsicherheiten. Sowohl allmählich als auch plötzlich verlaufende Katastrophen („slow and sudden-onset disasters“) schädigen sowohl Bevölkerungsgruppen als auch Ökosysteme. Diese direkten Effekte können darüber hinaus zeitlich und räumlich versetzt weitere Schäden verursachen. Der Klimawandel ist zudem eine höchst ungewöhnliche Quelle von Unsicherheit. Die Dimensionen dieser Unsicherheit sind tatsächlich planetar, weil sie sich über die urbanen Zentren der Welt hinaus erstrecken. Mehr noch, sie werden nicht durch einen luziden Gegner verursacht, sondern erwachsen, stattdessen, entlang einer langen Kausalkette aus anthropogenen Aktivitäten. Dies verwischt die klaren Grenzen zwischen jenen, die Unsicherheit erzeugen und jenen, die sie erleiden. Obendrein sind Prozesse klimaspezifischer Unsicherheit überaus komplex, weil sie aus einem Zusammenspiel gesellschaftlicher und biophysikalischer Prozesse erwachsen.

Andererseits ist das Zustandekommen klimaspezifischer Unsicherheiten keine Zwangsläufigkeit. Vielmehr haben wissenschaftliche Studien politische Maßnahmen („policies“) als essenziellen, intervenierenden Faktor identifiziert. Politische Maßnahmen haben eine bedeutende Rolle, weil sie verhindern können, dass die Exposition gegenüber direkten Klimafolgen in Vulnerabilität resultiert. Zudem helfen gut funktionierende, inklusive Institutionen und der nachhaltige, transparente Umgang mit Ressourcen dabei, die Risiken für Ressourcenkonflikte und andere indirekte Konsequenzen zu senken. Allerdings können politische Maßnahmen auch kontraproduktiv sein, wenn diese zu stark auf konventionellen sicherheitspolitischen Instrumente basieren oder enggeführt Symptome statt Ursachen klimaspezifischer Unsicherheit fokussieren.

Allerdings sind diese politischen Maßnahmen nicht ausreichend erforscht. Insbesondere gibt es bislang kaum systematische Taxonomien oder Typologien die eine systematische Analyse von Klimasicherheitspolitiken auf nationaler Ebene ermöglichen oder diese gar in ihren breiteren Kontext von Beiträgen der selben Institutionen zu klimaspezifischer Unsicherheit einordnen. Die vorliegende kumulative Dissertation trägt zur Schließung dieser Lücken bei. Sie geht dazu der Frage nach: „Wie adressieren zivile und militärische Institutionen Klimasicherheit auf nationaler Ebene? Und mit welchen Folgen? („How are national-level civil and defense institutions approaching climate security and with what effects?“) Die Dissertation definiert dazu Klimasicherheitspolitik als politische Maßnahmen nationaler Institutionen die diese explizit mit einem Verweis auf Klimasicherheit rechtfertigen. Wohlgermerkt schließt dies nicht nur umgesetzte politische Maßnahmen („policies“) ein, sondern bezieht die politischen Begleitprozesse

der Gewährwerdung, Bewertung, Planung, Implementierung und Evaluation als fünf Modi von Klimasicherheitspolitik ein. Um diese verschiedenen Aspekte zu untersuchen, entwickelt die vorliegende Dissertation mehrere Analyserahmen die zu unterschiedlichem Maße entweder auf große Stichproben oder tiefere Fallstudien genutzt werden können.

Kapitel 2 entwickelt dazu zunächst ein Konzept zur Studie der klimasicherheitspolitischen Modi der Gewährwerdung und Bewertung. Das Konzept differenziert diese gemäß ihrem Fokus auf direkte und indirekte Klimafolgen. Anschließend wird das Konzept angewendet, um zu prüfen, inwiefern nationale Regierungen Klimawandel als sicherheitsrelevantes Thema framen. Dafür präsentiert das Kapitel einen neuartigen Datensatz mit Nationalen Sicherheitsstrategiedokumenten aus 93 Ländern. Die Analyse zeigt, dass eine große Mehrheit der nach 2007 veröffentlichten Dokumente Klimasicherheit thematisiert. Diese Bezugnahmen stellen jedoch direkte Klimafolgen oft in zu großer Engführung dar, charakterisieren potenzielle indirekte Klimafolgen – etwa Ressourcenkonflikte und klimaspezifische Migration – bisweilen auf wissenschaftlich nicht haltbare Weise und werden zumeist dem größeren Kontext des globalen Umweltwandels („global environmental change“) nicht gerecht, in welchen der Klimawandel eingebettet ist.

Anschließend erweitert Kapitel 3 die Untersuchung der klimasicherheitspolitischen Modi der Gewährwerdung und Bewertung um eine Studie regierungsinterner Differenzen im Umgang mit klimaspezifischer Unsicherheit. Das Kapitel vergleicht die Framings sicherheitsrelevanter Klimafolgen durch Verteidigungsministerien und Ministerien mit zivilen Ressorts der selben Länder miteinander und identifiziert dadurch unterschiedliche Ausmaße klimasicherheitspolitischer Gewährwerdung und Bewertung. Dazu entwickelt das Kapitel ein Konzept welches Klimasicherheitsframings entlang von vier Aspekten untersucht. Es bewertet diese dahingehend ob sie auf anthropogene Ursachen Bezug nehmen, welchen Fokus sie setzen und mit welcher Gewissheit sowie für welchen Zeitraum sie die Manifestation klimasicherheitsrelevanter Folgen formulieren. Der Vergleich deckt erhebliche Unterschiede in den Frames von Ministerien mit militärischem und zivilem Ressort auf. Insbesondere zeigt die Untersuchung, dass Verteidigungsministerien den Klimawandel eher als ein langfristiges Problem identifizieren und sich überwiegend auf dessen indirekte Konsequenzen konzentrieren.

Diese Beobachtungen geben Anlass für eine nähere Untersuchung militärischer Klimasicherheitspolitiken im sich anschließenden Kapitel 4. Das Kapitel entwickelt eine Taxonomie welches klimasicherheitspolitische Maßnahmen nach ihrem Interventionspunkt differenziert, also ob sie auf Mitigation, Adaption an direkte Klimafolgen oder Adaption an indirekte Klimafolgen

abzielen. Im Rahmen dieser Taxonomie werden die jeweiligen Maßnahmen dann gemäß der involvierten fünf klimasicherheitspolitischen Modi weiter differenziert. Die Taxonomie wird anschließend in einer Mixed-Method-Studie angewendet um die klimasicherheitspolitischen Maßnahmen von Streitkräften des Nordatlantischen Verteidigungsbündnisses (NATO) vergleichend zu untersuchen. Dabei werden die ersten drei Modi – Gewährleistung, Bewertung und Planung – mit Hilfe einer Dokumentenanalyse für alle NATO-Streitkräfte bewertet, welche solche Dokumente veröffentlicht haben. Anschließend werden die Implementierung und Evaluation klimasicherheitspolitischer Maßnahmen im Rahmen von fünf Fallstudien ausgewählter Streitkräfte näher untersucht. Das Kapitel zeigt, dass NATO-Streitkräfte Klimafolgen in ihren Strategien häufig nennen und bewerten, allerdings seltener spezifische Reaktionen ankündigen. Mit Blick auf Implementierung und Evaluation ergänzen die Fallstudien drei Befunde: Streitkräfte priorisieren den Erhalt von Kapazitäten gegenüber der Senkung von Emissionen, sie haben Schwierigkeiten, die von ihnen angekündigten Beiträge zum Katastrophenschutz umzusetzen und Russlands Angriffskrieg auf die Ukraine hat verschiedene Auswirkungen auf die klimasicherheitspolitischen Aktivitäten der untersuchten NATO-Streitkräfte.

Kapitel 5 erweitert den Fokus und untersucht den Kontext in dem Streitkräfte ihre klimasicherheitspolitischen Maßnahmen durchführen. Das Kapitel leitet dazu eine Typologie ökologisch relevanter militärischer Aktivitäten aus den wesentlichen Strömungen der umweltbezogenen Friedens- und Konfliktforschung ab. Diese Typologie ermöglicht eine vollständige Erfassung ökologisch relevanter militärischer Aktivitäten. Sie differenziert diese danach, ob sie primär auf die Streitkraft selbst oder externe Akteure ausgerichtet sind und inwiefern neuartige Mittel verwendet und, respektive, Ziele verfolgt werden. Anschließend wird der erste umfassende Literaturüberblick akademischer Studien zu ökologisch relevanten militärischen Aktivitäten präsentiert und die identifizierten Aktivitäten entsprechend der Typologie eingeordnet. Dieser Literaturüberblick organisiert die bislang erforschten militärischen Aktivitäten in vier verschiedene Rollen: Streitkräfte sind in die Durchführung klimasicherheitspolitischer Maßnahmen beteiligt, haben allerdings auch eine Komplizenschaft durch ihren Anteil an Umweltzerstörung, sind involviert in geopolitischen Unternehmungen des Anthropozäns und, bisweilen, der Obstruktion von konventioneller Klimapolitik.

Das anschließende Kapitel stellt den verschiedenen Bemühungen um klimasicherheitspolitische Maßnahmen eine Betrachtung der Entstehung von klimaspezifischer menschlicher Unsicherheit („climate-related human insecurity“) gegenüber. Kapitel 6 präsentiert dazu Einsichten von zwei interviewgestützten Fallstudien, welche den Inselstaat Vanuatu und Guam, ein nicht-

inkorporiertes Territorium der USA im Pazifik, untersuchen. Das Kapitel identifiziert, auf welche Weise menschliche Unsicherheit aus dem Zusammenspiel lokaler Folgen des Klima- und Umweltwandels mit lokalen Manifestationen ökonomischer Ungleichheiten und (post-)kolonialer Abhängigkeiten resultiert. Das Kapitel entwickelt kein eigenes Rahmenwerk für die Untersuchung von Klimasicherheitspolitik sondern ordnet diese durch zwei Momentaufnahmen von Pfaden zu klimaspezifischer menschlicher Unsicherheit in einen Problemkontext ein. Diese Kontexte illustrieren die Schwierigkeiten, welche sich bei der Konzeption und Umsetzung klimasicherheitspolitischer Maßnahmen stellen.

Kapitel 7 rekapituliert die Befunde der vorangegangenen Kapitel. Mit Bezug auf die Forschungsfrage präsentiert das Kapitel ein dreiteiliges Argument: (1) Klimasicherheitspolitiken sind weithin in nationalem Regierungshandeln etabliert aber (2) werden in ihrer Umsetzung oft ihren eigenen Zielen nicht gerecht und (3) adressieren häufig nicht ausreichend die sicherheitsspezifischen Herausforderungen des Klimawandels und des ihn einbettenden globalen Umweltwandels („global environmental change“). Diese Befunde werden diskutiert und anschließend in die umweltspezifische Friedens- und Konfliktforschung eingeordnet. In einem abschließenden Abschnitt werden die Implikationen der Befunde für die Forschungsfelder der Policy-Studien, der (kritischen) Sicherheitsstudien sowie der Außenpolitikanalyse und der Internationalen Beziehungen diskutiert.

Current state of Cumulative Publications

Chapter	Status
Chapter 2	<p>Published as single-authored peer-reviewed article in <i>Political Geography</i> (Q1; IF: 4.1; H: 109).</p> <p><u>Cite as:</u> Vogler, Anselm (2023): Barking up the tree wrongly? How national security strategies climate and other environmental change as security issues. <i>Political Geography</i> 105, August 2023, 102893. https://doi.org/10.1016/j.polgeo.2023.102893.</p>
Chapter 3	<p>Published as single-authored peer-reviewed article in <i>International Studies Review</i> (Q1; IF: 3.3; H: 68).</p> <p><u>Cite as:</u> Vogler, Anselm (2023): Tracking Climate Securitization: Framings of Climate Security by Civil and Defense Ministries. <i>International Studies Review</i> 25 (2), June 2023. https://doi.org/10.1093/isr/viad010.</p>
Chapter 4	Currently under review at the <i>Journal of Contemporary Security Studies</i> .
Chapter 5	Currently under review at the <i>Journal of Global Security Studies</i> . Reviewed with “Major Revisions” and “Major Revisions” in the first round, reviewed with “Minor/Major Revisions” and “Accept” in the second round, currently in third review round.
Chapter 6	Submitted to <i>Global Environmental Change</i> , currently undergoing initial editorial check.

Preface

When I started working on my dissertation in April 2020, I felt not necessarily bound for a lifetime experience. Covid-19 had just struck many countries and I started my work firmly locked down at home, confronted with decades of literature researching the overwhelmingly complex entanglements between climate change, ecosystems, and societies. But the following three and a half years turned out to become a wonderful, productive, and exciting time. This is thanks to the invaluable support of a number of people to whom I am very grateful.

Ursula Schröder has supported me throughout the whole dissertation process. It was her who decided to hire me as researcher into the Institute for Peace Research and Security Policy Hamburg (IFSH) and thereby into the German Research Foundations' cluster of excellence on "Climate, Climatic Change, and Society". Her supervision was full of reassuring trust. She trusted me with hiring student assistants, conducting field research and conference trips, and even visiting the School of Geography at the University of Melbourne after the pandemic had finally lost its teeth. She also repeatedly recommended my work to decision makers, helping me to be invited to transfer events. Her encouragement, charismatic guidance, and challenging comments on my manuscripts and presentations enabled – and motivated – me to transform my early drafts – full of attempts to explain everything at once and linking them to as many audiences as space would just allow – into a series of more coherent contributions.

Her supervision was so well matched by the support that Tobias Ide, my second supervisor, provided throughout the years that I sometimes wondered what effective coordination must have taken place between them behind the scenes. As one of the leading (and, finally, prize winning!) scholars on environmental peace and conflict research, he conveyed to me the efficiency, pragmatism, endurance, and productivity that world-class research requires and proved to me how this can be done with remarkable kindness. Moreover, he took the time to have a constructive eye on my broader skillset in scientific writing, presenting and navigating scientific conferences. With coffee breaks in Hamburg, strolls through Braunschweig, walks at Mont Royal, drives to the Twelve Apostles and Indian Ocean sunsets, he often reminded me to take breaks, to recognize the beauty of research as a privileged but highly intense profession and to not forget the fun in solving puzzles, both research and Quokka-related.

My supervisors' trust and support brought me into contact with a number of researchers who's work is very important to me and to whom I am very grateful for their continued advice. Matt McDonald has repeatedly given me feedback on my manuscripts, invited me to a workshop in Brisbane on the "Ecological Crisis and the Politics of the Anthropocene" during my time in

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Chapter 1: Introduction

Snowy Montreal was still cold in March when the Climate Security Association Canada invited me to its inaugural session. In a nostalgic 1970s university building, a diverse crowd of world leading scholars, defense administratives and a few PhD students convened to discuss how climate change would affect security policy and how security policy could respond, in turn, to the climate crisis. The practitioners outlined how their various defense ministries intended to endure, and even tackle, climate change. They described ambitious roadmaps but readily admitted concerns over strained resources and limited mandates. The scholars added their encounters with cases of infighting between and within ministries about the right course of action, siloization and even the occasional disbelief. What all could agree upon was that climate change intersected in one or another way with security.

These discussions got my mind wandering. A few months earlier, I had observed such intersections on Guam. Governed by the United States as unincorporated overseas territory, this Micronesian island is referred to as the “tip of the spear” (Gelardi 2021) because it sits in a geostrategically crucial position, about half way between the contiguous United States and the People’s Republic of China. This nice, remote, Pacific place is heavily reshaped by military presence. Large shares of the island are locked off to public access, hosting a considerable United States military presence that makes itself constantly known in the island’s public sphere. Billboards advertise recruitment opportunities to the local population, large groups of uniformed force members eat lunch at Guam’s extensive shopping malls and military transport planes roar frequently across the sky above the islands populated high-rise hotels and crowded, wide highways under the scorching Pacific sun.

1.1 Climate security as a peculiar challenge for security policy

Considering the forces mustered on Guam in the name of the United States’ national security, it was both intriguing and terrifying to imagine how powerful nation states could affect security in the face of climate change if they pursued it as ambitiously as their national security. Back in cold Montreal, it seemed, scholars had a similar impression. Under Chatham house rules, one made the compelling case, that climate security should be focused on ecosystem resilience instead of national security assets and that, consequentially, the maintenance of climate security was better assigned to civilian actors than to military forces. Another one noted the considerable share of greenhouse gases inevitably emitted by military forces and suggested that they, as one of the central operators of national security apparatuses, might indeed be rather a source of

climate *insecurity*. A third one, finally, pointed out how the invocation of climate security has generally not yet resulted in the measures of exceptional scope required to limit global warming. This confusion over the right responses might have to do with several unusual characteristics of climate-related (in-)security. First, climate change is a dramatic source of insecurity. It has disastrous, sometimes existential impacts on human populations, ecosystems and other living beings (Sears 2021). Anthropogenic climate change alters Earth's atmospheric composition and increases the heat-insulating greenhouse gas effect beyond its Holocene equilibrium. The resulting warming triggers a series of ecosystem changes such as coastal inundation and salination, coral bleaching, the massive retreat of glaciers, and more frequent and intense extreme weather events resulting in sudden- and slow-onset disasters (IPCC 2021). These processes move Earth's ecosystems away from their status quo towards new statuses and severely impact human populations through harms to livelihoods, cultural values, indigenous and traditional knowledge and the well-being of displaced people (Adger et al. 2022), forcing earth's current human and other living inhabitants to an, usually unwelcome, adaptation that, at times, exceeds their capacities.

Second, climate change has, by definition, a truly planetary scope that is still unusual even among contemporary security challenges (Sears 2021; Rothe, Müller, and Chandler 2021; Lövbrand, Mobjörk, and Söder 2021). Unjust local differences notwithstanding (Simangan 2021), climate change manifests across the entire planet. In contrast to traditional and other non-traditional dangers such as interstate war, transnational terrorism or pandemics that primarily affect strategically relevant locations and populated civilizational centers, climate change manifests just as well on the shores of Alaska as of New York and even more in some remote places such as Tuvalu than in the densely populated city center of Berlin. Moreover, these various local manifestations are then globally transmitted through supply chains and other forms of globalized connectivity (Challinor, Adger, and Benton 2017; Bren d'Amour et al. 2016).

This planetary scope has been requiring immediate and far-reaching actions for decades now (IPCC 1990; Meadows et al. 1972). Yet, responses that maintain security in the face of climate change are, third, not straightforward because there is no intentional adversarial entity to single out and to engage. As much as every decision to join an armed fight or to pursue terrorist activities might be motivated by structural or situational greed, grievances and opportunity structures, they usually leave some intentionality and decision space to those that engage in it and who could, in principle, be dissuaded from doing so. In contrast, the impacts from climate change are not caused by lucid, intentional actors that intentionally seek to harm adversaries.

Adding to its perplexing complexity, this process results instead, like a returning boomerang, from a long causal chain initiated through harmful anthropogenic activities, thereby blurring the source of the harm and those who are harmed (Rothe, Müller, and Chandler 2021).

Another peculiar feature is, fourth, that insecurity arises, in opposition to traditional and most other nontraditional security issues, from climate change not through one primary mechanism. To illustrate the contrast, insecurity that results immediately from violent conflict arises to a large extent through immediate and directed kinetic effects that, only in turn or by anticipation, contributes to indirect insecurities such as hunger and grief. In contrast, already the direct impacts from climate change manifest through a multicausal cluster of phenomena (IPCC 2022a) and transforms ecosystems in various ways beyond the boundaries of what its local inhabitants can, and desire to, endure (Adger et al. 2022).

Fifth, and finally, climate change brings a daunting complexity. To be sure, adequately navigating security challenges such as terrorism or civil war requires already the consideration of a hugely complex interplay of interacting societal factors and emergent processes (Brosché, Nilsson, and Sundberg 2023; Toros 2008) and these insecurities also often bring along an entanglement with their surrounding biosphere (Pereira et al. 2022; Truong and Dinh 2021; Hägerdal 2021; Uexkull, d'Errico, and Jackson 2020; Ide 2015).

But considering climate change as a security issue involves the full scope of both complex systems of the biophysical and the societal realm and therefore takes the range of factors and processes to an entirely new order of magnitude (Spaiser et al. 2023; Abitbol and McCandless 2022), ranging not only over decades but across millennia to come (Nauels et al. 2019). Moreover, climate change is paralleled by the crossing of other *planetary* boundaries such as freshwater change or biodiversity loss (Rockström et al. 2023; Steffen et al. 2015). Attributing the local manifestations of environmental change to the process of climate change or, instead, other global environmental change, is often not straightforward (see e.g. Gonzalez, Chase, and O'Connor 2023; Oliver and Morecroft 2014) and research into their security implications is often studying impacts of environmental change regardless of their origins in climate change or other global environmental change (see e.g. Ide et al. 2023; Wiederkehr et al. 2022). Accordingly, this dissertation will discuss climate security policies in the context of global environmental change.

1.2 Climate security policy as an important field of security policy

Being a matter of planetary scale and far from simple fixes, political responses are not straightforward yet of vital importance. Policy matters for at least three reasons: First, climate-related insecurities are sensitive to political responses. The latter influence whether climate change impacts result in direct climate-related insecurities. Second, they influence whether and how such direct impacts affect the likelihood of violent conflict. Third, there is justified concern that some policy responses could, in fact, further aggravate insecurity.

First, direct climate change impacts vary depending not only on the exposure of local populations to impacts but also their respective vulnerability (IPCC 2022a; Kelman et al. 2016). For example, hazardous heat waves killed up to 345,000 people globally in 2019 but the share of prevented potential heat-related deaths is much higher in places where air conditioning systems are common (Romanello et al. 2021). Moreover, impacts from climate change differ not only between but also within the same places, depending on the exposed' social, class and gender status (O'Brien 2006; Daoud 2021). This implies that policy responses matter. However, policies can also lead to maladaptation and aggravate existing problems (IPCC 2022a, 26; Schipper 2022; Work et al. 2019; Nightingale 2017). This, again, implies, that policies matter differently, depending on the ways in which they affect exposed populations and particularly vulnerable subgroups within them.

Second, the academic debate about whether human's exposure to direct climate change impacts increases or decreases their likelihood to engage in violent conflict also substantiated the relevance of policy responses for climate security. This became evident from an initially heated and then increasingly productive academic debate. Echoing earlier literature on scarcity-driven resource conflicts (e.g. Homer-Dixon 1999), initial contributions quantitatively associated assumed macro-level indicators of climate change with hypothesized indirect impacts such as increasing violent conflicts (Burke, Hsiang, and Miguel 2015; Hsiang, Burke, and Miguel 2013; Hsiang, Meng, and Cane 2011). These early climate-conflict studies provoked scholarly responses questioning a deterministic connection from impacts of climate – and other environmental change – to violence and thereby undermined the notion that global environmental change would indirectly trigger violent conflict (Buhaug et al. 2014; Benjaminsen et al. 2012; Scheffran et al. 2012; Hendrix and Salehyan 2012). Many further studies followed in the subsequent years, marking a “decade of progress” (von Uexkull and Buhaug 2021, 3; Scartozzi 2021; Sharifi, Simangan, and Kaneko 2021; Mach et al. 2019).

These studies imply several major roles for policy in dealing with indirect consequences. Policy shapes societal and political contexts which are crucial intervening factors in determining whether meteorological phenomena affect the likelihood of protests (Koubi et al. 2021; Ide, Lopez, et al. 2021), intrastate violent conflict onset (Wiederkehr et al. 2022; Benjaminsen and Ba 2019; Ide et al. 2020; Selby et al. 2017; Ide 2015) and – more emerging – conflict intensity (Ide 2023a; 2023d; Linke and Ruether 2021; Kikuta 2019; Eastin 2018). Policy also matters in reducing compound risks through the reverse connection leading from warfare and violence to environmental destruction (Buhaug and von Uexkull 2021; Swain and Öjendal 2018). Finally, environmental peacebuilding scholars documented, how successful management policies for shared environmental challenges can be conducive to peace (Ide, Bruch, et al. 2021; Johnson, Rodríguez, and Quijano Hoyos 2021; Krampe, Hegazi, and VanDeveer 2021; see however Ide 2020).

Third, scholars have elaborated how some policies could, in fact, increase insecurity in the context of climate change. This is well illustrated, for instance, in the case of climate migration which is another popular trope in the public discourse on indirect climate change impacts. Similar to violent conflict, the relation between climate change and displacement is highly context-dependent and research remains contested. According to a recent meta review, only about half of the reviewed studies found heat to increase migration (Issa et al. 2023) and evidence mostly links environmental impacts to temporary, short-term, or domestic migration (Hoffmann, Šedová, and Vinke 2021; Hoffmann et al. 2020). Moreover, personal and social circumstances affect migration decisions of exposed populations (Koubi et al. 2022) and migration intentions do not equal the ability to do so, as populations can be involuntary “trapped” (Benveniste, Oppenheimer, and Fleurbaey 2022).

Accordingly, scholars have warned of policies that prioritize tightening border controls over climate action (Miller, Buxton, and Akkerman 2021). Such approaches stigmatize displaced populations (Daoudy, Sowers, and Weinthal 2022) and migration as their means to adapt (Gioli et al. 2016) to a climate change that they have not produced (Simangan 2021). They have raised similar concerns related to other forms of counterproductive policy responses that focus narrowly tools of conventional security policy or that seek to address symptoms instead of causes (Chmutina et al. 2018; Hartmann 2014).

1.3 Climate security policy as an understudied field of security policy

This dissertation studies such political responses as climate security policies. A growing body of research has studied such national level efforts but their outlined peculiarity and importance are not well-matched by current research.

It labels these political responses as climate security policies (see also Busby 2021) and defines them as national level institutions' policies whose adoption they explicitly justify as means towards climate security. This definition moves beyond conventional security policy actors to include civil stakeholders as well but, for practical reasons, draws the scope narrower than an approach that would include any policy that could potentially have an aggravating or alleviating effect on the impacts from climate change (for a similar definition of security policy see Krebs 2018, 263).

Importantly, climate security policy does not only entail policy output. Instead, it involves several aspects of policymaking with different consequentiality. Drawing on public policy literature, this dissertation's definition considers five related modes of climate security policy (Peters and Fontaine 2022; Lindquist et al. 2021). The first and, arguably, least consequential mode of climate security policy is awareness, which is already achieved when policy actors consider climate change or its impacts as security issue to be addressed (Rumbach and Kudva 2011). Secondly, the next more consequential policymaking activities would be assessments through which policy actors elaborate the specificities of climate change impacts and frame the danger or threat which they want to address by policy (Eriksson 2020; Eriksson and Reischl 2019). This makes assessments an important strategic tool for institutions to advocate for their preferred policies in interinstitutional competition (Boscarino 2016). Thirdly, climate security policymaking can involve planning, where actors design their responses to the assessed problem (Peters 2022). Fourth, they may implement measures (Berrang-Ford, Ford, and Paterson 2011) and, fifth, policymaking can involve the evaluation of activities (IPCC 2022b, 43; see also Major and O'Grady 2010).

In the noticeable absence of exceptional responses to climate change, the five-mode framework is useful as it expands the scope beyond implementation. As it is capable of identifying early-stage climate security policy elements, it allows for a more comprehensive discussion because the presence of some stages is a requirement for others to appear – for example, assessment implies awareness and the evaluation of a policy requires it to be implemented before. Importantly, this study takes into account that policy actors usually engage with several policies

simultaneously, affecting each other and moving from awareness to implementation and beyond in anything but linear fashion (Lindquist et al. 2021, 304; Green, Sterner, and Wagner 2014; see already Pressman and Wildavsky 1984; Lindblom 1959). Moreover, not every planned policy is actually implemented (Knill, Steinebach, and Zink 2023). The dissertation therefore does not expect climate security policies to emerge in a strictly linear way and uses the framework instead to study which of the five elements are present in observed policies.

Previous research has observed numerous efforts at climate security policy by a range of national and international actors (Hardt et al. 2023; Floyd 2015), establishing a rapidly expanding field of climate security policy (Busby 2021). International governmental organizations with mandates as different as the Organization for Security and Co-operation in Europe (OSCE), United Nations Security Council (UNSC), NATO and the United Nations High Commissioner for Refugees (UNHCR) are engaging from different angles with climate security (Bremberg 2023; Hardt 2020; Dellmuth et al. 2018; Conca, Thwaites, and Lee 2017; Floyd 2015). A policy community has formed at the European Union (Bremberg, Sonnsjö, and Mobjörk 2019) and several regional organizations such as the Association of Southeast Asian Nations (ASEAN) or Economic Community of West African States (ECOWAS) developed customized approaches to climate security (Krampe and Mobjörk 2018).

At the domestic level, a notable share of defense and “civil” (i.e. not related to defense) institutions engages with climate security policy. Studies have repeatedly documented and evaluated the framing, planning and – less often – actual activities undertaken by individual militaries under the label of climate security (Söder 2023; Charbonneau 2022; Jayaram 2021; Burnett and Mach 2021; Estève 2021; Brzoska 2015; 2012b). Research found these defense efforts paralleled by an emerging development among civil agencies to engage in climate security policy (Jernnäs and Linnér 2019). However, studies found that difficulties prevail in utilizing the notion of climate security to generate urgent action, to organize interaction between civil ministries and conventional security institutions (Hasui and Komatsu 2021; Neby and Zannakis 2020), and to translate concepts of climate security into practical policy (Brodén Gyberg and Mobjörk 2020; Abrahams 2019).

Nevertheless, research gaps constrain the conceptual and empirical understanding of national level climate security policies. In terms of conceptual development, some existing studies make tentative inferences on the role of policy obstacles (Yamada 2021; Brodén Gyberg and Mobjörk 2020; Abrahams 2019). However, there are almost no generalizable frameworks, taxonomies

or typologies for systematic assessments that could comprehensively capture national-level institutions' climate security policies, let alone situate them in the respective institutions' wider entanglements in contributing to climate insecurity. A partial exception is one study by Michael Brzoska who published a classification of different military forces' climate security roles in 2015. However, these military roles predate the Paris agreement and can therefore not capture recent developments. Moreover, the framework is not readily transferrable to civil climate security policy efforts and it does not entail the study of environmentally harmful activities (Brzoska 2015).

Additionally, several empirical gaps stand in the way of simply inferring generalizable frameworks from existing studies. First, these paint a partial picture as most studies focused on western, industrialized, and developed countries (Oramah, Olsen, and Gould 2022; Jayaram 2021), echoing sampling biases in general security studies (Brenner and Han 2021; Adamson 2020; Bilgin 2010) and specifically in environmental peace and conflict research (Adams et al. 2018; see however Ide 2023c). Second, climate security policies by civil actors are particularly understudied (see however Yamada 2021; Brodén Gyberg and Mobjörk 2020). Third, studies that analyze not only problem framing and planning but include actual policy implementation by defense actors are either predating the Paris agreement (Brzoska 2015; 2012a) or they are, again, focusing on individual cases (Söder 2023).

In other words, our understanding of national-level climate security policy remains limited. Climate security plays a prominent role in international forums (Hardt et al. 2023; Bremberg, Mobjörk, and Krampe 2022), think tanks (Daoust and Selby 2022; Brzoska 2009) and, partially, media outlets (Schäfer, Scheffran, and Penniket 2016). It is timely to trace its policy uptake at the national-level more systematically. Who engages in climate security policy? With which preferences? And with what results?

1.4 Structure of this dissertation

This dissertation addresses these questions and responds to the outlined gaps in our understanding of climate security policy as national-level security agenda item. Climate security policies are both peculiar and important as they address a diffuse challenge that cannot be overcome by reactively constraining an adversary, that is global but also complex and manifests differently in different regions, depending not only on exposure but also on vulnerability (IPCC 2022a; Kelman et al. 2016). To investigate how national level institutions approach climate security, this cumulative dissertation asks the following question:

How are national-level civil and defense institutions approaching climate security and with what effects?

To trace these approaches, this cumulative dissertation undertakes a sequence of investigations on rhetorical and practical approaches to climate security by civil and defense sector national-level institutions from a broad range of countries. It thereby studies how these national institutions approach a global security challenge whose “forces of destruction” challenge state-driven “modes of protection” (Sears 2021, 2). Each chapter contributes to this endeavor by developing and then applying new concepts to new empirical material in comparative designs. This moves the study of national-level climate security policy beyond single-case explorations of accessible, well-researched countries towards generalizable claims on climate security approaches by both defense and civil ministries.

1.4.1 Step 1: Surveying National Security Strategy Document Framings of Climate Change

There is a wealth of case studies on individual nations’ approaches to climate security (Loik and Jürgenson 2023; Estève 2021; McCormack 2020; Sahu 2019; von Lucke 2018; Hayes and Knox-Hayes 2014). In contrast, studies that provide a generalized account of how national-level civil and defense institutions approach climate security are few and far in between. To expand beyond Michael Brzoska’s pioneering works (Brzoska 2015; 2012a; 2012b), chapter 2 develops a general overview of whether, and with which connotations, national-level security institutions publicly subscribe to climate security. In line with the chosen broad definition of policy, this chapter studies the policy mode of framing. It conducts a content analysis to investigate framings of climate security in high-level national security strategy documents (NSSD) such as white books, white papers and national security strategies that were published by governments, national security councils, defense departments or similar executive branch institutions.

To enable the comparison of climate security framings across many diverse cases, chapter 2 introduces the *degree of coverage* which measures how often these authoritative security policy documents *focus* on the *direct* and *indirect impacts* from climate change. These categories are then applied to a novel dataset that consists of overall 310 NSSD published by institutions from 93 countries between 2000 and 2020 (in selected cases, NSSD published in 1998 and 1999 were added, see chapter 2). It thereby addresses the gap in comparative studies of national-level climate security policies and particularly in research beyond western, educated, industrialized, rich and developed countries.

This quantitative work is more than an exercise in numbers. The chapter finds that climate security is commonly established as an issue in national security strategies around the globe. Previous research had documented the swift uptake of climate change as security issue by Western powers but suggested that climate security found little purchase in other world regions (von Lucke 2018; Diez, Lucke, and Wellmann 2016). In contrast, this chapter finds climate security frames in 73 percent of all NSSD published after 2007 and shows that climate security is globally established on national security policy agenda. This insight is novel as nonwestern moves to integrate environmental change into security policy have been rarely studied before (see however Oramah, Olsen, and Gould 2022; Jayaram 2021). The analysis also shows that 77 percent of NSSD published since 2000 referred to other environmental issues, indicating that climate change is just one aspect in a wider realm of national-level security institutions' concerns related to their nonhuman biophysical environment.

As outlined above, prominent scholars paid attention to climate security policies out of concern over approaches that emphasize its possible, but less straightforward and more contingent, indirect consequences (Barnett 2019; McDonald 2018; see also Eriksson 2020). Thus this chapter differentiates the overall coverage of climate security framings by their focus on direct and indirect impacts. It finds that a large majority of NSSD referred to the direct impacts from climate and other environmental change but makes three qualifying observations that indicate how national-level climate security policies often prioritize impacts over contextualization and therefore fall short of addressing underlying, deeper problems.

First, a majority of these documents warns of more frequent and extreme weather events. This is plausible as they have often considerable impacts on societies (Ide 2023b; Adger et al. 2022; IPCC 2022a). It is nevertheless a notable choice that far fewer NSSD discuss the circumstances that lead to these events or specify their resulting impacts. Second, a considerable share of NSSD published after 2007 framed climate change as security issue with regard to indirect

impacts such as migration and a variety of conflicts. Particularly common are warnings of resource conflicts – a notion that appeared in 28 percent of analyzed documents. Third, compared to climate change, the crossing of other planetary boundaries receives much less attention as NSSD rarely discuss developments such as biodiversity loss or the introduction of new entities, for example microplastics, into ecological systems (Rockström et al. 2023; Steffen et al. 2015). With these investigations, chapter 2 demonstrates that climate change has become a popular item on national-level security policy agenda (see also Busby 2021) – and by no means only in Western nations. However, national-level climate security policy is not an exclusive business for conventional security apparatuses. Recent research identified an emerging engagement of civil institutions in climate security policies as well. A previous study briefly documented the notion of “climate change as an urgent security threat” as a common storyline in Nationally Determined Contributions (NDC) which are submitted as authoritative national climate policy pledges to the United Nations Framework Convention on Climate Change (UNFCCC; Jernnäs and Linnér 2019, 77). While an important starting point, this study does neither intend to provide a systematic assessment of civil institutions’ climate security frames nor to tell whether the observed storylines represent the view of the NDC-authoring nation or merely their coalition of civil ministries and agencies involved in authoring the NDC. Therefore, it remains unclear, what the uptake of climate security frames by national-level civil institutions entails and what it does for the urged transformation of nation’s security policies (McDonald 2021b, 202; Barnett 2019; Trombetta 2008).

1.4.2 Step 2: Contrasting Civil and Defense Framings of Climate Change

This is where this dissertation’s exploration of climate security frames continues. The previous chapter found climate security globally established in many national-level security agenda but also observed that this often brings along problematic problem framings. As comparative research on defense and civil ministries in geographically balanced samplings is widely absent, it is hard to tell, whether these problematic approaches actually reflect coherent all-governmental problem definitions. To close this gap, chapter 3 systematically analyzes and compares the climate security policy frames presented by civil and defense sector domestic institutions of the same country and identifies indeed notable differences between them.

For this investigation, the chapter draws on existing climate security research and organizational theory to develop a framework that can further evaluate climate security frames according to the four aspects of *origins*, *focus*, *temporality* and *certainty*. The study applies this second framework by content analysis to a subset of 70 NSSD published by defense ministries and to

50 NDC. While the former represent framings of climate change as a security issue by national defense sectors, the latter provide an insight into climate security framings undertaken by the coalitions of civil ministries and agencies that collaborate in producing NDC.

The comparison finds that NDC do also commonly make climate security frames. However, there are clear differences in the tonality of identified climate security frames between civil and defense institutions. Both NSSD and NDC commonly referred to direct impacts from climate change but NDC presented these impacts much more differentiated. In contrast, references to indirect impacts were made far more commonly by defense departments than by civil ministries. Additionally, NDC located the manifestation of climate-related insecurities more commonly in the past or present than defense departments who were, in turn, more likely to adopt climate-related security issues as long-term concern into their NSSD. Moreover, the anthropogenic origins of climate change were common in NDC but almost two thirds of NSSD did not refer to them at all.

These findings imply the existence of a distinct civil approach to climate security policy. Thereby, the chapter adds a systematic foundation to the long-standing suspicion that civil and defense ministries would approach climate change differently and in a way that is more conducive to the protection of vulnerable populations and to addressing the deeper, underlying problems by highlighting anthropogenic emissions (McDonald 2018; von Lucke, Wellmann, and Diez 2014; Barnett 2003).

For the wider public policy and security studies research, these findings strongly support observations that policymaking institutions translate problems not in a rational, functionalist way into solutions but that instead different institutions, even within the same government, already depart from each other in the framing of the problem that they seek to solve (Peters and Fontaine 2022; Peters 2022; Hudson 2013). Moreover, this study shows that this is the case in very different countries and even for issues that a country has publicly adapted onto its official security agenda.

1.4.3 Step 3: A closer look at defense departments' climate security policies

The analyses in chapters 2 and 3 indicated that conventional security policy actors and, in particular, defense ministries frame climate security notably different than ministries with a civilian area of dedication. To explore the practical implications of these defense approaches, chapter 4 moves beyond the study of framing and studies all five modes of policy making outlined above. To provide such an in-depth comprehensive analysis, it trades the large sample sizes of

the previous chapters for a more detailed comparative study of selected defense departments and their attached forces.

This expands on a range of recent studies which reported notable examples of individual military forces' involvement in climate security policies. They all provided important indications on individual aspects such as their climate security problem perceptions, the pitfalls of their mitigation efforts and even the role of climate security in military interventions (Söder 2023; Depledge 2023; Charbonneau 2022; Burnett and Mach 2021; Estève 2021; Jayaram 2021; Harris 2015). Thereby, these studies substantiated the existence and practical implications of military responses to climate change. Less is, however, known about how the observed activities are embedded into the respective force's overall climate security policies. Moreover, while it is not necessarily their intention, the potential for generalization from case studies is limited. It seems therefore timely to embed their work into a more comparative and comprehensive approach.

To this end, chapter 4 draws on policy studies to develop an analytical framework that examines the policy elements of *awareness, assessment, planning, implementation* and *evaluation* respectively aimed at the three conceivable *intervention sites of mitigation, first- and second-order adaptation*. Drawing on a multi-method design, the chapter then applies this framework to NATO military forces as these are more transparent about their climate-related activities than most other forces. In a mixed-methods approach, it first expands a subset of the data presented in chapters 2 and 3 to analyze forces' awareness, assessment and planning efforts and finds indications for awareness and assessments related to climate change in all studied documents but notes a lack of explicit planning. The chapter then adds five case studies with additional document analyses and expert interviews on the two major forces of Canada and France, and on the three comparatively small forces of Slovenia, Estonia and Latvia, respectively, to study their implementation and evaluation efforts.

The chapter infers three generalizable claims about the climate security policy efforts pursued by armed forces. First, they explicitly refer to tradeoffs between reducing emissions and maintaining military capabilities – and always prioritize capabilities over mitigation. They sometimes seek to evade this tradeoff with plans to increase energy efficiency but are at the same time planning to introduce high-energy weapon systems and are likely to use the efficiency gains for expanded capabilities.

A second generalizable pattern refers to armed forces' disaster response missions. Chapter 4 observes a high amount of disaster-related planning. This resonates with the observations in chapters 2 and 3 that executive heads, defense ministries and other executive institutions place a higher emphasis on disasters than on other direct impacts in their NSSD. However, the case studies undertaken in chapter 4 also demonstrate that armed forces express, often quite publicly, concerns over their ability to translate these planning efforts into actual implementation. Particularly the armed forces of Canada, France and Slovenia reported capacity and personnel constraints that limit their ability to fulfill the notably increasing amount of disaster response missions.

Third, the chapter shows that the Russian invasion of Ukraine altered the prioritization of goals within climate security policy and between climate security policy and other tasks in various ways, revealing difficult tradeoffs due to the simultaneous increase in tasks related to disaster response and to conventional defense. The Canadian armed forces, for example, remained very concerned over climate security and particularly the ravaging wildfires. However, they also increased territorial defense efforts in their Arctic borderlands as a response to the combination of a melting Arctic sea ice and the reemerging conflict with Russia. Similarly, the smaller eastern European states Latvia, Estonia and Slovenia indicated that climate security policies were less important to them than conventional defense tasks.

By studying climate security policy implementation, these findings demonstrate how conventional security institutions struggle to achieve self-proclaimed climate-related goals. In particular, military forces face tradeoffs between addressing climate security and conventional tasks. They therefore end up predominantly implementing reactive climate-related measures while the pursuit of conventional security agenda items has overriding priority. This substantiates earlier concerns over military forces' ability to make meaningful contributions to climate security (Brzoska 2009; Barnett 2003; Deudney 1990). In a more general sense, the chapter offers a conceptual and methodological framework to comprehensively study the various responses to a security issue undertaken by an institution, ranging from awareness to evaluation and from problem mitigation over preventive to reactive adaptation.

1.4.4 Step 4: Widening the Analysis towards Ecologically Relevant Military Activities

Systematizing and expanding earlier work, the previous chapter shows how militaries implement climate security policies selectively and with difficulty. Beyond these difficulties in conducting climate security policy, defense institutions' approaches are only a part of all their touchpoints with the natural environment. Understanding, how they approach climate security

entails, therefore, to contextualize defense policies within military forces' broader ecological entanglements.

Such entanglements have been studied before, even disproportionately more often than military's climate security responses. However, the literature is, again, dominated by case studies (Crawford 2022; Bigger and Neimark 2017; Frey 2013; Yelin and Miller 2009) and a few econometric studies that rather seek for significant correlations between defense expenditure and greenhouse gas emissions (Hooks, Lengefeld, and Smith 2021; Smith, Hooks, and Lengefeld 2014) than to explore the ecological entanglements of militaries as institutions. Perhaps because they hardly reference each other, this large body of studies has produced little systematic insights on the wider entanglements of military forces and the natural environment.

To organize this research on militaries' ecological entanglements and to embed military climate security policies among them, chapter 5 develops a comprehensive *typology of ecologically relevant military activities* from previous research in streams of environmental peace and conflict research (Ide et al. 2023). The introduced typology differentiates military activities along three dichotomous criteria. First, ecologically relevant activities could either be mainly *directed* at external or at internal actors, they could either be novel or conventional in their *purpose*, and – similarly – they could be novel or conventional in the employed *means*.

This typology is then used to guide the first literature review on ecologically relevant military activities. Drawing together the substantial scientific documentation, the review identifies four roles through which military forces interact with their environment. While the conduct of climate security policy is one distinct role, it is paralleled by three other roles that provide the context for military climate security policies. These are, first, complicity through the substantial environmental damages incurred from military conduct, second, military involvement in Anthropocene geopolitics that manifest in responses to climate change through the militarization of geopolitically changing regions such as the Arctic and, third, cases of obstruction where military forces even interfered with climate policy. Based on these insights, chapter 5 complements the previous chapters' characterization of military forces as institutions that struggle to address deeper, underlying aspects of climate security with a systematic observation of their involvement in a range of environmentally harmful activities.

Chapter 5 also provides inroads for further research on the role of armed forces in facing environmental change and the Anthropocene in general (Simangan 2022; Jayaram and Brisbois 2021). The chapter systematizes the substantial evidence on environmentally harmful military practices and the environmental consequences of armed forces' mandates to secure territories.

This contextualizes military initiatives to engage with climate security and links previously disconnected studies to expand the empirical evidence base for skeptical takes on the role of defense organizations in national level climate security policy (see already Barnett 2003; Deudney 1990). By integrating a disparate body of literature into a plausible assessment of military-ecology entanglements, it makes general claims that could help to overcome their striking absence in major reviews of environmental peace and conflict research literature (see e.g. von Uexkull and Buhaug 2021; Sharifi, Simangan, and Kaneko 2021; Mach et al. 2020; Koubi 2019).

In a more general sense, chapter 5 expands the typology introduced in chapter 4. While the latter proposed a way to comprehensively structure policies initiated in pursuit of a security policy issue, the former provides a scheme to contextualize these policies within the wider realm of entanglements. Together, these two frameworks enable a comprehensive study of institutional entanglements with climate change but also other anthropogenic challenges.

1.4.5 Step 5: Contrasting Climate Security Policy with the Co-Production of Human Insecurity

Step by step, the previous chapters explored how climate security policies are established at national security agenda in many countries but how this does not come along as a straightforward policy exercise. Governmental institutions do not arrive at a clear and unified problem definition and then do everything required or, at least, possible, to respond to it. Instead, the findings illustrated how national-level actors frame climate security differently and how, in particular, military forces design and pursue selective and narrow responses under the label of climate security.

This shows that climate security policies are anything but straightforward. An additional layer of complexity arises because the manifestation of climate *insecurity* is neither. Therefore, chapter 4 identified wider entanglements through which military forces' climate security policies are paralleled by contributions to climate-related insecurities. Chapter 5 continued to explore these contributions to insecurity by military forces and a wider range of national-level actors. It characterized the manifestation of climate-related insecurities as a coproduction of climate change exposure and the local manifestation of wider economic inequalities and colonial legacies.

This endeavor builds on substantial previous research. Many impacts from climate change on human populations, ecosystems and the assets of security apparatuses are well-documented (Ide 2023b; Adger et al. 2022; IPCC 2022a; McDonald 2021b). Furthermore, these studies are par-

alleled by academic work that argues how these insecurities result less as inevitable manifestations from climate change but rather from political inequalities and persisting (post-)colonial legacies (Sultana 2021a; Barnett 2020b; Rodríguez and Inturias 2018; see also Le Billon 2001). More recently, calls emerged to bring these strains together to show how, for instance, human well-being is affected by climate change only under given economic circumstances (Ide et al. 2023) and, vice versa, how economic inequalities play a role in the manifestation of climate-related insecurities beyond a narrow focus on violent conflicts (Duffy and Brockington 2022).

Chapter 6 contributes to such a synthesis in order to provide a more comprehensive understanding of climate insecurity as the real-world challenges in whose context climate security policies operate. It examines climate insecurity by focusing on its effects on human security, which are well-documented and already evident (Adger et al. 2022; Barnett 2020a). The attribution of these impacts to climate change and environmental decline is arguably less contested compared to the attribution of impacts to more abstract or partial forms of security, such as national security or economic security (Rockström et al. 2023; Wiederkehr et al. 2022; Ansari and Holz 2020; Ghadge, Wurtmann, and Seuring 2020; Chen 2020; see however Kelman et al. 2016; Ide 2023b).

The study focuses on two pacific island entities, Vanuatu and Guam. These are illustrative because they have a similarly high climate change exposure but very different political and economic circumstances and, accordingly, face very different impacts from environmental change on human security. Previous studies linked the manifestation of individual insecurities to climate change and, similarly, to economic and (post-)colonial phenomena for Vanuatu (Munro 2021; Savage et al. 2021; McDonnell 2021) but less so for Guam (see however Delgado 2022; Schwebel 2018).

To this end, the chapter draws on problem-centered expert interviews with stakeholders from the political, non-governmental organizations (NGO), and scientific sectors of both islands and triangulates these with existing research literature. Both case studies map the complex interplay of factors that result in impacts on human security on both island territories. They illustrate, how climate change results in the manifestation of different human insecurities depending on local political and economic factors, including a heavy military presence in the case of Guam due to its geostrategic location. The findings from Guam also illustrate, how climate change can be masked by other processes of environmental change. Given the importance of intervening political and economic factors, the two case studies contour how climate security policy aims at a target that is drawn to narrow.

1.4.6 Step 6: Reflecting on Climate Security Policy

A final concluding section recapitulates the insights that this cumulative mixed-method dissertation generated through content analyses, case studies with interviews and triangulation, and a literature review (see also table 1.1). The conclusion discusses implications for environmental peace and conflict research and the broader study of Public Policy, (Critical) Security Studies, Peace and Conflict Studies and International Relations along with its subfield of Foreign Policy Analysis and also raises questions for further research.

Table 1.1: Overview of analyses conducted in chapters 2-6

Chapter	Studied actors	Studied policy stages	Developed frameworks	Methodological approach
Chapter 2	All-governmental and defense departments	Awareness and assessment	Degree of coverage; focus on direct vs indirect impacts	Document analysis of 310 NSSD by 93 countries
Chapter 3	Defense departments and coalitions of civil departments	Awareness and assessment	Framings of origins, focus, certainty and agency	Document analysis of 70 NSSD and 50 NDC by 39 countries
Chapter 4	Defense departments/ armed forces	Awareness, assessment, planning, implementation, evaluation	Five stages of policy-making (awareness, assessment, planning, implementation, evaluation); three intervention sites	Multi-method study with document analysis of 52 NSSD and five case studies analyzing further documents and interviews
Chapter 5	Defense departments/ armed forces	Contextualizes military climate security policies with other ecologically relevant military activities	Framework of ecologically relevant military activities categorized by recipient and novelty of purpose and means	Systematic literature review
Chapter 6	Political, societal and scientific stakeholders from Pacific island entities	Contextualizes (re-) production of human insecurities related to environmental change	Two case study snapshots capturing the pathways to human insecurity on Vanuatu and Guam	Field research on Vanuatu and Guam with overall 23 interviews

Drawing on the previous five chapters, the conclusion provides a response to the research question. Responding to how national-level civil and defense institutions approach climate security and with what effects, the final section concludes that climate security policies are an agenda item widely adopted by various national-level governmental institutions in many different countries. This, however, is often not followed up by sufficient action to fulfill self-proclaimed goals and, more importantly, does not address deeper, underlying problems.

These findings speak to the various streams of environmental peace and conflict research (Ide et al. 2023). Regarding the research on climate change's human security impacts, the chapters

collect broad indication that national climate security policies are not well-equipped to counter the problems that this research stream identifies. Rather, national security institutions are found to be involved in the (co-)production of insecurity. Moving beyond many earlier studies, the cumulative dissertation combines the comprehensive study of local human security impacts with tracing them back to underlying structures studied by political ecology and decolonial approaches. Through two large comparative studies, the chapters of this dissertation call into question earlier studies of climate securitization by showing that climate security framings are not limited to countries in the global North. Adding to climate conflict research, the dissertation offers some of the first comparative analyses of military forces' climate security policies and thereby explores their understudied role as potentially intervening factor in climate-related conflicts. Finally, the study identifies potentials for further research into Environmental Peacebuilding.

The interdisciplinary dissertation also hold insights for the surrounding disciplines. It develops frameworks that can be applied to study how institutions navigate complex policy challenges and collects ample evidence for the politicized character not only of efforts to initiate policy processes but also the whole policy design processes. These findings resonate also with the field of (critical) security studies. They observe an involvement of civil institutions in climate security policy, suggesting the involvement of a widening circle of actors and add to the evidence that the initiation and even the conduct of security policies are not exempt from political contestation. These observations suggest that responses even to a seemingly straightforward problem definition can vary widely in their form and implications. Finally, the dissertation also contributes to the (sub-)disciplines of Foreign Policy Analysis and International Relations. It shows a surprisingly widespread expression of concerns over climate change in NSSD but also finds how these expressions reflect self-interest and contested politics within national governments related to this transnational issue.

Chapter 2:¹

Barking up the tree wrongly? How national security strategies frame climate and other environmental change as security issues

Abstract

The right framing of climate and other environmental change is crucial to guide policy responses towards preventing human suffering, displacement, and violent conflict. This study analyzes how ministries of defense and other security policy actors from 93 countries framed climate and other environmental change in national security strategy documents (NSSD) published between 2000 and 2020. An inductive content analysis reveals three shortcomings in the representations of environmental and climate change in these documents: First, representations of direct impacts are overly dominated by a focus on disasters. Second, references to indirect climate impacts do not reflect the current state of research. Third, a share of references to climate and other environmental change represents the planetary dimension of change in problematic ways. Additionally, the global scope of the analysis reveals regional differences in climate securitization: Framings of climate migration were mostly raised by potential destination countries, which often have high historical emissions, fueling concerns of climate injustice. By contrast, questionable statements on environmental and climate conflicts were published in the Global North and South alike. All in all, this suggests that the securitization of environmental and climate change are global phenomena. They do, however, not adequately reflect the planetary uncertainties of the Anthropocene.

2.1 Introduction

United Nations (UN) Secretary General Antonio Guterres described global climate efforts as a “life-or-death struggle” for humanity’s safety and survival (Guterres 2022). Scientific evidence supports grave concerns over climate change (IPCC 2021; 2022a) and the overstepping of other environmental planetary boundaries (Steffen et al. 2015). Environmental change is fundamentally reshaping the planetary conditions in which politics takes place (Dalby 2022; Simangan 2022). Accordingly, it has become a major topic on the global political stage (Aykut and Maertens 2021; Panke 2020).

Policymakers increasingly approach these changes as a security issue. Around 2007, the IPCC’s fourth assessment report, together with publications from influential think tanks, drew political attention to security-relevant impacts of climate change (Brzoska 2009; Floyd 2015). This led to the creation of a diverse field of climate security policy (Bremberg, Mobjörk, and Krampe

¹ This chapter has been published in a double-blind peer-reviewed journal as Vogler, Anselm (2023): Barking up the tree wrongly? How national security strategies frame climate and other environmental change as security issues. *Political Geography* 105. 102893. 1-11. <https://doi.org/10.1016/j.polgeo.2023.102893>. References to National Security Strategy Documents (NSSD) are referenced with the abbreviation, the issuing country and the year of publication. The documents can be found in the annex. Formatting and table and figure names slightly adjusted to match the cumulative dissertation’s layout.

2022; Busby 2021) centered on international organizations such as NATO, the United Nations Security Council, and ASEAN (Dellmuth and Gustafsson 2021; Krampe and Mobjörk 2018) as well as defense departments (MoD; Burnett and Mach 2021; Brzoska 2015) and other (from here on “civil”) national agencies (Brodén Gyberg and Mobjörk 2020; Abrahams 2019).

Climate security is politically established but academically contested. There are at least three reasons for this. First, problem framings are crucial intervening factors. Environmental degradation and climate change do not automatically translate into displacement (Ash and Obradovich 2020; Kamta, Schilling, and Scheffran 2020; Koubi et al. 2022), interstate competition (Nicol and Heininen 2014), or violent conflict (Wiederkehr et al. 2022; Ide et al. 2020). Whether they do so depends on political circumstances and responses (Busby 2022; von Uexkull and Buhaug 2021; Eastin 2018; Detges 2017). At the same time, the selection of these policy responses depends on whether environmental change is framed as endangering national, human, or ecological security issue (Ide et al. 2023; McDonald 2018; 2013; see also Eriksson 2020).

A related second concern is that policy actors select these environmental security framings according to their institutional interests, which can be at odds with ambitious climate policy (Floyd 2015; McDonald 2021a). In particular, defense administrations and military staffs are under scrutiny as proponents – and benefactors – of conceptualizations that shape environmental change as national security issue (Estève 2021; McDonald 2018; von Lucke, Wellmann, and Diez 2014). Such conceptualizations have long been criticized as counterproductive and potentially reducing climate security efforts to reactive, ad hoc responses to disaster, displacement, and conflict (Barnett 2003; Deudney 1990).

Third, there is an asymmetry between research streams that focus on climate security and those that concentrate on the impacts of other forms of environmental change. The former emerged in response to the rapid emergence of public and academic debates on climate security. It might, however, be too narrow to adequately capture the challenges of the latter. While it is true that climate change has severe impacts and has undergone substantial securitization, other processes of human-driven environmental destruction also exist, such as the entry of novel entities or green water deterioration (Steffen et al. 2015). These similarly degrade local ecosystems, resources, and livelihoods. Consequently, while investigations of security impacts in general frequently focus on all-encompassing environmental change (Ide et al. 2023; Wiederkehr et al. 2022; Barnett 2019; Koubi, Stoll, and Spilker 2016), environment-related securitization research has tended to concentrate specifically on climate change (Jayaram 2021; Estève 2021; Brzoska 2015).

Environmental peace and conflict research has made much progress over the last decade (Ide et al. 2023; Busby 2022; Ide, Bruch, et al. 2021; von Uexkull and Buhaug 2021). Still, major gaps remain. The emergence and implications of national-level climate security discourses is well documented (Diez, Lucke, and Wellmann 2016; Hayes and Knox-Hayes 2014). Existing research, however, has focused mostly on the major developed countries (see however Oramah, Olsen, and Gould 2022; Jayaram 2020). The few comparative studies that have been undertaken all predate the Paris Agreement (Brzoska 2015; 2012b). Most of these focused either on the military (Burnett and Mach 2021; Jayaram 2021; Estève 2021) or – less often – on civil ministries (Koppenborg and Hanssen 2021; Brodén Gyberg and Mobjörk 2020). While these studies have traced the development of climate-related security framings in selected cases (Busby 2021; Krampe and Mobjörk 2018), the security framings of other environmental change remains understudied.

Environmental change poses serious risks, and problem framings play a crucial role. This paper traces these problem framings across official security policy publications. It introduces a new dataset of 310 National Security Strategy Documents (NSSD) published by 93 countries between 2000 and 2020. The study includes strategies published by MoDs and broader “all-governmental” security strategies and analyzes how national bureaucracies have framed climate change and other types of environmental change as security issues in these documents.

The next sections outline how security framings of environmental change affect policies and how these national-level responses matter. The paper then introduces the new dataset and discusses how policymakers around the world have framed climate and environmental security in NSSDs.

2.2 The importance of environmental security frames

Competing political actors use framing to rhetorically transform political issues into decidable policy problems, sometimes by linking them to security (Eriksson 2020; Eriksson and Reischl 2019). By means of framing, actors highlight or “silence” aspects of an issue in order to promote preferred policy responses (Chong 2019). Therefore, framing is an important institutional tool to advocate for preferences in competition with other stakeholders (Boscarino 2016). Securitization theory focuses on framings that emphasize security aspects of an issue and can be “understood as a subfield of framing” (Watson 2012, 281; see also Mortensgaard 2018).

Studies of environmental security framings mostly focus on climate change. These framings have substantial but mixed policy impacts. They can promote policy support among voters (Feldman and Sol Hart 2018; Morton et al. 2011) and climate governance actors (Donald,

Young, and Mach 2022). Presentations of climate change as a security issue in schoolbooks generate policy support (Ide, Detges, and Leimeister 2019) and a slight majority of interviewed United States (US) public officials agreed that climate security frames can mobilize policy support (Abrahams 2019, 336). However, climate securitization can also backfire and hamper policy support (Thomas and Warner 2019; Warner and Boas 2019). It is also difficult to translate into practical policy (Oramah, Olsen, and Gould 2022; Abrahams 2020; Brodén Gyberg and Mobjörk 2020).

In light of these manifest impacts on policy, securitization scholars have raised concerns over the framing of climate and environmental change as conventional national security risks (McDonald 2013; Brzoska 2009; Hartmann 1998). Such framings can stigmatize victims (Daoudy, Sowers, and Weinthal 2022; Thomas and Warner 2019) and omit underlying structural inequalities (Barnett 2020b). Moreover, they can justify counterproductive policy responses (Abrahams 2019) and might shift policy ambition towards containing second-order effects such as migration or conflict (von Lucke, Wellmann, and Diez 2014) while neglecting the fundamentally disruptive nature of climate insecurity (Dalby 2022).

2.3 Security policy responses to environmental change by national executive institutions

Numerous domestic institutions are involved in policy responses to climate and environmental change under the label of climate security. These actors also shape the climate–security–peace nexus by promoting their preferred course of action through conscious framing of climate and environmental change as security issues. Major elements of this community are MoDs, other ministries, various agencies and security councils (Busby 2021; Brodén Gyberg and Mobjörk 2020).

Military forces play an ambiguous role in this context. They actively frame climate security (Brzoska 2015; 2012b) and pursue a climate security agenda (Burnett and Mach 2021; Jayaram and Brisbois 2021). Military forces provide climate-related services such as early warning systems or robust assets for humanitarian disaster response missions (Busby 2021), post-conflict development support to local farmers (Ali and Pincus 2018), and even afforestation campaigns (United Nations Peacekeeping 2020).

At the same time, military activities are inextricably linked to environmental damage (Simangan 2022; Barnett 2003; Deudney 1990). Military facilities and warfighting cause long-lasting damage to ecosystems (Pereira et al. 2022; Colgan 2018). For example, the US-military's use of Vieques, a small island close to Puerto Rico, led to the relocation of its inhabitants and is a showcase for the impacts of military activities on environmental justice (Yelin and Miller 2009;

see also Alvarez 2021). Beyond local damage, the deployment of military forces leads to immense greenhouse gas emissions (Crawford 2022; Parkinson and Cottrell 2022).

The growing but ambiguous military engagement with the originally civil field of climate policy is not the only process that is securitizing climate policy. Civil agencies are increasingly engaging with security-related aspects of environmental change. Foreign ministries navigate between energy security and climate policy (Downie 2019; Trombetta 2018) and development agencies such as the Swedish International Development Cooperation Agency (SIDA) have begun to address the climate–conflict nexus (Brodén Gyberg and Mobjörk 2020). Civil ministries have also started justifying their activities with reference to climate security (Jernnäs and Linnér 2019). For example, a broad coalition of Japanese civil ministries, spearheaded by the Ministry of the Environment, successfully employed security framings to promote domestic climate policies (Koppenborg and Hanssen 2021).

Research into the securitization of climate change and other kinds of environmental change has come a long way. It has, however, mostly focused on case studies (Burnett and Mach 2021; Estève 2021; Brzoska 2012b). Comparative studies have neither covered post-Paris developments (Brzoska 2015; 2012a) nor traced differences between exclusively military and integrated security strategies. Moreover, research has had a strong focus on climate change. The framing of other kinds of environmental change as a security problem is, at best, under-researched (see however Burgess, Owen, and Sinha 2016; Fischhendler and Katz 2013; Stoett 2010). These gaps limit our understanding of how climate change and other kinds of environmental change are constructed as security issues.

To expand the scope of securitization research, this study investigates a global sample of NSSDs to trace the tensions outlined above: How do the investigated documents refer to climate change and broader environmental change? And what distinguishes strictly military strategies from broader, integrated strategies? In answering these questions, the paper provides an up-to-date, general assessment of how domestic institutions frame climate and environmental change as policy problems.

2.4 Method

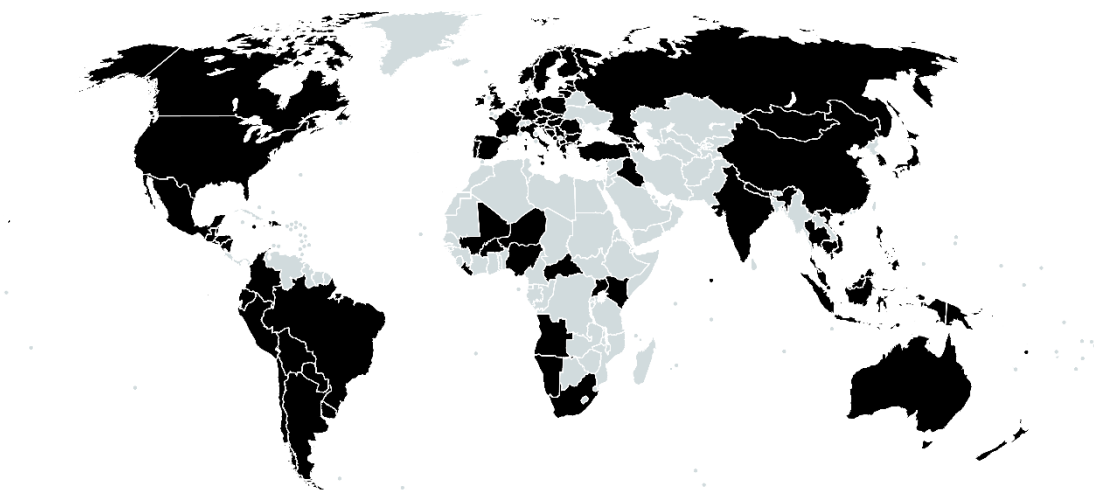
2.4.1 Sample

Bureaucracies use NSSDs to frame national, regional, and global developments as security issues and actionable policy problems. Often enough, they also state specific responses (Caudle 2009). This makes NSSDs a valuable, if under-researched resource for comparative analyses (see however Baciu 2020; Berenskoetter 2005; see annex 2.1 for further information).

Considering the global inequalities linked to climate impacts and responses (Barnett 2020b) and the differences in climate discourses between poor and wealthy countries (Vu, Liu, and Tran 2019), this study aims at the broadest geographical scope possible and includes publicly available official security policy strategies from as many countries as possible. The selected timespan covers every year from 2000 to 2020. However, if a country published appropriate documents between 1995 and 2000 but none between 2000 and 2005, the country's most recent NSSD from the late 1990s is included to maximize geographical and temporal coverage. Accordingly, the 1998 NSSDs from Mongolia, South Africa, and Brazil and the 1999 NSSDs from Argentina, Paraguay and Uruguay were included (see figure 2.1, table 2.1).

Applying these criteria, the author identified 342 official security policy strategies. Documents were obtained via extensive research across online repositories, official websites, and archives. Some of these documents were subsequently excluded. Japan publishes annual defense white books of well over 500 pages in length but with only gradual annual changes. Therefore, only every second Japanese white book was included. Other documents were excluded because they only address technical implementation issues and contain no framing or security policy discussion. These criteria reduced the sample to 310 documents covering 93 countries around the world, (counting the federation of Serbia and Montenegro, which was dissolved in 2006, as a separate country, see annex 2.1 for a list of included documents and further research on NSSDs).

Figure 2.1: Map of NSSD-authoring countries



Black: Country included in sample with at least one NSSD. Figure charted with Mapchart.net

Table 2.1: NSSD-authoring countries

Albania	China	India	Montenegro	Serbia and Montenegro
Angola	Colombia	Indonesia	Namibia	gro
Argentina	Croatia	Iraq	Nepal	Singapore
Armenia	Czech Republic	Ireland	Netherlands	Slovakia
Australia	Denmark	Italy	New Zealand	Slovenia
Austria	Dominican Republic	Jamaica	Nicaragua	South Africa
Azerbaijan	Ecuador	Japan	Niger	South Korea
Belgium	El Salvador	Kenya	Nigeria	Spain
Belize	Estonia	Latvia	North Macedonia	Sweden
Bolivia	Ethiopia	Lebanon	Norway	Thailand
Bosnia and Herzegovina	Finland	Liberia	Papua New Guinea	Timor-Leste
Brazil	France	Lithuania	Paraguay	Turkey
Brunei	Georgia	Luxembourg	Peru	Uganda
Bulgaria	Germany	Malaysia	Philippines	United Kingdom
Burkina Faso	Greece	Maldives	Poland	Uruguay
Cambodia	Guatemala	Mali	Portugal	USA
Canada	Haiti	Malta	Romania	Vanuatu
Central African Republic	Honduras	Mexico	Russia	Vietnam
Chile	Hungary	Mongolia	Serbia	

2.4.2 Content analysis

All documents were read in terms of the guiding question: “Which processes related to a) environmental change and b) to climate change are named as a risk or threat?” The analysis distinguishes between impacts from climate change and from other environmental change based on the exact phrasing used in the NSSDs. The collected statements were manually coded by inductive content analysis (annex 2.1). Keyword searches were conducted at a later stage to identify complementing information (annex 2.10). This approach enabled four comparisons related to the outlined gaps.

- (1) The study included two types of NSSDs. It included NSSDs exclusively published by MoDs or senior military staffs and integrated “all-government” security strategies, which outline a comprehensive all-agency approach to security. The latter are usually published by national security councils or the whole government (hereinafter “other executive institutions”).
- (2) The study moved beyond a narrow focus on climate security. It included all environment-related framings in the analysis. This enabled a comprehensive view of national-level security framings of climate change and other kinds of environmental change.
- (3) The included documents cover the first two decades of the millennium. The data thus reveals how climate and other environmental change emerged over time as security issues on national security agendas.
- (4) The sample includes publications from a geographically diverse range of countries. This enables – with some limitations due to availability – a comparison of issue saliences across regions.

2.4.3 Calculations

To interpret the findings that emerge from reading this heterogeneous and large dataset requires further decisions. The unit of analysis is set at the document level to account for variations in the length of NSSDs. In other words, the analysis considers whether a statement appears in a document or not.

In some countries, institutions from the same subsample published more than one NSSD in a single year. Armenia’s National Security Council, for example, published two NSSDs (a military doctrine and a national security strategy) in 2007. This heterogeneity is compensated for to avoid artificial inflation of some countries’ climate security framing activity by a higher number of NSSD publications. To that end, the unit of analysis merges (“collapses”) those documents into a singular case, dichotomizing code appearance at institution-year level. This resulted in a document-year matrix of 300 rows (annex 2.5). Regardless of whether one or several NSSDs from the same subsample and year mention a given frame, it will be counted as one appearance.

This matrix is used to calculate the degree of coverage as a parameter that guides further interpretation of NSSDs (annex 2.1). The degree of coverage calculates the share of documents per subsample from a given year that refer to a given aspect and indicates how prominent that aspect was within NSSDs published by an authoring group within a given period (annexes 2.7 and 2.8).

2.5 Results

2.5.1 Overall coverage of climate and other environmental change

References to local environmental problems were already common in NSSDs from at least the early 2000s. These references to environmental (in)securities were gradually augmented by references to climate change. Some early NSSDs – including publications from the Global South – referred to climate change as well. These climate security references became much more common after 2007; however, at a global level, this change was more gradual than is often argued. Notably, these newer climate-related references did not displace but rather complement the long-standing warnings over local environmental impacts.

Already in the early 2000s, NSSDs often referred to environmental issues not explicitly related to climate change. The coverage fluctuated slightly over the years but overall, 77 percent of NSSDs published between 2000 and 2020 referred to non-climate-related environmental issues (annex 2.7: column C). Climate security framings became considerably more common after 2007 but were not quite absent before 2007, either. Notably, these early appeals were by no means exclusively raised in developed countries (see figure 2.2; annex 2.7: column F).

Climate security frames are now firmly established in national security publications around the globe. Climate impacts were mentioned in 54 percent of NSSDs published from 2000 to 2020 (n = 162 of 300; annex 2.5, column BF) and in 73 percent of NSSDs published from 2008 to 2020 (n = 134 of 184; annex 2.8: F5; see figure 2.2). Notably, NSSD publications by defense actors made such references only slightly less often than NSSDs published by other executive institutions.

In contrast to the often-observed takeoff in the Western hemisphere and international organizations around 2007/2008, a substantial share of governmental publications linked climate and security well before it gained broad attention in 2007. Overall, 14 percent of NSSDs published before 2008 by MoDs or military forces and 43 percent of integrated strategies already covered climate change (annex 2.8: F10, F16). This suggests that the climate-security nexus emerged more gradually than sometimes suggested.

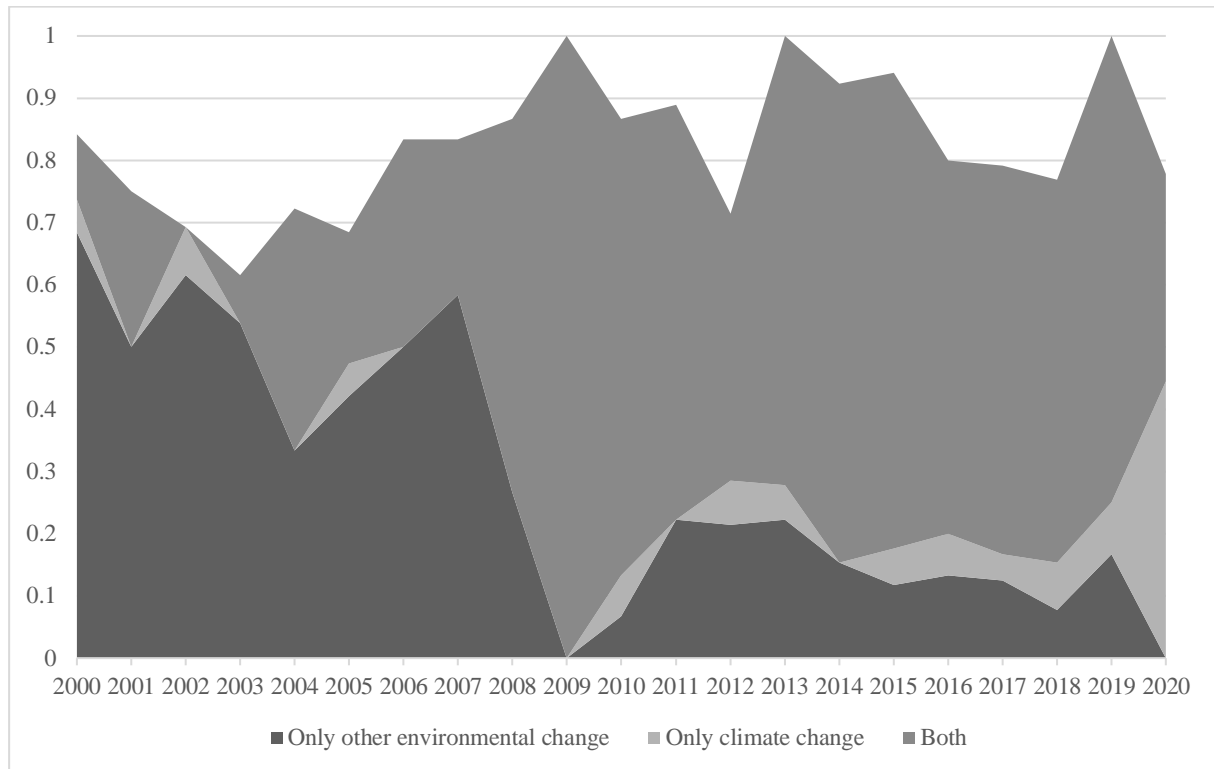
Moreover, this climate security agenda by no means originated exclusively in the West. In fact, before 2004, the shares of security strategies published by countries from South America, Southeast and East Asia that referred to climate change even exceeded those from the Western countries. As early as 1998, Mongolia warned that “climatic changes” negatively affect “human environment and economy” (NSSD Mongolia, 1998, p. 27, see method chapter on inclusion of

pre-2000 NSSD). Other early publications that referred at least briefly to climate change were produced by Paraguay (1999), Argentina (1999), Cambodia (2000), and Colombia (2003).

This also applies to the “threat multiplier” notion that climate change might compound or multiply other challenges. The ideas of compound or amplifying effects were already discussed among Western countries prior to 2008 (NSSD Norway, 2004, p. 28; NSSD Germany, 2006, p. 19) but also by Burkina Faso, which dedicated a whole page of its NSSD to climate impacts in 2004 (NSSD Burkina Faso, 2004, p. 61). This was before the European Union (EU; Floyd 2015) and several think tanks elevated the issue (McDonald 2018; Brzoska 2009).

These early references notwithstanding, references to climate security increased globally from 2008. In every region except Sub-Saharan Africa, references to climate change in security strategies became more common between 2008 and 2015 compared to the previous four years (annex 2.11: Z82-AJ83). References in Australasian strategies increased particularly abruptly. They never referred to climate change before 2008 but did so extensively afterwards. This partially reflects the Australian government’s troubled efforts to employ climate security as a vehicle for greater ambition in climate policy (McDonald 2015; 2012).

Figure 2.2: Coverage of climate/ environmental change in NSSD



2.5.2 Direct impacts from climate change and other kinds of environmental change

A high proportion of references to climate change and other kinds of environmental change focus on impacts that stem directly from biophysical processes. Of NSSDs published since 2008, 77 percent mention such direct impacts from environmental change and 73 percent those from climate change (annex 2.8: D5, F5). Extreme weather and disasters were mentioned particularly often. Overall, 60 percent of NSSDs warned of these events, and, after 2007, their increase through climate change was expected by 34 percent of the strategies (annex 2.8: M6, AU5). Another group of climate-related concerns with an established place in security strategies are those that refer to direct impacts on ecosystems or resources, such as climate-change-related damage to water, food supplies, and ecosystems or sea level rise. Besides natural disasters, other environmental change was most commonly linked to ecosystem degradation and resource depletion (see table 2.2).

By contrast, references to climate-related challenges for military bases and operability or to maladaptation were surprisingly rare. They both appeared in only 1 percent of NSSDs (annex 2.7: AJ6). The lack of concerns related to bases and operability is unexpected, given that such references are an established component in the recently emerging climate security strategies published by MoDs or individual military branches (Ministère des Armées France 2022; United Kingdom Ministry of Defence 2021; Department of the Army 2022). More problematic is the

absence of warnings related to maladaptation, suggesting that national security agendas have not yet begun to take these risks seriously enough (Swatuk et al. 2021; Froese and Schilling 2019). Notably, keyword searches did not reveal any references to geoengineering, indicating either an absence of salience or publicity for this pitfall-ridden form of response (McDonald 2022).

Focusing on direct impacts guides political attention to immediate manifestations and enables a focus on human security (Daoudy, Sowers, and Weinthal 2022). Still, depicting disasters as “natural” neglects the political nature of adaptation failures (Brzoska 2018; Kelman et al. 2016) and existing disaster risk reduction frameworks have shortcomings (Nohrstedt et al. 2022). It also draws practitioners to narrow, seemingly manageable hazards while neglecting climate change (Chmutina et al. 2018). The devastating floods in Germany in 2021 and the subsequent water shortages in 2022 showed that even rich and developed countries can suffer from both floods and droughts (IPCC 2022a, 11). Risk reduction strategies were found to not sufficiently appreciate this link (Ward et al. 2020). NSSDs mirror this shortcoming: Only 19 percent mention both floods and droughts (annex 2.10: B10).

Table 2.2: Most commonly discussed first-order impacts from climate/environmental change in NSSD

Climate change	Other environmental change
CC increases extreme weather and natural disasters 23	Natural and manmade disasters (domestic or 60 abroad) as threat
CC harms water systems 14	Environmental degradation as a threat 34
CC causes rising sea-levels 13	Resource depletion as a threat 27
CC threatens agriculture or food security 13	Illegal resource exploitation as a threat 16
CC harms ecosystems 10	Unsustainable resource exploitation as a threat 9
CC threatens human or community security 8	Energy scarcity or politics as a threat 7
CC harms economy 8	Population growth causes environmental problems 1
CC impacts underdeveloped places more heavily 7	
CC increases epidemics or pandemics 5	

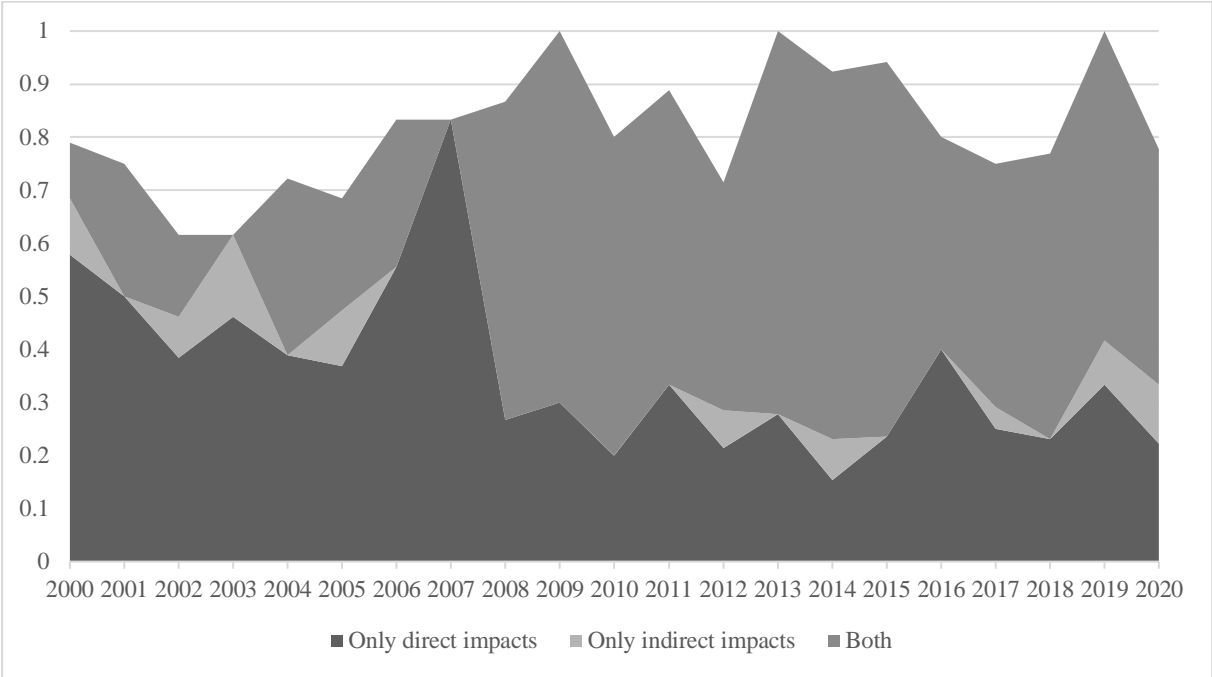
¹ **First-order impacts:** stemming directly from climate/environmental change

2.5.3 Indirect impacts from climate change and other forms of environmental change

NSSDs published before 2008 did already refer to the security implications of climate change and other kinds of environmental change. However, references to indirect impacts, i.e., those that manifest through societal reactions to biophysical change, have since undergone a qualitative shift (see figure 2.3, table 2.3). The share of documents raising such concerns, particularly in relation to climate change, increased abruptly after 2007 (annex 2.7: columns E and H). Overall, 45 percent of NSSD published from 2008 to 2020 referred to indirect consequences of climate change (annex 2.8: H5). In other words, security strategies published after 2007 express

concerns about reactions of societal actors towards climate change almost as often as they mention insecurities stemming directly from climate change. This is, arguably, more problematic than raising concerns over direct climate impacts, because drawing attention to scientifically contested second-order effects conceals the direct climate impacts that are their underlying causes (Daoudy, Sowers, and Weinthal 2022; McDonald 2018).

Figure 2.3: Coverage of direct and indirect consequences from climate/environmental change



Notably, the coverage of the two most contentious indirect impacts from climate and other environmental change, migration and violent conflicts, varied across regions (figure 2.4 and annex 2.11). Western Europe, Northern America, and Australasia were particularly vocal concerning the specter of climate-related migration, while concerns over conflicts related to climate or environmental change were shared across regions. Warnings of climate migration are thus raised particularly by countries from regions that are responsible for high shares of cumulative historical emissions and are potential destination areas. These include Australasia (where 45 percent of NSSDs published after 2008 mention climate migration, annex 2.11: Z-AI113), Western Europe (40 percent), and Northern America (38 percent). Some of their NSSDs refer to “potentially destabilizing mass migration flows” (Australia NSSD 2009, p. 30), warning of up to “110 million climate refugees” (Belgium NSSD 2019, p. 27), “waves of migration” (Czechia NSSD, 2015–2, p. 7) and “mass migrations” that pose “social, developmental, economic, political, cultural, health, integration and security challenge[s]” (Croatia NSSD, 2017, p. 7).

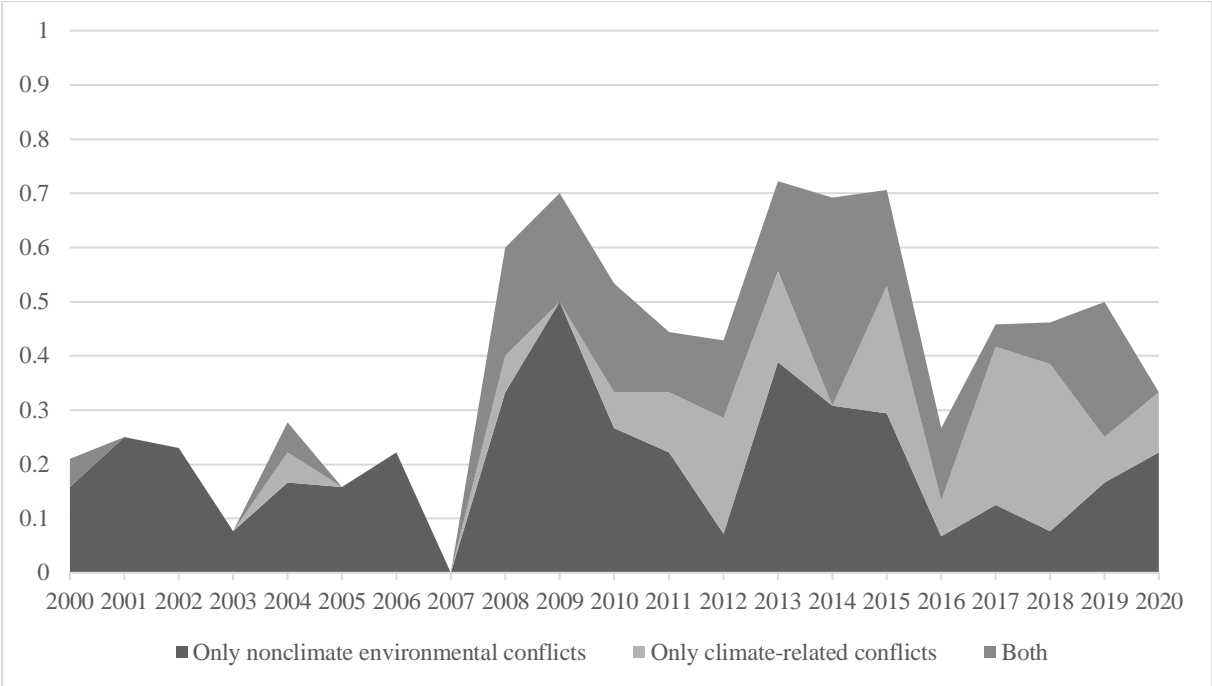
Table 2.3: Most common second-order impacts¹ from climate/environmental change

Climate change		Other environmental change	
CC will cause migration	14	Resource conflicts as a threat	28
CC is a threat multiplier or accelerator	11	Environmentally induced human conflicts as a threat	4
CC will contribute to resource competition	10	Foreign emissions as a threat	1
CC changes the strategic landscape in the Arctic/Antarctic	10	Manmade attacks weaponizing the environment	1
CC may lead to conflicts within states	9	Higher environmental threats due to lack of mitigation capacities	1
CC may lead to conflicts (in general)	6		
CC increases tensions between states	3		
CC may lead to conflicts between states	2		

¹ **Second-order impacts:** caused by societal reactions to climate change

By contrast, most vulnerable regions with historical emigration records, such as Central America/Caribbean (where 11 percent of NSSDs published after 2008 mention climate migration, annex 2.11: Z-AII13) or Southeast Asia (17 percent), refer less often to climate migration – and not a single Sub-Saharan African mentions it. The few potential countries of origin that remark on climate-related migration make sure to mention the contexts of “loss of life, physical destruction and disease” (Vanuatu NSSD, 2018, p. 68, see also Timor-Leste NSSD, 2016, p. 10) or the decline in the ability to make a living from agricultural produce (Mexico NSSD, 2014, 87) that precede such movements.

Figure 2.4: Coverage of climate and other environmental conflicts



These stigmatizing migration-related statements by several potential destination countries do not account for the fact that whether environmental change leads to migration is highly context dependent (Abel et al. 2019). People are by no means always able (Koubi et al. 2022) – or willing (Pemberton et al. 2021) – to respond to environmental impacts by migrating. Immobility or entrapment, however, do not appear as frames in NSSDs. This suggests that the loss of local livelihoods only becomes problematic for industrialized, potential destination countries when its victims intend to migrate. Moreover, such migration by no means automatically causes conflict. Instead, political factors are crucial (Wiederkehr et al. 2022; Schutte et al. 2021). Therefore, such statements are unjustified. They add to concerns about stigmatizing and antagonizing framings of migration (Daoudy, Sowers, and Weinthal 2022) as they help to establish “climate migration as a looming security crisis without an empirical scientific basis” (Boas et al. 2019, 902).

Concerns over conflicts driven by climate change and other kinds of environmental change have become more common over time and are by no means limited to the developed world. Overall, 52 percent of NSSDs published since 2008 referred to them (annex 2.11: AJ121). They were less common during the early 2000s and focused mostly on environmental change. References to climate-related conflicts were few and far between until 2008. From then on, however, references to environmental change increased and were joined by a rapidly increasing share of mentions of climate conflicts. Overall, such references were not restricted to certain geographical regions. They were common in publications by Australasian (52 percent of all NSSDs from the region) and Western European countries (52 percent), but also Sub-Saharan Africa (53 percent) and South America (48 percent; annex 2.11: Y116-AJ122).

Conflicts explicitly linked to climate change are mentioned in 30 percent of all NSSDs published from 2008 onwards (annex 2.8: J5), most of which are linked to resource competition or conflicts within states. By contrast, conflicts or tensions between states are rarely mentioned (see table 2.3). Such resource and climate conflicts are not inevitable (Ide, Lopez, et al. 2021; Ide et al. 2020) and still subject to ongoing research (von Uexkull and Buhaug 2021). Therefore, such warnings potentially scapegoat climate change for policy failure (Dalby 2018b) and distract from actual drivers of vulnerability (Barnett 2020b, 1174). Tellingly, potentials for building and maintaining peace through environmental peacebuilding (Ide, Bruch, et al. 2021) are considered in only 4 percent of NSSDs that refer to climate change (annex 2.5: column AZ).

Unlike warnings of climate-related migration, references to climate and other environmental conflicts also emerged in the Global South (see table 2.4). Until 2003, Sub-Saharan Africa,

Southeast Asia, and East Asia even had the highest shares of NSSDs mentioning environmental or climate conflicts, albeit with small sample sizes. Between 2004 and 2007, references to climate or environmental conflicts were most frequent in NSSDs from South America, and, once again, Sub-Saharan Africa. Strategies published by Australasian, Central and Eastern European or Northern American countries did not refer to such conflicts at all during that time (Oramah, Olsen, and Gould 2022; annex A11: Y116-AJ122). During this period, references to climate migration remained rare throughout all regions (annex 2.11: Y108-AJ114).

This suggests that concerns over climate or environmental conflicts persisted during the mid-2000s in the Global South while the Global North, and particularly the United States focused less on such framings. However, after 2007, references to climate conflicts became far more common in general (see table 2.4). As previously observed, Western European, Northern American and Australasian NSSD then became very vocal over conflicts and, to a smaller extent, climate migration (Dalby 2018b; Brzoska 2012b). Notably, however, South American NSSDs often mentioned conflicts as well.

After 2015, combined shares of NSSDs from Western Europe and Northern America referring to climate or environmental conflicts declined again. Most notably, the United States' National Security Strategy from 2016 reflects the Trump presidency's resistance to ambitious climate-policy goals, referring instead to an "anti-growth energy agenda that is detrimental to U.S. economic and energy security interests" (NSSD USA, 2016, p. 22). This formulation is a textbook example of competing security frames (Fischhendler, Boymel, and Boykoff 2016; McDonald 2015). It avoids any explicit reference to climate change impacts while nonetheless containing a number of climate-relevant assignments that reflect the then-persistent efforts of the US administration to continue climate policies "under the president's radar".

Figure 2.5: Regional shares of NSSDs referring to climate-related migration and/or conflict^{1,2}

2000–2003

		Share referring to climate migration		
		0-24%	25-74%	75-100%
Share referring to env./climate conflict	0-24%	AUS (6), CAC (1), CEU (12), NAM (1), SAM (7), WEU (11), WSA (1)		
	25-74%	EAS (4), SEA (4), SSA (2)		
	75-100%			

2004–2007

		Share referring to climate migration		
		0-24%	25-74%	75-100%
Share referring to env./climate conflict	0-24%	AUS (4), CAC (7), CEU (17), EAS (4), NAM (4), WSA (6)		
	25-74%	SAM (6), SEA (4), SSA (2), WEU (13)		
	75-100%			

2008-2015

		Share referring to climate migration		
		0-24%	25-74%	75-100%
Share referring to env./climate conflict	0-24%			
	25-74%	CAC (7), CEU (28), EAS (14), SEA (5), SSA (5), WSA (6)		
	75-100%		AUS (7), NAM (5), SAM (8), WEU (26)	

2016-2020

		Share referring to climate migration		
		0-24%	25-74%	75-100%
Share referring to env./climate conflict	0-24%	CAC (2), CEU (18)	WSA (5)	
	25-74%	EAS (6), SAM (6), SSA (6)	NAM (3), WEU (16)	
	75-100%	SEA (7)	AUS (4)	

^a **AUS:** Australasia; **CAC:** Central America and Caribbean; **CEU:** Central and Eastern Europe; **EAS:** Eastern Asia; **NAM:** Northern America; **SAM:** South America; **SEA:** Southeast Asia; **SSA:** Sub-Saharan Africa; **WEU:** Western Europe; **WSA:** Western and Southern Asia (see also A13).

^b Numbers in brackets indicate number of NSSD published in given region during respective time span.

2.5.4 Planetary dimension of climate change and other kinds of environmental change in NSSD

Climate change and other kinds of environmental change may manifest locally, for example through ecosystem degradation, extreme weather, or rising sea-levels. However, both processes have an inextricable planetary dimension. NSSDs often address this dimension insufficiently.

Other environmental change is almost exclusively characterized as a local process. References to planetary-scale environmental degradation are notably absent. It seems that no NSSD referred to the concept of “planetary boundaries” (Steffen et al. 2015). A number of documents warned of localized impacts such as freshwater issues, land use, or biodiversity. However, more abstract boundaries received (almost) no explicit mention. Only twelve documents referred to ozone layer depletion, four to the introduction of novel entities into ecosystems, three referred to oceanic acidification and only two mentioned aerosol loading or biogeochemical flows (annex 2.10).

By contrast, explicit references to climate change inevitably invoke the planetary dimension implied by the term “climate”. However, a proportion of the strategies invoked this planetary process only in a tokenistic way. 25 percent of the collapsed documents (n = 40 of 161) that warn of climate impacts contain only nonspecific statements depicting climate change as a danger (table 3.3 and annex 2.5: column BG). They do not describe specific impacts but claim their existence, acuteness, complexity, security relevance, or “unforeseeableness”. The Slovenian defense ministry’s 2020 White Paper provides an example:

“Security risks stem mainly from unstable geographical areas characterized by internal conflicts, failure of authority, corruption, poverty, scarce resources, land degradation, and population growth, which creates conditions for the spread of radicalism, terrorism, crime, and illegal mass migration. The impact of climate change is another factor influencing the development of the security situation, while the speed and scale of population movements cause increased epidemiological risks” (NSSD Slovenia (2020), p. 8).

Climate change is thus merely added in passing as another threat to place on the ministerial agenda (see also Gilman 2022; Estève 2021) without advocating the systemic changes that are actually required for climate security (Dalby 2022; McDonald 2021b). Such framing “without identifying a referent object leads to misunderstandings over the nature of climate insecurity and how it operates on political, social, and ecological levels” (Daoudy, Sowers, and Weinthal 2022, 3) and fuels counterproductive responses (McDonald 2018).

2.6 Conclusion

The emergence of policies addressing security-relevant impacts of environmental change and the securitization of regular policy responses have both generated scholarly interest. Yet, comparative analyses on how domestic security communities approach environmental change as a security problem are scarce. This study reviewed the last two decades of framings and responses to climate change and other environmental change by defense ministries and other executive institutions around the world. It investigated 310 white books, national security strategies and other, similar NSSDs published by 93 countries between 2000 and 2020.

This analysis expands research on climate security responses in a twofold way: (1) It complements the investigation of framings of climate change as a security issue with an analysis of security framings related to other environmental change. (2) The study also provides a comprehensive assessment of climate and environmental security framings in NSSDs that moves beyond the West and covers a broad time span.

Both environmental and climate change are mentioned in more than 70 percent of national security strategies and similar documents published after 2007. References to environmental change were already common in the early 2000s (annex 2.8). By contrast, references to climate change became similarly established only after 2007. It is important to note that references to climate security were neither entirely absent nor limited to countries from the Global North before 2008 (annex 2.8).

These representations of environmental and climate change come with three shortcomings. First, NSSDs often mention direct impacts from environmental and climate change but focus particularly on disasters. This heavy focus on disasters that are often ex-post manifestations of previous policy failures (Field and Kelman 2018) might distract from root causes and more preventive responses.

Second, a substantial share of NSSDs focus on indirect consequences that only manifest through societal reactions to direct impacts. Such a focus often reflects questionable underlying assumptions and does not help with solving the actual problems (Daoudy, Sowers, and Weinthal 2022; Barnett 2019). Notably, concerns over climate-related displacement are mostly raised by potential destination countries who are often deeply complicit in climate-related displacement as a result of their historical cumulative emissions. By contrast, concerns over climate and other environment-related conflicts were widely shared across regions. This included frequent references from several regions of the Global South. Overall, 52 percent of NSSDs published after 2007 raised such concerns (annex 2.11: AJ121). Such references to indirect impacts are no less

problematic: Where a security policy warns of climate-related conflicts, it implicitly admits the failure of earlier, preventive responses that can well prevent scarcities from translating into conflict (Wiederkehr et al. 2022; Ide et al. 2020).

A third shortcoming lies in the insufficient reference to the planetary dimensions of environmental and climate change. Environmental change is characterized mostly as a local-level issue. This goes along with sidelining several other concerning planetary boundary processes. Few NSSDs even glance at the broader picture of global environmental change. References to ozone depletion, aerosol loading, or oceanic acidification are rare, while other planetary dangers are entirely absent.¹ By contrast, the planetary dimension is inevitably involved whenever climate change is mentioned. However, about 25 percent of NSSDs refer to climate change only in a tokenistic way, simply adding it as a looming planetary specter to a list of conventional security threats without further elaboration. This puts climate change on a long laundry list of security concerns and might only serve to justify “bigger budgets for the same old things” (Gilman 2022).

These findings have political implications as they show the limitations of securitization. Formulating the right policy responses to environmental change is vital (Busby 2021; McDonald 2021b). Security strategies need to frame the problem carefully if they want to advocate substantial and effective responses that address biophysical first-order impacts. Western militaries and other security actors started to draw attention to environmental risks while searching for new legitimacy after the Cold War (Floyd 2015; 2008). The outlined shortcomings of NSSDs, however, support the notion that this was not entirely motivated by environmentalist ambitions. The observed form of climate securitization risks shifting political attention towards second-order consequences and therefore the wrong aspects of the climate–security nexus. This is even more troubling as the ongoing Russian invasion of Ukraine has returned large-scale interstate conflict to Europe and with it a plethora of competing security concerns.

The investigated dataset expands our knowledge about security responses to environmental change. But this research is by no means conclusive. Further research should follow-up on the observed absence of mentions of other planetary boundaries in NSSDs. Is climate change really unique in terms of its securitization? And is that a curse or blessing for policy responses to these other planetary processes? Moreover, the observed framings should be compared to possible implementation gaps: What are the NSSD publishing institutions doing after framing the problems? The analysis could also be expanded to more specific planning documents. A number of major Western militaries recently published climate-specific strategy documents (e.g. Ministère

des Armées France 2022; Department of the Army 2022; United Kingdom Ministry of Defence 2021). While these typically do not speak to the general course of national security, they would be well worth their own systematic analysis.

Climate and other environmental change seriously imperil planetary boundaries, ecological systems, and human safety. Whether they should be approached as a security issue is a contested and politicized decision. Securitizing this is only conducive if it highlights the underlying core problems and incentivizes effective policy assignment (Warner and Boas 2019). Framing vulnerable or displaced groups as security risks not only stigmatizes them, it is also ineffective climate policy. Many NSSDs do not yet meet these requirements in terms of climate change, let alone risks to other planetary boundaries.

Note

¹One paper that does however represent a different genre of climate-specific defense strategies is the United Kingdom Ministry of Defence's recently published Climate Change and Sustainability Strategic Approach (United Kingdom Ministry of Defence, 2021), which does discuss biodiversity. Thanks to Cameron Harrington for this information.

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Author contributions

Anselm Vogler is the sole author of this paper.

Declaration of competing interest

None.

Supplementary material

Annex 2.1 (methodical remarks on NSSD research) and annexes 2.2-2.13 (calculations on the coverage of frames with different focuses in NSSD).

Chapter 3:²

Tracking Climate Securitization: Framings of Climate Security by Civil and Defense Ministries

Abstract

Defense ministries regularly frame climate security in their national security strategies. Recently, “civil” ministries also begun mentioning climate security. However, they do not mean the same thing. This article develops four indicators to assess the commitment of climate security framings to an understanding of climate security as either human/environmental or national security issue. It applies the indicators to fifty submissions of Nationally Determined Contributions (NDC) by civil ministries and seventy defense publications. The paper finds that NDC commonly refer to climate changes’ anthropogenic origins and biophysical impacts but rarely to indirect consequences such as migration or conflict. In contrast, military administrations rarely mention anthropogenic origins but warn more often than NDC of indirect consequences. This shows that a civil domestic discourse on climate security has emerged, more attuned to human security and environmental security and more conducive to climate change mitigation and adaptation. The paper argues that organizational theory can explain these differences in securitization: defense and civil ministries frame climate security differently so that it falls in line with their respective mandates and established organizational features. The article concludes with a checklist for assessing framings of climate security.

3.1 Introduction

The impacts of climate on security are contested. There is broad agreement that climate change endangers individuals, groups, and societies by means of a broad range of increasingly extreme weather phenomena as well as sudden and slow-onset disasters (IPCC 2021). However, the manifestation of these direct impacts depends on many intervening factors (Kelman et al. 2016; Barnett 2020a). Even more, contingent is the manifestation of indirect consequences such as displacement, the entrapment of populations, and military conflict (Buhaug and von Uexkull 2021; Scartozzi 2021).

Whether climate change affects security depends critically on policy and framing choices. Good policy choices strengthen resilience (Barnett 2019; Schilling et al. 2017), support potentially displaced people (Pemberton et al. 2021; Koubi et al. 2022), and reduce societal tensions, which are often the underlying reason for violent escalation (Ide, Kristensen, and Bartusevičius 2021; Ide et al. 2020; Ide 2015). In turn, these policy choices are influenced by how climate change

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is framed as a security issue (von Lucke, Wellmann, and Diez 2014; Trombetta 2008). Framings of climate security contain “often radically different ideas” and lead to significant differences in the “practices endorsed or dismissed and the actors or institutions legitimized or marginalized” (McDonald 2018, 173; Brodén Gyberg and Mobjörk 2021).

Studies have often contrasted two prominent approaches to climate security that have very different policy implications. One frames climate change as a national security issue and highlights its second-order consequences such as displacement or scarcity conflicts (von Lucke, Wellmann, and Diez 2014) while neglecting mitigation (McDonald 2018) and stigmatizing vulnerable populations (Daoudy, Sowers, and Weinthal 2022; Dalby 2018b). The second group of framings links climate change to human or ecological security (McDonald 2018) by highlighting the grave dangers emerging for displaced people, entrapped populations (Koubi et al. 2022; Pemberton et al. 2021), and underprivileged population groups (Ide, Ensor, et al. 2021).

Researchers have traced how international political actors commit to varying degrees to these different approaches (Krampe and Mobjörk 2018; Dellmuth et al. 2018; Floyd 2015). Research on the domestic politics of different states has mostly focused on military matters and defense ministries (MoD; Burnett and Mach 2021; Brzoska 2015). Research on the activities of ministries other than departments of defense (from now on referred to as “civil ministries”) in relation to climate security is limited (see however Brodén Gyberg and Mobjörk 2021; Abrahams 2019). Nonetheless, a recent study surprisingly found that coalitions of civil ministries often frame climate change as an “urgent security issue” (Jernnäs and Linnér 2019, 77).

This approach to climate security by civil ministries is understudied. Existing studies either do not capture more recent political developments or focus on individual cases. The few comparative studies that do exist focus either on defense (Brzoska 2015; 2012b) or on civil ministries (Jernnäs and Linnér 2019; Aamodt and Stensdal 2017). No study has so far systematically compared whether civil and defense ministries frame climate security differently

Hence, this study compares the framings of climate security used by civil and defense ministries. It suggests a system of four indicators that can be applied to evaluate whether institutional framings commit to framing climate security in terms of human security or national security. Climate security frames (1) may focus either on direct impacts on ecosystems or humans or on national security-related indirect impacts that usually require the involvement of human perpetrators to manifest. They also differ in (2) whether they refer to the anthropogenic origins of climate change. In most cases, such references are more important for the protection of ecosystems or human populations than for national security. Statements about climate impacts also

express different degrees of (3) certainty and (4) temporality. The scientific evidence base gradually declines from contemporary direct impacts on human or ecological security to possible future indirect impacts on national security. When framings deviate from this epistemological schema, it is likely to reflect institutional campaigning for a preferred human/ecological or national climate security agenda.

The study demonstrates this framework by applying it to civil and defense documents from thirty-nine countries. It finds that civil and defense ministries frame climate security substantially different. This can be explained by organizational theory: bureaucracies frame new policy problems in line with existing activities and established organizational features. Civil ministries emphasize anthropogenic emissions and the biophysical impacts of climate change, whereas MoDs have a stronger focus on second-order consequences such as conflicts. Civil ministries are also more likely to describe the manifestation of climate-related insecurities as a past or present issue than are MoDs.

This indicates that defense ministries' framings reflect shortcomings often associated with national security framings, while civil ministries put a stronger emphasis on human or even ecological security components. These differences show the diversity of approaches to climate security within governmental apparatuses. They also indicate a possible siloization of responses in the name of climate security. Since civil and defense ministries describe climate security very differently, they promote very different policy responses.

The article proceeds as follows. The first section outlines how policy responses are crucial for climate security outcomes and how they are affected by framing. A subsequent section introduces the four indicators of climate security frames. A brief section on method is followed by analysis and discussion of the findings.

3.2 Theoretical Framework

3.2.1 How Policy Affects Climate Security

Climate change directly threatens human and ecological security (Buhaug and von Uexkull 2021; IPCC 2021; McDonald 2018) through severe heatwaves, the increased severity and frequency of extreme weather events, and the potential scarcity of water and other resources. It endangers food supplies (Challinor et al. 2018; Bren d'Amour et al. 2016), power plants (Wang et al. 2019), and supply chains (Becker et al. 2018). There is however no direct "robust and general" link between these impacts and conflict (Koubi 2019, 343; Ide et al. 2020) or migration

(Koubi et al. 2022; Hoffmann et al. 2020). Such connections are difficult to research (Sakaguchi, Varughese, and Auld 2017; see also Adams et al. 2018; Ide 2017) and depend on a variety of conditions, including large-scale dependence on agriculture and societal phenomena such as ethnic exclusion (Ge et al. 2022; von Uexkull and Buhaug 2021; van Baalen and Mobjörk 2018).

Policy responses to direct climate impacts are thus crucial. Good policy responses prevent climate impacts that lead to conflict, while bad policy responses increase such risks. Climate change-related environmental stress does not necessarily cause human suffering (Matthew 2018) or local violence (Benjaminsen and Ba 2019; Selby et al. 2017), nor do human security challenges automatically translate into emigration (Koubi et al. 2022; Brzoska and Fröhlich 2016) or conflict (Ide, Kristensen, and Bartusevičius 2021; Ide et al. 2020; Brzoska 2018). Reliable and inclusive institutions, resilience-enhancing adaptation (Barnett 2019), or state capability and motivation to avoid or contain disasters (Busby 2021) are vital for preventing the worst outcomes. As in the case of environmental peacebuilding efforts (Ide, Bruch, et al. 2021; Schilling et al. 2017), they can reduce spillover risks and halt vicious cycles (Buhaug and von Uexkull 2021).

Civil ministries and agencies increasingly address such security-relevant climate impacts in their programs (Brodén Gyberg and Mobjörk 2021). However, each agency tends to pursue its own agenda and wages “turf battles” (Scobie 2016, 25) with other departments over mandates and resources in areas such as disaster response (Wamsler and Johannessen 2020, 8; Neby and Zannakis 2020, 602), food and energy security (Aamodt 2018, 383, 385), or climate-related issues in general (Lewis and Su 2021).

Defense ministries also advocate for policy responses that align with their institutional setup. They actively seek a role in the management of climate-related risks (Estève 2021) and seem to compete with other ministries for funding and mandates (Jayaram 2020; Brzoska 2012b), for example, in the area of disaster response (Jayaram and Brisbois 2021; Wamsler and Johannessen 2020). Given that some country’s military forces have been involved in actively hampering climaterelated efforts (Dwyer, Ingalls, and Baird 2016), have a questionable track record in environmental protection (Ferrante, Ferrante, and Fearnside 2020), and remain heavy emitters (Crawford 2022; Smith and Lengefeld 2020), this military involvement in climate security warrants scrutiny.

3.2.2 How Institutional Features Affect Framings of Climate Security

Organizational theory explains interministerial struggles over resources and mandates in terms of the characteristics of institutions. Domestic institutions are understood as “normative structure[s] composed of rules and roles specifying who is expected to do what, when and how” (Trondal 2021, 402). They reliably follow “standard patterns of behavior” (Allison and Zelikow 1999, 143; see also Trondal 2021; March and Olsen 1976) to provide and implement timely decisions on complex issues (Hudson 2013, 84–85). This inertia makes their preferences path-dependent (Egeberg and Trondal 2018; Hudson 2013, 2) and they are likely to approach climate change in ways that match their preexisting tasks.

Organizations play an important role as governmental “senses” (Hudson 2013, 84). They select and filter, that is, frame, incoming information into decidable questions (Egeberg 2011). At the same time, organizations often seek to expand their mandate and obtain new tasks (Hudson 2013, 87–88). This incentivizes them to frame new developments in a way that makes their toolkit appear the best fit for response. The field of climate security is no exception here (McDonald 2021b, 53). Via tailored threat assessments, climate security actors strategically influence how reasonable policy responses appear (Trombetta 2008). These frames “can have significant performative effects” (Browning and McDonald 2013, 241) as they guide policy responses (McDonald 2021b; Barnett 2019; Diez, Lucke, and Wellmann 2016; Dalby 2015; see also Boscarino 2016).

3.2.3 How Framing Affects Policy Responses

Several case and small-N studies have observed how civil and defense ministries frame climate security in ways that resonate with their respective agendas. One helpful concept in this context is frame contestation. It describes a process by which competing actors present diverging frames when advocating for different policy responses (Gear 2020).

The meaning of climate security is subject to just such frame contestation (McDonald 2021a, 23–26; Brzoska 2018; 2009). This has more than linguistic implications. Defining a threat is not an objective and rational process but rather a result of “securitization,” promoted by interested political actors (Dalby 2013b; McDonald 2013; Trombetta 2008). Successful securitization results from political framing. Proponents of different climate security discourses refer to different threats in the frames they employ, thereby arriving at different policy recommendations (von Lucke, Wellmann, and Diez 2014; McDonald 2021a).

Two major ways to frame climate security are particularly prominent. The first frames climate change as a national or international security issue and highlights the geopolitical risks that stem from it (Scott 2015; Briggs 2012). A publication by the Center for Climate and Security collects several articles that make this case. These studies raise concerns over issues such as the “weaponization” of water (King and Burnell 2017; Sternberg 2017), highlight how local fishery conflicts could turn into interstate conflict (Thomas 2017), and warn that states may erode or even disappear due to rising sea levels (Holland and Babson 2017; Werrell and Femia 2017).

A second way of framing climate change as security issue provides a different perspective on who is endangered by climate change. These emphasize the impacts on both human (Barnett 2019; von Uexkull and Buhaug 2021) and environmental security (McDonald 2018; Schilling et al. 2017). This perspective focuses on the immediate impacts of climate change, which are all “nonviolent in character” (Floyd 2015, 125). Such framings highlight the role of biophysical processes in threat construction, making climate change itself the focus of policy (McDonald 2018; 2013).

Scholars have made the case that framing climate change as a human or environmental security issue is normatively desirable because it directs policymakers’ attention toward direct climate impacts that have a solid scientific evidence base and would precede any second-order consequences. This approach implies that climate mitigation and preventive adaptation are logical responses (Daoudy, Sowers, and Weinthal 2022; Barnett 2019; McDonald 2018). If human and environmental security can be maintained, climate change will in most cases not become a national security issue.

3.2.4 Major Features of Climate Security Frames

Drawing on previous research, this paper argues that ministerial framings of climate security can be categorized along four dimensions: (1) whether they focus on direct or indirect impacts; (2) whether they refer to climate change’s anthropogenic origins; (3) temporality; and (4) certainty.

Climate security frames can focus either on direct, biophysical climate impacts as the “carrier” of danger, such as sea-level rise, droughts, and land degradation as the “carrier” of danger. Alternatively, these frames can center potential secondorder societal responses such as conflict or migration. Several studies have been carried out to identify the predominant focus of different international institutions (Maertens and Hardt 2021; Krampe and Mobjörk 2018; Dellmuth et al. 2018; Floyd 2015). Regarding domestic governmental agencies, defense ministries seem to combine both focuses (Burnett and Mach 2021; Estève 2021; Hasui and Komatsu 2021, 85;

Brzoska 2012a), while civil ministries and agencies rather focus on direct, biophysical impacts (Koppenborg and Hanssen 2021; Yamada 2021; Abrahams 2020). However, the Swedish International Development Cooperation Agency (SIDA) is also integrating climate-related conflicts into its programming (Brodén Gyberg and Mobjörk 2021) and the submissions of Nationally Determined Contributions (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC) regularly refer to indirect climate impacts as well (Jernnäs and Linnér 2019).

Whether to highlight anthropogenic emissions plays a similar role in the interagency contestation over the framing of climate security. These can be “silenced” as drivers of climate change by omission (McDonald 2018; von Lucke, Wellmann, and Diez 2014). With their heavy machinery, militaries are reliant on fossil fuels (Parkinson and Cottrell 2022). Therefore, while having long been concerned over climate change, the Pentagon long resisted emissions cuts (Crawford 2022). At most, there have been occasional announcements that the US military was becoming “greener” or “leaner” (Brzoska 2015, 184) and references to anthropogenic emissions by interviewed Pentagon employees (Burnett and Mach 2021, 4). While this has not previously been analyzed, extended references to the anthropogenic origins of climate change seem incompatible with defense ministries’ interests. Civil ministries do not face these obstacles. The Japanese Ministry of the Environment, for example, has referred to emissions in its climate securitization attempts (Koppenborg and Hanssen 2021, 61; Yamada 2021, 68).

Temporality specifies, when climate-related security impacts will manifest, is another major aspect of framing climate security. Diverse studies have indicated how the military tends to place the manifestation of climate-related security issues in the future (Burnett and Mach 2021; Brzoska 2015). In contrast, civil ministries frequently refer to climate change as an “urgent security threat” in their NDC submissions (Jernnäs and Linnér 2019, 77; see also Hayes and Knox-Hayes 2014, 88).

The final aspect is certainty. Warnings of climate-related dangers indicate— implicitly or explicitly—how confident they are that a security impact will manifest. Practitioners utilize the expression of high certainty as a political tool in climate security framings, and this often puts them at odds with more nuanced scientific considerations (Daoust and Selby 2022, 4; IPCC 2021; Buhaug and von Uexkull 2021). Defense practitioners are more likely to do so quite consciously (King and Goodman 2011; see however Burnett and Mach 2021). Indeed, the French MoD arguably employs expressions of uncertainty to “legitimize military solutions in

global climate governance” (Estève 2021, 600). Little research has been carried out on expressions of certainty by civilian agencies (see however Eriksson and Reischl 2019, 77). Organizational “turf wars” over climate security mandates might, however, incentivize them to express a particularly high degree of certainty over impacts that fall into their potential portfolios (Hudson 2013, 87–88; McDonald 2012).

These four aspects recur in climate security frames. By adjusting these frames, ministries influence which policy responses appear reasonable. Their variation can be associated with framings of climate change as a human or a national security issue. Immediate action to cut anthropogenic drivers of climate change limits otherwise unavoidable biophysical impacts and is conducive to ecological and human security. In contrast, reactive approaches that prepare for uncertain second-order consequences as part of a dystopic future do not help to solve the original problem. They can, at best, be justified as temporary ad hoc measures to maintain national security for a while. The systematic evaluation of climate security frames in civil and defense ministries would reveal where current climate security policies are headed.

Such an analysis remains to be undertaken. Michael Brzoska’s groundbreaking comparative studies were published before the ratification of the Paris Agreement (Brzoska 2015; 2012a). Other research on defense ministries focused on climate security framings in a single case or very small number of cases and/or are limited to the Global North (see however Jayaram 2021; Dwyer, Ingalls, and Baird 2016). One comparative study remarks briefly on climate security frames in NDCs (Jernnäs and Linnér 2019, 77), but otherwise, investigations of domestic civil approaches to climate security seem limited to case studies (see e.g. Brodén Gyberg and Mobjörk 2021; Yamada 2021). This study compares climate security frames of civil and defense ministries along four dimensions, ascribing to each institution an inclination toward either human or national security framings of climate change. This unpacks the domestic contestation over what is often assumed to be a monolithic national block of climate security policy.

3.3 Methods and Sample

3.3.1 Sample 1: National Security Strategy Documents

The positions of MoDs on climate change are drawn from strategy publications such as national security strategies or defense white papers (for brevity here considered together as national security strategy documents or NSSDs). These are significant official declarations of national security policy and include references to threats and risks officially perceived by the authoring

MoD. NSSDs have been analyzed before in terms of climate security (Brzoska 2015) as well as various other issues (Baciu 2020; Caudle 2009).

This study focuses exclusively on NSSDs that were published by MoDs alone. NSSDs that were published as joint documents by several ministries (e.g. Government of Canada 2005) or by national security councils are excluded, because they are always interorganizational compromises rather than authentic MoD products. National security councils are often located “between” different ministries or have their own agendas (Kaynar 2018). They are, for example, sites of executive top-down management or presidential politics in the United States (LaGattuta and Limbocker 2021; Burke 2018), interministerial negotiations and groupthink bias in the United Kingdom (Edmunds 2014, 537), and a presidential tool to push powerful bureaucratic elites into interministerial cooperation in Japan (Fukushima and Samuels 2018; Liff 2018).

This analytical decision ensures that the NSSD sample exclusively reflects MoD positions, but it comes at a cost. Some major military powers such as the United Kingdom, Russia, and China are not included. These countries, however, were already covered in previous climate security research (Roberts 2021; Warner and Boas 2019; Thomas 2017; Brzoska 2015; 2012b; 2009; Nicol and Heininen 2014), and controlling for inter-ministerial effects is prioritized over sample size in this study.

A common feature of the NSSDs included in the study is that they are public documents with no security classification. This means that they are intentionally designed for the general public. This sets them apart from classified strategy documents. Due to their nature, there is not much that can be known about classified documents. However, declassified documents on climate change do exist. For example, a brief memo to US President Carter from July 7, 1977, warned him of potentially “catastrophic” climate effects (Press 1977). These secret preparations for climate change have not been systematically analyzed. In a few decades, the declassification of more recent documents might well prove an interesting research subject. Speculatively, classified documents could, for example, go beyond the public conversation in elaborating how climate impacts are expected to affect military operability or drive the geopolitical gains and losses of different countries.

As the published counterparts of such classified documents, NSSDs play an important role in the strategic communication of MoDs. They convey positions that are intended to be publicly perceived by national and international audiences. International audiences include other states and international organizations. For example, Japan’s Defense White Papers regularly discuss the NSSDs of other major countries (see, e.g., Japan NSSD 2018). Similarly, the North Atlantic

Treaty Organization (NATO) Defence College regularly publishes studies on NSSDs (Calmels 2022; Roberts 2021). These features make NSSDs an important and influential part of international climate security discourses.

3.3.2 Sample 2: Nationally Determined Contributions

The selected NSSD statements are compared with statements in which civil ministries present their position toward climate change, derived from NDCs that are required to be submitted regularly under the UNFCCC framework. These national communications are a unique indicator of civil ministries' positions on climate policy. Since they follow sufficiently explicit external requirements (ecbi 2020), they have been frequently used for comparative studies (Atteridge, Verkuijl, and Dzebo 2020; Wang and Chen 2019; Tobin et al. 2018).

At the same time, individual NDCs differ substantially. It is plausible to interpret the content of NDCs as strategic attempts by their authors to frame climate change as a policy problem (see e.g. Jernnäs and Linnér 2019). In particular, they do not have to link climate and security, so it reflects a conscious choice if they do. Moreover, different nations involve very different parts of their administrative apparatuses in the authoring of these NDCs, but never MoDs (annex 3.1). This makes NDCs a promising site to track the exclusively civil trajectories of climate security.

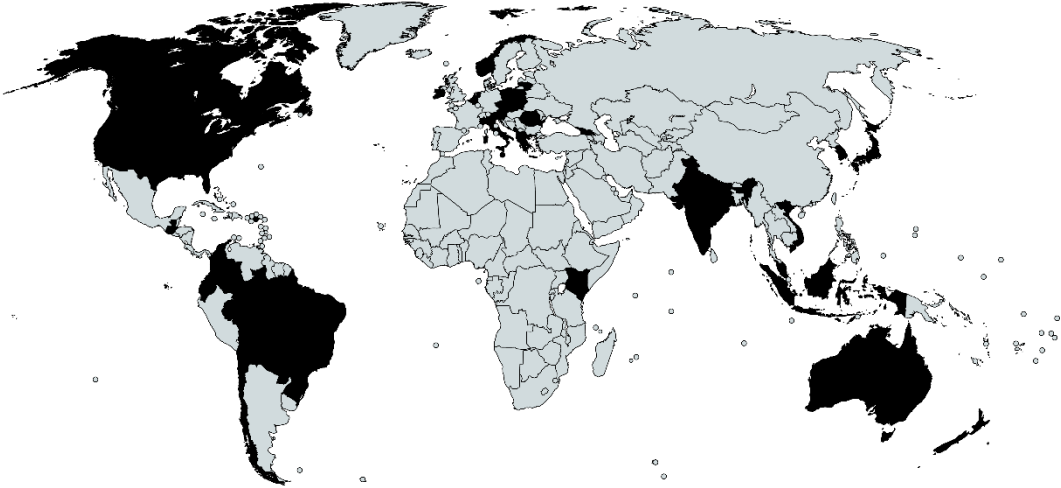
3.3.3 Sampling Criteria

To avoid availability-induced sampling bias, the study includes only documents from countries that published both an NDC and an MoD-authored NSSD. NDC documents are widely available. One hundred and ninety-two member states of the Paris Agreement submitted a first NDC, and member states are increasingly issuing updated or even second NDCs. However, NSSDs are much rarer, particularly those published exclusively by MoDs.

As NDC documents have only existed since the 2015 Paris Agreement, this study limits the NSSD sample to documents published in or after 2013. This is still sufficiently close to the 2015 Paris conference while also being well after climate security became prominent around 2007 (Brzoska 2009). There is no global repository that reliably collects all published NSSDs. Therefore, the selection results from the author's own extensive research and best knowledge (see annex 3.1 for further information). Overall, 122 countries were found to have published an NSSD since 2013, but only 70 of these documents were officially published by an MoD or the armed forces of the respective nation. Some countries have published more than one document. Overall, there are thirty-nine countries with an MoD-published NSSD since 2013 and at least

one NDC document since 2016. Those thirty-nine countries are included in this investigation (see figure 3.1, table 3.1, and annex 3.1).

Figure 3.1: Map of NSSD and NDC-authoring countries included in chapter 3



Note: Included countries highlighted in black.

Unfortunately, few MoD-published NSSDs are available from Africa and major parts of Asia. While these regions host a range of different political regimes, they include several particularly fragile or closed authoritarian regimes. The absence of NSSDs suggests that these countries’ MoDs play a less active role in shaping international (climate) security discourses. This does not, however, mean that they do not interfere in climate adaptation (see e.g. Hossain 2022; Tesfamariam and Hurlbert 2017). Thirteen of the thirty-nine countries are European Union (EU) members. As EU member states decided to submit a common NDC in 2016 and a common update in 2020, their NDC documents are the same. While countries typically submitted a First NDC and an Updated First NDC, some countries submitted only one NDC document and others up to three. In sum, fifty different NDC documents were published by thirty-nine states.

Table 3.1: NSSD and NDC-authoring countries included in chapter 3

Albania	Greece	Netherlands
Australia	Guatemala	New Zealand
Austria	India	North Macedonia
Belgium	Indonesia	Norway
Bolivia	Ireland	Paraguay
Brazil	Italy	Poland
Brunei Darussalam	Japan	Romania
Canada	Kenya	Saint Kitts and Nevis
Chile	Lithuania	Slovakia
Colombia	Malaysia	Slovenia
Czech Republic	Malta	South Korea
Ecuador	Montenegro	United States of America
Georgia	Nepal	Vietnam

3.3.4 Primary Analysis:

Identifying Climate Security Frames The study conducted two successive analyses of the material. The primary analysis entailed separate inductive content analyses of NSSDs and NDCs to identify all distinct types of statements, that is, frames, that describe climate change as a security issue. This primary analysis produced a comprehensive list of all statements in the analyzed NDCs and NSSDs (annex 3.3) that refer to climate change or its consequences as a security issue and additionally assessed whether a document referred to the anthropogenic origins of climate change.

3.3.5 Secondary Analysis:

Assessing Climate Security Frames The secondary analysis takes these identified frames as a starting point for further calculations to evaluate the four indicators of human or national climate security framings—focus, reference to anthropogenic origins, certainty, and temporality. Each passage in the original documents that referred to biophysical or societal dangers to climate security was further categorized regarding the certainty and time frame expressed about the manifestation of a security-relevant climate impact (see table 3.2).

Table 3.2: Coding Examples

Original text	Primary analysis: Identified climate security frames	Secondary analysis: Identified agency, temporality, and certainty
“Climate change has made hazards, especially storms, floods and droughts, more intense” (NDC Vietnam 2016, p. 7).	- CC increases extreme weather and disasters/Storms - .../Floods - .../Droughts	(1) Biophysical process (2) Certain impact (3) Impact in past/present
Climate change “will exacerbate the challenges of population growth and environmental degradation, and will contribute to food shortages and undermine economic development” (NSSD Australia 2016, pp. 55–56).	- CC harms ecosystems - CC threatens agriculture or food security - CC harms economy	(1) Biophysical process (2) Certain impact (3) Impact in future
“However, the concerns raised by climate change can, in themselves, heighten tensions between states and result in humanitarian crises with direct impacts on local, state and international structures, including possible escalation of local conflicts accompanied by increased migration pressures” (NSSD Czech Republic 2015, p. 12).	- CC may lead to violent conflicts between states - CC threatens Human or Community Security - CC is a threat multiplier or accelerator - CC will cause migration	(1) Biophysical process and societal agency (2) Possible impact (3) Impact in past/present

These metadata are then used to quantitatively compare NSSDs and NDCs in terms of the four indicators. The first indicator focuses on the degrees to which documents refer to direct and indirect dangers when framing climate security. To improve robustness, this is measured in four different ways: First, how many different frames labeling biophysical or societal processes as harmful to climate security appeared overall in NSSDs and NDCs, respectively. Second, the relative shares of the two document groups that (1) frame climate change as an exclusively

biophysical security issue or (2) also refer to the involvement of societal actors as perpetrators. Third, the average number of individual statements about biophysical and societal dangers to climate security made per document of all documents that mention any climate impacts. Fourth, the average count of different frames linking biophysical or societal processes to climate security in every NDC and NSSD that refers to climate change.

The second indicator refers to the shares of documents per genre that refer to the anthropogenic origins of climate change. This measures at the level of the individual document whether an NSSD or NDC mentions the anthropogenic origins of climate change. A document can either not refer to the anthropogenic origins of climate change, do so explicitly, or refer implicitly. Implicit references do not mention human responsibility for climate change but hint at it. For example, Albania's NDC states that "National emissions of the greenhouse gases represent only 0.017 percent of global emissions and the net per capita GHG [greenhouse gas; AV] emissions Albania was 2.76 tCO₂e [tons of carbon dioxide equivalents; AV] which is less than a quarter of emissions of high-income countries" (NDC Albania 2016, p. 2).

Some additional calculations are involved in measuring the certainty and temporality conveyed in climate security frames. The certainty conveyed by a statement is derived from the use of modal verbs, expressing either certainty or probability. Two residual categories account for statements that do not clearly fit into these two categories. "Probabilistic certainty" includes statements that communicate certainty about a shifting probability distribution. "NA" codes all those statements whose mode cannot be specified with confidence.

The temporality of climate security frames is derived from the use of grammatical tenses. The two main categories of this indicator are past/present and future. Residual categories for statements that do not fit clearly into these categories are "all times" for statements that cover both past/present and future and "NA" for statements that include no temporal information or an ambiguous tense (see table 3.2).

These categorizations of every frame are then used to calculate each document's certainty and temporality share. The certainty share of a document is the number of individual frames contained in the document that use modal verbs expressing certainty divided by the overall number of statements contained in the document that include a frame relating to climate security. *Mutatis mutandis*, the "temporality share" evaluates temporality for each document. This indicates the share of climate-related threats stated as manifesting in the past or present of all climate-

related threats mentioned within each document. These document-level certainty and temporality shares are then averaged again within the NDC and the NSSD sample, respectively (see table 3.3, annex 3.8 and 3.9).

Table 3.3: Calculation example for “certainty share” and “temporality share”

Source		Certainty framing as...				Shares			Temporality framing as...				Shares		
Country	Document	certain	prob. certain	possible	Total	Certain	Prob. certain	possible	past/present	future	all times	Total	Past/present	Future	All times
Australia	Updated First NDC (2020)	1	0	0	1	100%	0%	0%	0	0	0	1	NA	NA	NA
Georgia	First NDC	14	0	2	16	88%	0%	13%	16	0	0	16	100%	0%	0%
Malaysia	Updated First NDC	1	5	1	7	14%	71%	14%	6	2	0	8	75%	25%	0%
Paraguay	Updated First NDC	8	0	0	8	100%	0%	0%	6	2	0	8	75%	25%	0%
Guatemala	Libro de defensa nacional (2015)	4	0	2	6	67%	0%	33%	6	0	0	6	100%	0	0
Canada	Canada’s Defense Policy (2017)	6	1	5	12	50%	8%	42%	9	1	2	12	75%	8%	17%

Note: Selected examples. “Prob.” indicates probabilistic.

3.4 Climate Security Frames in NDCs and NSSDs

3.4.1 Focus of Climate Security Frames

Most of the observed civil and defense ministries frame climate change as a security issue in their publications. However, they emphasize very different aspects when doing so. Four out of five NDCs (84 percent; annex 3.5, AU57) and three out of four NSSDs (74 percent; annex 3.7, AH77) refer to biophysical climate impacts on security. Correspondingly, NSSDs mention the indirect impacts that manifest from societal actors’ responses to climate change far more regularly (43 percent; annex 3.7, AF77) than do NDCs (12 percent; annex 3.5, AS57).

Civil ministries also present direct climate change impacts with more nuance than defense departments (see tables 3.4 and 3.5). The NDCs investigated warn of thirty-nine direct impacts, whereas NSSDs refer to only nineteen. Civil ministries are also more consistent in their description of these direct impacts: Over ten different framings appear in at least every fifth NDC. In contrast, the only two direct frames that appear in more than a fifth of NSSDs are generic acknowledgments of climate change or warnings of disasters and extreme weather.

Table 3.4: Coverage of direct climate impacts in NDCs¹

Climate Change...			
...affects natural resources or ecosystems	20	causes landslides/avalanches	16
leads to rising temperatures	36	affects rain/hail	18
affects fishing resources	18	causes delayed/decreased rain	14
causes glacier loss	8	causes heat waves	16
affects land species	4	causes forest/wildfires	8
increases coral bleaching/disappearing	2	leads to air quality degradation	4
leads to the spread of invasive species	2	causes glacial lake outflow flooding	2
...affects the landscape		causes frost	2
leads to rising sea levels	24	...affects the social system	
causes land loss/inundation	12	is a threat/risk	68
leads to soil erosion/land degradation/desertification	12	will promote or import (new) diseases	24
leads to land/coastal degradation	16	affects agricultural productivity	22
...affects the water system	8	will endanger food security	16
causes freshwater scarcity	24	has uncertain consequences	6
causes saltwater intrusion	12	...threatens development/the economy	12
causes ocean acidification	8	threatens energy generation or supply	16
...increases extreme weather and meteorological disasters	30	will increase poverty	4
causes floods/flash floods	44	may endanger the tourism industry	6
causes droughts	30	will increase inequality	6
causes storms	22	CC as a threat-multiplier aggravates existing problems	6
causes more extreme rain/hail	16		

Note: Annex 3.5, row 57. The number indicates the percentage of documents in which the respective statement is found.

Table 3.5: Coverage of Direct Climate Impacts in NSSDs

Climate change...			
...is acknowledged ¹	36	affects military installations/operations	6
will have unforeseeable consequences	7	...affects the social system	
is the most acute or one of the most acute challenges	6	is a threat multiplier or accelerator	19
is complex and has complex consequences	4	threatens agriculture or food security	16
...affects the biophysical system		impacts underdeveloped places more heavily	10
increases extreme weather and natural disasters	39	endangers energy security	6
harms water systems	17	threatens cities and infrastructure	6
harms ecosystems	16	harms the economy	3
causes rising sea levels	13	increases epidemics or pandemics	3
...is a threat			
...to security	17		
...to human or community security	14		
...to the survival of sovereign states	1		

Note: Annex 3.7, row 77. The number indicates the percentage of documents in which the respective statement is found. ¹ Collects sentences that mention climate change without specification.

For indirect climate security impacts, the situation is reversed. These are predominantly issued by defense departments. The NSSDs studied contain nine different frames that involve societal agency. In contrast, only two NDC frames involve societal agency: warnings of climate migration and violent conflict (see table 3.6).

Table 3.6: Coverage of climate impacts that involve societal actors in NSSDs and NDCs

Climate change...			
NSSDs:		NDCs:	
...changes the strategic landscape	4	...leads to migration	8
...in the Arctic/Antarctic	13	...leads to conflict	6
...leads to violent conflicts	10		
...leads to conflicts within states	9		
...increases tensions between states	3		
...leads to conflicts between states	3		
Foreign emissions as threat	1		
...affects the social system in other ways			
...causes migration	17		
...will contribute to resource competition	11		

Note: Annex 3.5, row 57; annex 3.7, row 77 The number indicates the percentage of documents in which the respective statement is found.

These differences can also be quantified. NDCs that mention any climate impacts contain on average about 10.2 (annex 3.4, AO56) separate passages on biophysical impacts, covering on average 7.3 (annex 3.5, AO58) different biophysical frames. NSSDs that discuss climate impacts contain on average only 6.0 (annex 3.6, AH76) passages in total, focusing on average on 4.8 (annex 3.7, AH78) different biophysical impacts. Vice versa, these NDCs contain on average only 0.2 (annex 3.4, AS56) passages per document that refer to climate security frames emerging from the actions of societal actors. These passages refer on average to 0.2 (annex 3.5, AS58) different frames with societal focus per NDC. NSSDs that mention climate change include on average 1.2 (annex 3.6, AF76) passages that remark on climate security frames implying societal actors, focused on average on 1.0 (annex 3.7, AF78) different statements.

Some of the included documents reflect these aggregate differences particularly clearly. The Caribbean island nation of St. Kitts and Nevis, for example, referred to climate change in its 2016 NDC submission as “one of the major threats for key vulnerable sectors that are linked to vital pillars for sustainable development,” outlining impacts on areas such as forestry, water supplies, agriculture, and tourism. The same document, however, expresses no concern over how this “major threat” could lead to indirect socially induced climate impacts (St. Kitts and Nevis NDC 2016, p. 6). While its 2021 successor document briefly remarks on the potential “loss of social cohesion in the aftermath of disasters,” it also remains predominantly focused on warnings of direct climate impacts (St. Kitts and Nevis NDC 2021, p. 15). Other NDC submissions, for example, by Indonesia (2016 and 2021) or Ecuador (2019), have a similarly clear focus.

In contrast, some NSSDs display the emphasis that defense ministries place on indirect climate security frames with particular clarity. Japan's Defence White Papers from 2015 and 2016, for example, portray climate change as a driver of conflict, resource competition, and, particularly, a geostrategic factor in the Arctic region that "affects the global security environment," while discussing its biophysical impacts only implicitly (Japan NSSD 2015, p. 5; see also 2016). Similarly, Lithuania's National Security Strategy from 2017 remarks only briefly on the potential for increased natural disasters, but portrays climate change as an additional stressor for fragile states, contributing to their role as hubs of migration, conflict, and terrorism (Lithuania NSSD 2017, p. 4).

These observations resonate with the theoretical expectations. MoDs are mainly designed to operate robust assets to defend their country from invasion, while additionally dealing with an ever-growing number of threats, risks, and dangers. For example, the United Kingdom's MoD deals with terrorism, civil conflicts, organized crime, and weapons proliferation (Edmunds 2010). For them, climate change is just one of many issues. To be sure, this does not mean that they are completely indifferent to the biophysical manifestations of climate change; floods and forest fires already increasingly threaten military bases, for example (VanDervort 2020; Brzoska 2012b). Moreover, members of military forces do hold genuine environmental concerns (Jalili 2022; Smit 2018). Nevertheless, providing climate security is certainly not more essential to MoDs than dealing with adversaries. It is, at best, another serious item on the long list of challenges that they prepare for. This relative lack of focus and prioritization may cause MoDs to present less complex and less nuanced frames on its biophysical components.

On the other hand, the number of ministries that predominantly focus on environmental issues is rising. These have been found to increasingly engage with the climate security nexus (Brodén Gyberg and Mobjörk 2021; Jernnäs and Linnér 2019) but possess mainly expertise in environmental policy (Aklin and Urpelainen 2014 partic. 767). This means that the organizations authoring NDCs are more focused on climate change due to path dependency and organizational structure. Moreover, authoring these NDCs has been found to increase awareness even further and to contribute to institutional change among the ministries involved (Röser et al. 2020).

The stronger emphasis of MoDs on societal actors as harmful to climate security can again be explained by path dependency. MoDs historically emerged as governmental departments charged with managing national armed forces for wars against other countries. While this agenda is broadening, additional tasks remain centered on dealing with societal actors such as terrorists, criminal networks, and migrant networks (Edmunds 2006). This seems unlikely to

change. Indeed, the MoDs of various countries, including Iran (Olson 2016), Germany (Longhurst 2003), France (Irondele 2003), and the United Kingdom (Uttley, Wilkinson, and van Rij 2019), have all been found to avoid or delay major changes and to prefer incremental adaptation instead.

Yet, at the same time, militaries do claim their role in contributing to climate security, for example, by providing disaster response (Burnett and Mach 2021; Thomas 2017; Diez, Lucke, and Wellmann 2016; Brzoska 2012a; 2009). Again, path dependency guides them to this focus on a later stage in the causal chain between climate change and insecurity. It does not require deep structural changes for them to provide their traditional means of high mobility and operability in harsh weather conditions, to conduct disaster responses, or to patrol maritime regions to protect resources. Earlier research has, however, also pointed out how this reactive focus has stood in the way of disaster prevention (Field and Kelman 2018).

The lower tendency of civil ministries to point out second-order climate impacts resonates with their incentives. Civil ministries usually lack the “robust assets” to be applied in disaster response or conflict management. However, they have other tools at their disposal that are better suited for interventions at earlier points, such as mitigation via energy policy, financial aid, and development cooperation. Given that organizations engage in turf wars over mandates (Hudson 2013, 87–88), they have an interest in advocating for such conventional climate policies.

A final aspect of frames with a societal focus merits a brief discussion. Warnings of climate-related conflicts draw on the underlying assumption that scarcity drives tensions. Such claims have a questionable scientific basis (Barnett 2019; Mehta, Huff, and Allouche 2019). The burgeoning environmental peacebuilding literature highlights instead how scarcity creates inroads for peace initiatives, for example, through common resource management by conflict parties (Johnson, Rodríguez, and Quijano Hoyos 2021).

Interestingly, several NSSDs echo this idea of environmental peacebuilding. South Korea’s MoD refers to climate and environmental issues as potential “softer issues on which countries can easily engage” before expanding “the scope of cooperation to include more controversial issues” (South Korea NSSD 2014, p. 38). Similarly, India’s NSSD suggests that “common cause can be made of issues like climate change that seriously affect all the countries” (India NSSD 2019, p. 14). New Zealand’s MoD even questions scarcity determinism by stating that “historically, water-related tensions have led to more water-sharing agreements than violent conflicts” (New Zealand NSSD 2014, p. 14). Outside of this study’s sample, the United Kingdom and Peru highlight similar opportunities early in their NSSDs (Peru 2006; United Kingdom

2008). NDCs, on the other hand, do not include such references, revealing the potential for improved integration at the humanitarian– development–peacebuilding nexus (Bremberg, Mobjörk, and Krampe 2022).

3.4.2 Anthropogenic Origins in NSSDs and NDCs

The second aspect of climate security framing is the portrayal of climate change as an anthropogenic phenomenon. The differences between NSSDs and NDCs in framing climate change are striking. Every NDC refers either implicitly or explicitly to the anthropogenic origins of climate change. Such references are made explicitly in twenty-eight documents. Another twenty-two documents refer to them implicitly. None omits them. On the other hand, thirty-three of the fifty-two NSSDs (i.e., 63 percent) that do refer to climate change do not refer to its anthropogenic origins at all (annex 3.11, A3–H6).

As expected, NDCs do frequently refer to the anthropogenic causes of climate change. More telling, however, is the scarcity of references to the anthropogenic origins made by MoDs. Such framings increase the urgency of climate change and stress the need to deal with its consequences. Focusing on later-stage impacts, however, draws attention and resources toward military portfolios: hard and narrow security responses. Scholars warn of potential trade-offs between such responses and mitigation efforts that are crucial to preventing exactly those second-order security declines that may arise with more pronounced climate change (McDonald 2021b; von Lucke, Wellmann, and Diez 2014; Dalby 2013b; Brzoska 2009).

Moreover, military emissions are the elephant in the room when it comes to the question of origins. Globally, military forces are estimated to contribute 5 percent of greenhouse gas emissions (Parkinson 2019). The Pentagon’s legacy as the single biggest institutional emitter of greenhouse gases worldwide emerged in a long historical process (Crawford 2022). While several countries have begun to announce military emission cuts (Department of the Army 2022; Department of the Navy 2022; Ministère des Armées France 2022), the operability of a carbon-neutral force—particularly in a conventional conflict—remains difficult to imagine. While the first steps toward greening defense may be underway (Jalili 2022), prospects remain dim, particularly as the Russian invasion of Ukraine has fueled a new concern for conventional war.

The differences between defense and civil ministries in highlighting the anthropogenic origins of climate change are plausible from an organizational theory angle. National energy or emission policies are not within the scope of defense ministries’ existing portfolios and guiding attention to emissions does not help them to expand their mandates. Moreover, they negatively affect the organizational core elements of MoDs: to assign fossil fuel-powered heavy assets in

response to political dynamics. With their reliance on such assets, it is in the militaries’ organizational interest to avoid references to anthropogenic origins and emission cuts. In contrast, this is precisely in the interest of civil ministries to focus on anthropogenic causes, because regulating nationwide reductions expands their portfolio. Moreover, this does not jeopardize their capabilities as they usually do not own a large range of heavy assets that would be targeted by requirements for emission cuts.

3.4.3 Certainty in Climate Security Frames

The certainty expressed about the manifestation of potential dangers is another distinctive feature of climate security frames. It turns out that both NSSDs and NDCs express similar certainty about the manifestation of biophysical climate impacts but differ somewhat regarding societal impacts. NSSDs formulate 61 percent of their frames as certain and 10 percent with “probabilistic certainty.” NDCs, for their part, express certainty in 65 percent of their framings, and probabilistic certainty in 13 percent. There is however some variation in frames that involve societal actors as perpetrators. NSSDs formulate 63 percent of such warnings with certainty or “probabilistic certainty,” while NDCs do so in only 50 percent of frames (see table 3.7 and annex 3.8, I2-Q5).

Table 3.7: Disaggregated certainty shares of climate security frames in NSSDs and NDCs

RESULTS: Disaggregated certainty shares									
	Overall			Biophysical			Societal agency involved		
	Certainty	Prob. certainty	Sum	Certainty	Prob. certainty	Sum	Certainty	Prob. certainty	Sum
NSSDs	61%	10%	70%	60%	12%	72%	48%	16%	64%
NDCs	65%	13%	79%	59%	13%	72%	50%	0%	50%

Note: “Prob.” indicates probabilistic.

There can be strategic reasons for expressing such certainty. In their function as governmental “senses,” institutions use their area of expertise to draw attention to new issues while striving for additional mandates and resources (Hudson 2013, 84). Climate security practitioners have stated that expressing certainty helps to justify policy responses (Hayes and Knox-Hayes 2014, 90).

Expressing certainty about the manifestation of biophysical climate impacts seems plausible given the severe warnings in recent reports of the Intergovernmental Panel on Climate Change and their sound and growing scientific base (IPCC 2021). However, the sizeable degree of certainty expressed, particularly by MoDs, about second-order consequences is rather problematic. It threatens to “naturalize the causes of conflict” and to distract from the multitude of ways in which good policy can avoid many climate-related hardships (Barnett 2019, 930). The high

certainty is also dubious given that defense staff members do not always appear to be familiar with the intricacies of climate science. Pentagon employees, for example, tend to rely on open-source internet resources rather than academic publications (Burnett and Mach 2021).

3.4.4 Temporality in Climate Security Frames

The time frame in which climate-related insecurities are portrayed as manifesting is the final aspect of this comparison. With their stronger focus on biophysical impacts and anthropogenic emissions, NDCs describe climate impacts on average in 70 percent of their frames per document as a past or present issue. NSSDs, on the other hand, only do this in 52 percent of cases. Vice versa, NSSDs situate 40 percent of climate security frames in the future, while the equivalent figure for NDCs is only 29 percent (totals are not equal to 100 percent due to residual categories).

Further differentiation by focus is instructive. Both document groups tend to frame biophysical impacts as a past or present issue and expect insecurities that involve societal agency to lie in the future. However, this distinction is stronger for NDCs than for NSSDs. NSSDs do place 52 percent of their climate security frames with a societal agency in the future, while NDCs do that only 60 percent of the time (see table 3.8 and annex 3.9, H1-N5).

Table 3.8: Disaggregated Temporality Shares of Climate Security Frames in NSSDs and NDCs

RESULTS: Aggregated shares						
	All frames		Biophysical		Societal agency involved	
	Past/Present	Future	Past/Present	Future	Past/Present	Future
NSSDs	52%	40%	52%	39%	34%	52%
NDCs	70%	29%	71%	28%	20%	60%

Note: Totals do not equal 100 due to residual categories

This divergence has some implications. Preventive adaptation and mitigation policies have to take place earlier than responsive security measures. Proper climate policy may help to prevent climate-related conflict dynamics and even promote climate-resilient peace (Barnett 2019)—but the window for action is rapidly closing. On the other hand, hard security measures can attempt to provide climate security only in a world where climate change has already led to suffering, displacement, and conflict. With their different toolboxes, civil and defense ministries are therefore specialized in different phases of the causal process between climate change and insecurity. Justifications for their respective toolboxes are to be found at different points of time.

NDCs are authored by those institutions that deal with climate change itself. For ministries that are explicitly dedicated to environmental or climate policy, climate change is their only concern, or at least one of only a few dramatic threats on their agenda. Ministries that deal with developmental or diplomatic issues without commanding “hard power” assets also seem likely to appreciate early preventive measures, because they encounter climate change throughout their work (Brodén Gyberg and Mobjörk 2021; Genovese 2019).

On the other hand, MoDs deal simultaneously with a large array of security issues. It reflects their organizational modus operandi, to prepare a limited set of tools for a large array of potential future eventualities (Edmunds 2014; 2010). Hence, they have incentives to approach climate change by preparing for a more insecure future. Their stronger focus on future security impacts matches this preference.

3.5 Implications for Policy and Research

This article proposed a new system of four analytical categories to categorize climate security frames. The categories were applied to a broad sample of publications by civil domestic institutions and defense departments from thirty-nine countries. The analysis revealed that both civil and defense ministries frame climate change impacts as security issues.

They do so, however, in very different ways. Defense ministries are far more likely than civil government departments to warn of indirect climate impacts, driven by societal actors’ responses to direct climate impacts. But while the former often warn of conflicts or displacement, they seldom point toward the anthropogenic origins of climate change. In contrast, every NDC publication mentions this fact about the source of emissions. Moreover, not only do civil and defense ministries refer to different climate impacts, they also express different levels of confidence regarding their manifestation and highlight different time frames. In particular, defense ministries express a higher certainty about the current or future manifestations of indirect impacts than do civil ministries. Conversely, civil ministries are more likely to frame direct climate impacts as issues that are already manifest in the present or the past than are defense departments.

This is significant. It shows that the ongoing emergence of transnational and supranational climate security governance (Maertens and Hardt 2021; see also Hickmann 2017) is paralleled by a diversification of national-level climate security proponents. Governments do not form a monolithic bloc on climate security. Rather, there is considerable contestation between civil and military approaches to climate security.

These different approaches to climate security can be explained using organizational theory. Ministries do indeed display institutional inertia, even when they approach crises as grave as climate change. Their preferred versions of climate security do not inevitably seek to promote mitigation and to focus responses on firstorder biophysical climate impacts, even though these would maximize prevention and have the most powerful long-term impact. Rather, ministries frame climate security according to their institutional backgrounds in a way that aligns with their past activities and mandates.

This justifies skepticism about MoD approaches to climate security. They depict climate change as something that has suddenly overwhelmed the planet and that should be dealt with by narrowly preparing to address its symptoms. This bears the risk of labeling inhabitants of vulnerable regions as a threat despite them being the least responsible for climate change and the least equipped for adaptation (Barnett 2020b).

Apart from the dangers of stigmatization, such warnings of resource conflicts and climate migrants are not only ineffective but also counterproductive. They are unlikely to promote mitigation while also distracting from the increasingly timesensitive original problem: climate change scholars have expressed concerns about such framings of climate as a security issue (Barnett 2019; McDonald 2018; Rothe 2017; von Lucke, Wellmann, and Diez 2014), and they are indicative of the divide between academia and practitioners in the climate security nexus (Daoust and Selby 2022; Gilmore et al. 2018).

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Author contributions

Anselm Vogler is the sole author of this paper.

Declaration of competing interest

None.

Supplementary material

Annexes 3.1-3.11 (calculations on the coverage rates for focus, origins, temporality and certainty of climate security frames in NDC and NSSD).

Chapter 4:³

Hardly exceptional? How NATO militaries respond to environmental change

Abstract

NATO Militaries are actively responding to climate change and other environmental problems but without adjusting the core characteristics of how they seek to provide security. Drawing on a mixed-methods analysis, this paper finds that most NATO members discuss environmental change in high-level strategic documents and adds case studies on the armed forces of Canada, France, Estonia, Latvia and Slovenia. The article argues that militaries are becoming increasingly visible in global environmental politics but that their actual responses fall far short of substantial, let alone exceptional measures on three grounds. First, forces always prioritize military capabilities over emission reductions. Second, they indicate increasing difficulties in responding to the growing disaster response tasks. Third, the Russian invasion of Ukraine affected individual forces in different ways, causing them to redefine their climate security roles. Taken together, this raises questions about the contribution that militaries can make towards climate security in the Anthropocene.

4.1 Introduction

Defense departments show a growing interest in climate change and other environmental issues (Burnett and Mach 2021; Jayaram 2021; Vogler 2023a). Yet, climate security can mean different things, resulting in different conclusions about how to maintain it (McDonald 2013). This puts some political framings at odds with research findings that emphasize the impacts of climate change on human (Adger et al. 2022; Daoudy, Sowers, and Weinthal 2022) and ecological security (McDonald 2021b).

Militaries are suspected of pursuing such counterproductive framings of, and responses to, environmental change (see already Deudney 1990; Barnett 2003). The core concern is that military forces will not prioritize the reduction of their considerable environmental impacts (Crawford 2022; CEOBS and Concrete Impacts 2022) or will do so in problematic ways (Harris 2015; Bigger and Neimark 2017). The concern is that they might instead center their efforts on avoidable second-order consequences, such as displacement or conflict (McDonald 2018). This could

³ This chapter is under review as single-authored article in the double-blind peer-reviewed *Journal of Global Security Studies*. Its first submission received two well-meaning but substantial calls for major revision. Its second revision received one call for minor-major revisions and was accepted by the other reviewer. The version in this cumulative dissertation is the one resubmitted to the journal in August 2022. Formatting and table and figure names slightly adjusted to match the cumulative dissertation's layout.

“sideline [...] development, diplomacy, and humanitarian assistance, which may be more important levers for addressing overseas impacts” (Busby 2021, 190).

These concerns have motivated scholars to carefully trace how militaries engage with environmental politics. Studies have focused on major powers, including France (Charbonneau 2022; Estève 2021) and the United States (Burnett and Mach 2021) but also on less high-profile or nonwestern militaries such as the Swedish (Söder 2023) and Indian (Jayaram 2021) forces. Alongside detailed case studies of individual countries’ activities, comparative studies have also documented the high level of attention paid to climate and other environmental change in high-level planning documents (Vogler 2023a) and identified types of military responses (Brzoska 2015).

Nevertheless, uncertainty prevails about the emerging roles that military forces are playing with respect to environmental change. Recent studies have concluded that “current climate governance scholarship does not generally reflect” the significance of military climate responses (Jayaram and Brisbois 2021, 4) and that “little is known about how these organizations [...] actually account for climate change and its consequences” (Söder 2023, 1). This difficulty in pinpointing generalizable characteristics of military responses to environmental change results, arguably, from the absence of recent studies that include both framings of *and* measures in reaction to climate change within a comparative design guided by an external theoretical framework (see however Brzoska 2012a; 2015). Adequately capturing militaries’ environmental entanglements might also require widening the analytical scope to include other ecological crises (Steffen et al. 2015) because they are closely entangled with both impacts of and responses to climate change (Ide et al. 2023).

This article therefore expands our understanding of the role that militaries play in responding to environmental change. It evaluates how NATO member forces frame environmental change and respond with specific measures. These cases are significant for three reasons: First, The alliance actively calls upon its member forces to pursue climate change as a security concern (NATO 2022). Second, the activities of NATO member forces are comparatively well documented. Finally, by studying NATO forces, the analysis covers a group of militaries that recently hastened to reconstruct their capabilities for territorial defense following the Russian invasion of Ukraine. This article thus probes whether military forces maintain their environmental efforts when confronted with severe interstate tensions.

To this end, the study combines two theoretical frameworks. The first differentiates between mitigation, and first- and second-order adaptation as three conceivable sites where militaries can theoretically respond to environmental change. Secondly, a climate policy framework enables the analysis of military responses ranging from awareness and assessment, via planning, to implementation and evaluation (IPCC 2022b, 43). These frameworks are applied in a two-step mixed-methods approach, first by analyzing NATO member awareness, assessment, and planning efforts, thereby expanding a recently published dataset of high-level strategies (Vogler 2023a). This first step distinguishes between forces with major and minor responses to environmental change. In the second step, case studies are conducted on the armed forces of Canada, Estonia, France, Latvia, and Slovenia.

Together, these two analyses characterize the responses of military forces to environmental change. NATO forces are responding to environmental change but prioritize defense capabilities over mitigation and struggle to accommodate defense and disaster tasks, particularly after facing the Russian invasion of Ukraine. Therefore, this study argues that practical military responses to environmental change are emerging but are not substantial, let alone exceptional.

4.2 Theoretical Framework

4.2.1 Policy Options for (Military) Adaptation to Environmental Change

Anthropogenic climate change causes heatwaves, floods, and ecosystem loss. Even with immediate emission cuts, impacts would persist. IPCC reports predict centuries to millennia of unavoidable sea level rise. Swift emission cuts are crucial to prevent further planetary destruction (IPCC 2023, 18).

Climate change and other instances of crossing planetary boundaries directly impact ecosystems and human lives. Environmental change generates unbearable conditions such as heatwaves and undermines livelihoods (Daoudy, Sowers, and Weinthal 2022; Adger et al. 2022), often in areas beyond initial impacts (Franzke et al. 2022).

Moreover, these direct impacts can contribute to second-order consequences such as displacement and conflict. Environmental change can lead to population displacement (Hoffmann et al. 2020), but not everyone is motivated or able to leave affected regions (Koubi et al. 2022). Environmental change is also discussed as a driver of violent conflict (von Uexkull and Buhaug 2021) – though here political and societal factors were found to be more influential (Wiederkehr et al. 2022; Ide et al. 2020; Benjaminsen and Ba 2019).

Militaries can respond to these environmental insecurities at three different sites of intervention. They can mitigate the root problem by reducing emissions and enacting environmental protections (Rajaeifar et al. 2022; Depledge 2023). Secondly, they can undertake first-order adaptation: Apart from efforts to protect their own bases and operability, this mostly includes disaster response missions (Newby 2020). Finally, scholars have warned that militaries could be increasingly involved in second-order adaptation by obstructing migration and intervening in violent conflicts (Oels 2012; McDonald 2018; Simangan 2022).

4.2.2 Military Responses to Climate Change

Responses at different intervention sites do not contribute equally to security from impacts of environmental change (Simangan 2022). Later responses take place, by definition, after significant damages have already occurred, offering limited prevention from future impacts and providing less protection for human and ecological security (Daoudy, Sowers, and Weinthal 2022; McDonald 2021b).

In line with organizational theory, a key concern is that militaries might advocate and implement those responses, in particular, that suit their organizational interest (Vogler 2023b) and therefore would prefer reactive approaches. These would tie up resources in narrow responses to symptoms instead of contributing towards slowing environmental change or protecting vulnerable populations.

Such concerns have led to longstanding scrutiny of military responses to environmental climate change (Barnett 2003; Deudney 1990) and have motivated calls to transform security policy (Trombetta 2008; Floyd 2008; McDonald 2018). A number of studies have investigated what aspects of climate change individual militaries focus on (Brzoska 2012b; Jayaram 2020; Burnett and Mach 2021) and criticized them as the “climatization” of an essentially unchanged agenda or as “greenwashing” (Estève 2021; Bigger and Neimark 2017; Harris 2015). Research has also begun to study the entanglements of nonwestern and smaller militaries in climate security policies (Söder 2023; Jayaram 2021).

However, there are only few comparative analyses of problem framings *and* actual responses by different military forces and they predate the 2015 Paris Agreement and the 2021 NATO Climate Change and Security Action Plan (Brzoska 2012a; 2015). More recent publications have explored how defense departments frame climate and environmental change (Vogler 2023b; 2023a), but these have not assessed policy plans or implementation. Consequently, an up-to-date comparative assessment of how military forces respond to environmental change is still lacking.

4.2.3 Assessing Military Responses to Environmental Change: From Awareness to Evaluation

An IPCC framework can be adapted to analyze military responses to environmental change. The IPCC's Working Group 2 offers a model to assess the actual range of adaptation policy efforts. The model includes five stages that range from awareness and assessment, via planning and implementation, to evaluation (IPCC 2022b, 43; Major and O'Grady 2010).

The first stage, awareness, occurs when an institution recognizes the impacts of environmental change. During the assessment stage, the institution identifies potential risks and impacts (Rumbach and Kudva 2011). This assessment informs the subsequent planning phase, in which the institution formulates "intentions to act" (Gagnon-Lebrun and Agrawala 2007, 398) and proceeds with implementation (Berrang-Ford, Ford, and Paterson 2011).

It is important to note that the range of military responses to environmental change does not reflect progress in a linear sense. To be sure, some problem awareness is a precondition for conscious policy planning and without implementation there is nothing to evaluate. However, public policy research has long shown that the road from problem formulation to implementation and evaluation is anything but straightforward (Lindquist et al. 2021; see already Lindblom 1959; Pressman and Wildavsky 1984) and can just as easily result from bottom-up preference aggregation as from top-down strategy implementation (Sabatier 1986). These caveats still apply (Green, Sterner, and Wagner 2014). Additionally, scholars have argued that the plethora of policies produced by modern democracies has caused bureaucracies to respond with "policy triage", causing selective implementation of planned policies (Knill, Steinebach, and Zink 2023).

The remainder of this paper will outline the research design and then apply the five-stage typology to assess the different range of NATO member force responses to environmental change at the three outlined intervention sites.

4.3 Methodical Framework

This study utilizes a mixed-methods approach. First, it analyses all indications of awareness, assessment, and planning related to climate and any other environmental change in high-level security or defense strategies published by NATO member states since 2015. This initial analysis also serves to identify NATO member forces that indicate a high or medium amount of response activities. In a second step, case studies allow analysis of assessments and plans in more detail and investigation of their implementation and evaluation efforts.

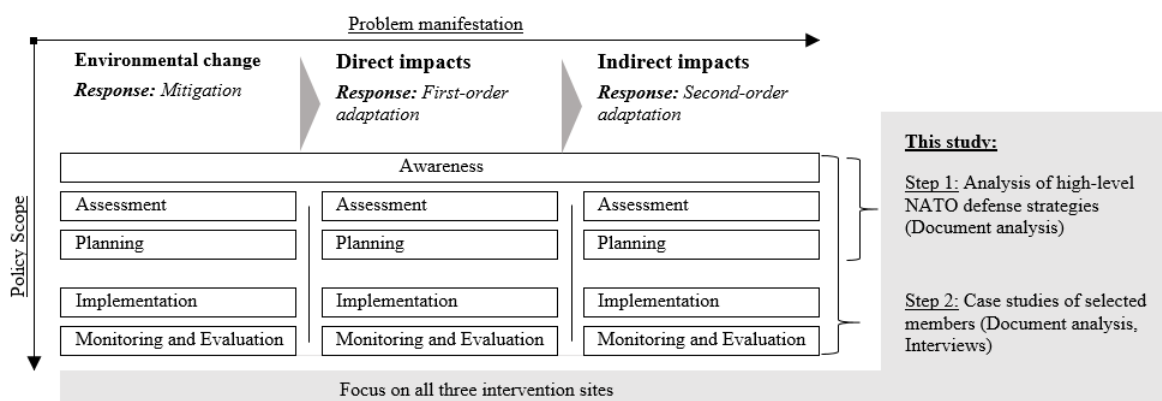
4.3.1 Step 1: High-level document analysis

Overall, NATO member states have made 52 high-level security or defense strategies available since 2015. These cover 27 of the 31 NATO members. Most of these documents were identified in a recent publication of national security and defense strategies (Vogler 2023a). As this study included only documents published up to 2020, further documents were added manually. English versions published after 2015 were not available for Greece, Portugal, and Türkiye – or for Iceland, a NATO member without armed forces.

In line with earlier studies, these documents were analyzed to assess NATO members' awareness, assessments, and planning regarding mitigation, and first- and second-order adaptation. Awareness was assumed as soon as any references to environmental change appeared in high-level security strategies (Brzoska 2015; 2012a). Passages or interviews that specified the impact of environmental change on security were interpreted as assessments (Brzoska 2012a; Burnett and Mach 2021; Vogler 2023a). Planning was identified through announcements or calls for specific responses (Brzoska 2012a; Söder 2023).

This first analytical step expands on an earlier dataset. Most passages indicating awareness or assessment were already identified in a previous study on the framing of environmental and climate change as a security issue. These passages were interpreted as assessments of environmental change (Vogler 2023a). Statements indicating planning intentions were then added to the dataset (figure 4.1).

Figure 4.1: Study design



4.3.2 Step 2: Case studies

Step two of the analysis examines military implementation and evaluation efforts. This is less straightforward, as high-level strategy documents “often say little about what has already been done” (Brzoska 2012a, 172). Tracing this requires the analysis of technical documents and interviews (e.g. Söder 2023; Jayaram 2021). Consequently, case studies are conducted on selected NATO member forces.

The case studies aim to obtain insights that can be generalized to assess patterns among all NATO member forces with at least medium-level responses to environmental change (Lund 2014). Due to the limited number of previous academic studies, the case studies relied on analyzing technical environment-related documents, conducting semi-structured interviews with defense professionals, and consulting third-party grey literature. Where documents were not available in English, AI-based services such as ChatGPT and DeepL were utilized for translation.

To ensure generalizability, this approach follows the idea of a *diverse case* selection, selecting cases that “represent the full range of values” within a case universe (Seawright and Gerring 2008, 300), which here refers to NATO member forces with major and minor response profiles to environmental change. For the purpose of sampling, the study combined first- and second-order adaptation. Case studies were thus selected to include some whose strategy documents indicate little ambition in mitigation and first- or second-order adaptation and others with high values in these regards (see table 4.1).

In practice, data availability constrained case selection. These constraints are hardly surprising as a considerable share of military planning documents are probably classified. Moreover, not all defense departments regularly make available all unclassified documents. Even NATO member forces that have published several environment-related publications might distort the observers’ impression by publishing some information and not others. In order to substantiate the impressions gained from document analysis, the study added interviews with defense practitioners from the selected countries.

Interview requests were made by phone and email to all NATO member state defense departments. Most did not reply, others declined, often tellingly emphasizing time constraints in light of the Russian invasion of Ukraine. Representatives of three member defense departments, however, kindly agreed to interviews in 2022. Following best practices for research on hard-to-access communities, insiders and gatekeepers were involved in facilitating additional inter-

views (King, Horrocks, and Brooks 2018, 30). Several interviewees reached out to their domestic and international colleagues, leading to an interview with a representative of a fourth country. Contacts made at a meeting of researchers and defense practitioners in March 2023 meant a fifth interview could also be arranged. In the end, representatives from Canada, France, Estonia, Latvia, and Slovenia were interviewed. Judging by their high-level strategy statements, these countries represent cases with major (Canada, France), medium (Slovenia), and minor (Estonia, Latvia) response profiles to environmental change (figure 4.2).

The purpose of the interviews was to obtain insights from stakeholders involved in the various defense departments' responses to environmental change. This suggested a focus on knowledge-based questions "about factual information the participant holds" (King, Horrocks, and Brooks 2018, 37) based on the expectation that the information shared would reflect an aggregation of each interviewee's relevant day-to-day activities (von Soest 2023).

Semi-structured interviews were chosen to account for the knowledge-oriented purpose and substantial preexisting theoretical and case-specific knowledge (Morse 2012). However, having only one interview per country, albeit in two cases with several participants, posed a particular challenge. There was no opportunity to iteratively narrow the questionnaire from interview to interview until saturation was achieved. As this became clear early on, the questionnaire combined a degree of more open and more closed questions to account for this one-off nature of the interviews (annex 4.4).

4.4 Analysis

4.4.1 Responses to environmental change in NATO defense strategies

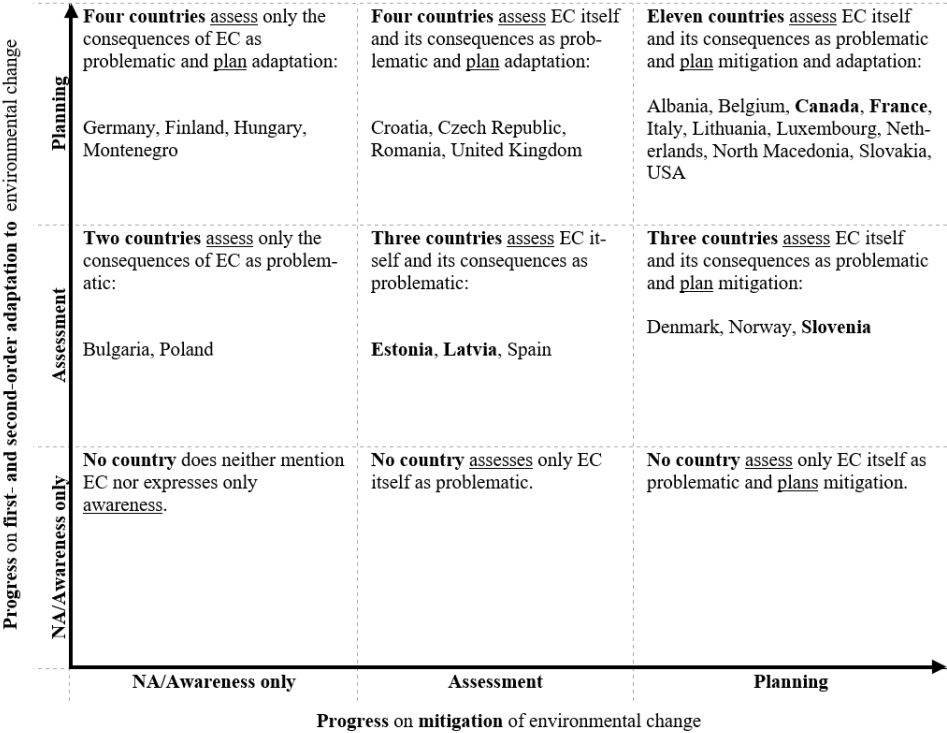
All investigated NATO member forces mention climate change or other environmental problems at least briefly. This confirms at least a minimal level of institutional awareness about those issues among NATO members (annex 4.3). Including strategies published after 2020, the share is even higher than in earlier analyses, which already observed a prominent role for climate security in strategies from Europe and Northern America (Vogler 2023a).

The various high-level documents from NATO member forces highlight different specific risks, but all acknowledge environmental change generally or its direct or indirect impacts. Direct impacts from environmental change are a shared concern among all 27 member forces. Similar to previous comparative studies (Brzoska 2015; Vogler 2023a), warnings about "natural" disasters and their association with climate change are common. Assessments of the other focus points show some variation. Six countries did not assess environmental change itself, and seven

did not refer to indirect, second-order consequences in the documents under investigation (see annex 4.4).

Many countries present assessments of environmental change. In contrast, the strategies reveal limited strategic planning beyond disaster response. Bulgaria, Estonia, Latvia, Poland, and Spain do not provide any specific measures (figure 4.2). Among the remaining 22 forces, 19 plan for first-order adaptation, but only 14 have explicitly announced mitigation plans involving environmental protection measures and/or emission cuts. Second-order adaptation plans remain uncommon. This absence of planning indicates a “planning gap” and resembles earlier observations about the difficulty of translating concerns related to climate security into policy action (Burnett and Mach 2021).

Figure 4.2: Responses to environmental change by NATO members



Note: This figure only reflects statements from high-level strategy documents. Countries included in case studies are printed in bold. “EC” stands for “environmental change”.

4.4.2 Armed forces' responses to environmental change in Canada, Estonia, France, Latvia, and Slovenia

Interviewee availability enabled case studies on the forces of Canada, Estonia, France, Latvia, and Slovenia. Judging by their high-level documents (see figure 4.2), this selection includes cases with very different responses to environmental change.

The Canadian Armed Forces demonstrate a notable commitment in their strategies and were explicitly mandated by Prime Minister Justin Trudeau to “support our whole-of-government effort to reduce emissions, create clean jobs and address the climate-related challenges communities are already facing” (Prime Minister of Canada 2021). They have pledged to engage in environmental conservation efforts and specified emission reduction pathways with periodic evaluations. These goals, however, seem to face challenges typical for forces with ambitious mitigation goals. Canada’s Defence Policy guidelines, published in 2017, declare the goal to reduce their “emissions by 40 percent from the 2005 levels by 2030“, but immediately add that this is “excluding military fleets” (National Defence Canada 2017, 75).

Canada’s military is also undertaking substantial efforts in *responding* to environmental change. This includes regular disaster response deployments in support of civil authorities in Canada and abroad under the operational labels RENAISSANCE and LENTUS (Government of Canada 2023a, 2023b). Part of this effort is the Canadian Armed Forces Reserve that was recently expanded by more than 1,500 additional personnel (National Defence Canada 2017, 110p).

The Canadian defense apparatus is also implementing second-order adaptation. A prime concern of Canada’s foreign and security policy is the increasing geopolitical importance of the melting Arctic. Canada considers the Arctic a region “where issues of climate change, international trade, and global security meet.” While the generally peaceful and “productive” cooperation among Arctic stakeholders is emphasized (National Defence Canada 2017, 50), Canada is investing more than 26 billion Canadian dollars into the North American Aerospace Defence Command (NORAD) until 2042 for capabilities specifically dedicated to its high north (Government of Canada 2022a). In contrast to their mitigation, the Canadian forces have announced the evaluation of first-order and second-order adaptation efforts only for their upcoming Departmental Energy and Environment Strategies.

France has a similarly high profile in military responses to environmental change. They adopted a biodiversity strategy for their military training areas (Républic Française 2021) and are also pursuing emission reduction targets. These efforts have led to overall emission reductions between 2010 and 2022, but this likely resulted partially from the reduction of military personnel over the same period. The French Defense Energy Strategy 2020 specifies further reduction goals for civilian fleets and buildings. However, similar to the Canadian case, these goals exclude emissions from aviation and marine use, though these are recognized as the French forces' largest emission sources. Efforts at reducing these emissions are yet limited to prototype development (Ministry for the Armed Forces France 2020, 30; see annex 4.4).

French forces also engage in first-order adaptation. With over two million citizens living in various overseas territories and extensive ties to formerly colonized countries, France is considerably exposed to climate change impacts. In response, France regularly conducts disaster response missions, trains other forces in this, and has conducted humanitarian operations that provide food or water supplies (see annex 4.4).

But French forces also claim a role in responding to second-order consequences such as climate-related migration and violent conflicts (see annex 4.4). For example, the French MoD's *Observatoire Défense et Climat* has been associated with an agenda of reactive militarized responses to climate impacts that are particularly problematic in the context of long-standing French geopolitical interest in the Sahel region (Estève 2021; see also Charbonneau 2022 and Daoust and Selby 2022). Similarly, the *Observatoire's* frequent publications contain statements on achieved progress and seek to constantly raise issues related to the defense-climate nexus.

It is instructive to compare the well-researched cases of the Canadian and French forces' responses to the activities of smaller and likely less involved militaries. The Slovenian military also emphasizes conservation efforts (Slovenska Vojska 2023) but does not seem to have specified emission reduction goals. This small country, however, is leading several research projects focused on reducing military emissions, including those resulting from actual military use. These include RESHUB, a project with several European partner nations that aims at developing a hydrogen infrastructure (European Defense Agency 2023).

Slovenia's adaptation efforts seem to be still in their nascent phase. Slovenia's defense department published a number of threat assessments on issues such as pandemics, wildfires, and floods in 2015 and 2016. It is telling that these documents refer to climate change only very briefly. However, after devastating forest fires in 2022, Slovenia's ministry of defense purchased four new firefighting planes and intends to deploy them also in other European countries

in disaster response missions. Publicly visible second-order adaptation remains limited to a brief assessment in Slovenia's 2020 Defence White Paper, vaguely linking climate change to "illegal mass migration" (Slovenia Ministry of Defense 2020). In extension, the publicly available evaluation of climate-related activities remains limited to a few environmental impact assessments.

Estonia and Latvia did not present planning-stage efforts related to environmental change in their high-level documents. The case studies confirm this smaller response range. Estonia seems to focus mainly on climate mitigation, listing numerous mitigation efforts in reports and policy documents, such as the development of hydrogen power generators, renewable energy plants at military training areas, and hybrid and electrical mobility plans (annex 4.4).

By contrast, adaptation efforts seem limited. Compared to Slovenia, Estonia has so far been spared large wildfires and other major disasters. As one interviewee stated, "they don't feel climate change here". This is also reflected in less pronounced disaster response efforts. High-level planning documents do not call upon the Estonian armed forces to undertake disaster response and there is also little other evidence that they are expected to play such a role. Second-order adaptation planning is slightly more advanced, though involvement of the Estonian armed forces remains indirect. This notably included a study on the implications of a melting Arctic for Estonia and efforts to address climate-related migration during Estonia's non-permanent membership of the United Nations Security Council (Loik and Jürgenson 2023).

Latvia's efforts resemble in many ways those of Estonia. Tallinn's defense department published an environmental strategy in 2017, announcing mitigation plans. The strategy includes measures in the building and civilian vehicle fleet sectors as well as afforestation efforts and investments in alternative fuels but does not specify targets.

Latvian forces also deployed in disaster response. The Latvian forces purchased several new helicopters that can also be used to fight wildfires. Interviewees also confirmed the purchase of other equipment for disaster response. The Latvian military, however, does not yet prioritize responses to potential second-order consequences from environmental change. As in the cases of Slovenia and Estonia, Latvia's 2019 National Security Concept warns that climate change might lead to increased migration, but interviewees stated that the defense administration is not yet planning for such issues. Furthermore and similar to the Estonian armed forces, no efforts related to evaluation were found and the interviewees shared time constraints as an obstacle to more systematic efforts (annex 4.4).

4.5 Discussion: Capabilities first, defense first, disaster response second?

Common features stand out in the militaries' responses at each focus point. Having been observed for NATO forces with a higher and a medium climate policy profile alike, they are likely to indicate some generalizable characteristics of military-led climate responses.

First, military forces do not commonly pursue mitigation efforts. If they do so, they implement them in questionable ways or with little ambition. Above all, militaries never sacrifice capabilities to reduce emissions. Even France and Canada strive for binding emission reduction efforts only in areas circumstantial to military use. They commit to reducing emissions from barracks and civil vehicle fleets but not from military use. To be sure, it is far more challenging to reduce the emissions of heavy floating, let alone flying machinery, and the investigated forces already engage in various efforts such as climate-neutral field camps and even the development of hydrogen-fueled armored tactical vehicles (annex 4.4).

Still, they emphasize that capabilities always outweigh emission-related considerations. Canada's armed forces claim to remain "as committed as ever to reducing our greenhouse gas (GHG) emissions while remaining operationally effective" (National Defence Canada 2020). Similarly, the French Climate and Defense Strategy declares a readiness to "contribute to the collective effort towards the energy transition" but simultaneously "must continue to assert the requirements of its mission to protect France's interests and its freedom of action" (Ministère des Armées 2022). The environmental strategy of Estonia's MoD even states – in bold type – that "environmental and climate policy objectives will be taken into account to the extent that they do not conflict with the needs of the organisation of national defence" (Estonian Ministry of Defense 2021).

One approach to emission reductions that promises to protect military capabilities focuses on efficiency gains in military energy use. For example, the French MoD's 2020 energy efficiency strategy promises to make "energy transition an operational advantage" by "seeking energy efficiency [...] and optimising consumption" (Ministry for the Armed Forces France 2020, 5; see annex 4.4). This approach is certainly not without pitfalls. The documents imply the expectation that increased energy efficiency will reduce overall emissions. But is this plausible? The French MoD's strategy already eyes "the possibility of integrating new weapons that are highly energy intensive (railguns, directed energy weapons, etc.)." How likely is it that military institutions, mandated with existential tasks, will not end up using the capability of moving a certain tonnage at half the energy to simply develop heavier, more capable military vehicles (see York 2006)?

Military forces are mandated to field heavy capabilities as directed by their governments. To be sure: It benefits the climate if they reduce their emissions. But reductions do not automatically follow from gains in efficiency, freed-up money, or reduced energy import dependency. Rather, military forces are entangled in path-dependencies of fossil fuel consumption (Belcher et al. 2020). The exclusion of actual military emissions from reduction targets and the risks of recommitting efficiency gains confirm a long-standing notion: Militaries prioritize their capabilities not emission cuts.

Second, it becomes increasingly apparent that military forces have only limited capacities to respond to growing calls for disaster response – and they increasingly express concern at potential overburdening. Disaster response is frequently discussed as a military contribution to adapting to environmental change (Brzoska 2015). Canada and France in particular regularly field substantial deployments to assist civil authorities in responding to disasters such as floods or wildfires at home and abroad (see annex 4.4) – in the case of France with a special focus on former colonies. Similar to France, the United Kingdom and the Netherlands announced continued efforts towards disaster-related resilience in their former colonies, Overseas Territories and Commonwealth members in their defense strategies (annex 4.1). Moreover, some defense strategies mention disaster response as the only potential military contribution in response to environmental change.

But these activities place a high burden on existing defense capacities. The limits to the availability of military disaster capabilities are beginning to show. The French *Observatoire Défense et Climat* called for “reflections on the maintenance of this capacity [to conduct humanitarian food security missions] in a context of simultaneous mobilisation [...] and/or of an HADR [humanitarian assistance and disaster relief; AV] [...] as this type of operation is likely to become more frequent because of the multiplication of climatic hazards” (Observatoire Défense et Climat 2023, 15). In Canada, military disaster responses have even become so substantial that, as early as 2018, the Canadian Chief of the Defence Staff called them “almost routine” to which the annual planning cycle had to be adjusted (cited from Leuprecht, Christian; Kasurak, Peter 2020).

Third, the revival of tensions with Russia has impacted the activities of NATO member militaries directed at environmental change, particularly since Russia’s full-scale invasion of Ukraine in 2022. The conflict has caused various forms of friction at defense policy and military levels and has been widely referred to in defense strategies published since it began. It increased the existing challenges of fulfilling both disaster response and defense tasks, caused additional

implementation challenges and, in the case of Canada, aligned with concerns relating to Arctic melting, motivating substantial investments in territorial defense infrastructure.

Conventional defense and climate security seem particularly at odds among the smaller forces of Central Europe, which have long been warning about an aggressive Russian foreign policy. A Washington Post article quoted Slovenian Major General Robert Glavaš in 2022, describing “a dilemma [about] how to balance” the simultaneous demands on his forces emerging from the Russian invasion and domestic wildfires. He further noted that “at one point you need to decide what is important, this or that” (Washington Post 2022).

It seems that the Latvian government has already made this choice, pledging to donate its entire helicopter fleet to Ukraine (Latvia Public Broadcasting 2023)¹ although it has occasionally relied on them for wildfire fighting missions (annex 4.4). This will likely reduce the Latvian armed forces’ disaster response capacity. Finally, interviewees from Estonia described how the preparation of military training areas has gained a new urgency and binds substantial resources that would otherwise be invested into environmental policy efforts (annex 4.4).

Curiously, Canada’s growing hostilities with Russia seem not to subtract from climate-related security concerns but have rather turned the armed forces into a site of contestation over the right approaches to climate security. Increasingly dramatic wildfires have generated calls for first-order adaptation and mitigation by expanding the Canadian forces’ disaster response role and military emission cuts. Simultaneously, the increasingly accessible “northern approaches” draw the attention of the Canadian defense establishment to measures of second-order adaptation. The Russian invasion led to Western nations limiting their Arctic Council participation (Government of Canada 2022b), jeopardizing elements of Arctic policy that had previously been fairly cooperative (Roberts 2021; Nicol and Heininen 2014). Indeed, a few months after the war began, the Canadian government signed off the costly NORAD upgrade decision (Government of Canada 2022a).

Finally, France is a different case once again. When asked about the implication of the invasion, the French interviewee referred less to capacity tradeoffs, highlighting instead challenges to France’s global supply chains (annex 4.4). Motivated by its longstanding entanglements and interventions within the Francosphere, climate change impacts have long been perceived, and institutionalized, as issues of geopolitics and security (Estève 2021; Charbonneau 2022). While supporting Ukraine politically and militarily, the French government has not majorly reoriented its security and defense policy since the Russian invasion of Ukraine (Fofack 2023; Weck

2023). The French government announced a substantial increase in its defense spending in January 2023, but the budget's allocation signals a continuation of France's global focus rather than a shift to territorial defense (Caulcutt & Kayali 2023).

Taken together, these observations seem to allow a third and final conclusion about the responses of defense establishments to environmental change. When governments prioritize security responses to major interstate conflict, then environmental efforts are placed under strain. However, this does not mean that NATO forces have abandoned their focus on environmental change. Environmental concerns might have partially resulted from a need for new tasks after the Cold War (Floyd 2008) – it seems, however, that NATO members' defense policies now perceive them to be an issue that will remain.

4.6 Conclusions

This investigated NATO member forces to expand our understanding of militaries as actors in global environmental politics. It evaluates their efforts to address environmental change and its first- and second-order impacts using a five-stage IPCC framework covering awareness and assessments, planning, implementation, and evaluation. The first three stages are assessed across all member states based on their defense strategies. Case studies of five notable instances were added to study implementation and evaluation.

The document analysis indicated a “planning gap”. All militaries assessed environmental change or its impacts at least briefly, but actual plans were less common and dominated by first-order adaptation via disaster response. Only roughly one country in two declared an intention to involve the military in emission cuts or environmental protection. Finally, public plans for second-order adaptation remain particularly rare. Only Belgium, Luxembourg, and the United States explicitly link environmental change to new or growing peacekeeping/ stabilization tasks.

Three generalizable insights stood out. They cast doubt on the ability of militaries to play a constructive role in responding to environmental change. First, maintaining firepower is always prioritized over environmental goals (see also Dalby 2018c). Even the most ambitious forces commit to emission reductions only for buildings and logistics vehicle fleets. Emissions from actual military operations are, at best, approached by calls for greater energy efficiency and long-term prototyping projects. Second, while the strategy documents prominently announced military disaster response roles, the case studies revealed that forces struggled to fulfill this growing task *and* to pursue their conventional defense tasks.

Finally, the Russian invasion of Ukraine brought territorial defense back into the focus of NATO member militaries. This affected member states differently, depending on their previous circumstances. It appears that the French armed forces did not shift much of their focus away from humanitarian and stabilization-related efforts in the Global South. By contrast, Central European forces from Slovenia, Latvia, and Estonia reflect their far more immediate concerns with Russia's invasion of Ukraine. In more than one instance, these defense efforts sidelined climate-related considerations. Finally, Canada seems to have become a site of contestation over which implications to draw from climate change for defense activities. The North American state's military engages in disaster response efforts and is pursuing some emission reductions. However, while the renewed emphasis on interstate war does not seem to compete with climate security considerations, it draws attention to second-order adaptation by gearing up the defense infrastructure along its northern coast.

These observations sharpen our understanding of the roles that militaries currently play in response to environmental change. They add to concerns about military forces' ability to contribute in meaningful ways to safe Anthropocene futures (Simangan 2022; McDonald 2018; Barnett 2003). The analyzed strategies show growing degrees of reflection on environmental change (see also Vogler 2023a) but often avoid specifying tasks, particularly outside the realm of applying force in an organized way (see also Brzoska 2015). To be sure, some militaries have made greater efforts or commitments. These include the French, Canadian, and US militaries as well as some smaller forces. But mitigation in the form of cuts in emissions is not a top priority even for them, and their contributions to first-order adaptation face capacity constraints – particularly in times of peer-to-peer conflict. Finally, second-order responses are underspecified and are unlikely to contribute to long-term human or ecological security outcomes in any case (McDonald 2018).

These findings have several political implications. First, including the considerable (Crawford 2022) but poorly documented (see however Crawford 2022; Belcher et al. 2020) military emissions in reporting and reduction activities is a prerequisite for meaningful mitigation and a requirement for governments to meet their fast-approaching net-zero deadlines (see also Rajaeifar et al. 2022). Secondly, there are limits to military disaster response contributions. As extreme weather events grow increasingly severe, even this lender of last resort struggles to provide security. Thirdly, militaries so far seem to have undertaken little specific planning for second-order adaptation by means of peacekeeping and/or stabilization operations. Arguably, this is good news, given that military responses can do little to resolve environmental change and its direct impacts. In any case, democratic societies will have to deliberate on the extent to which

they want to involve their militaries in disaster response and should consider serious guardrails on militarized responses to second-order impacts (see also Simangan 2022; McDonald 2021a). Further research should continue to monitor the actual responses of military forces to environmental change. Research access to armed forces is difficult, and empirical observations are therefore worth sharing. Triangulating the case studies presented here with further interviews would be just as desirable as gaining access to large militaries that have so far published only few plans in response to environmental change, such as Germany, Finland, or Poland. Such studies could further elucidate how conventional security actors respond to the challenges of the Anthropocene. However, as even the most active NATO member forces have shown limited activities, these studies will probably not affect the conclusion that military forces are falling short of the exceptional measures needed to respond to environmental change in the Anthropocene.

Note

¹Latvia's Prime Minister Krišjānis Kariņš stated on June 21, 2023, that Latvia would transfer all of its helicopters to Ukraine. It is, however, possible that this refers to the aircraft from Soviet times and excludes the two modern MH60 Black Hawk helicopters recently received from the US.

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Declaration of competing interest

None.

Supplementary material

Annexes 4.1-4.3 (calculations on the coverage rates for awareness, assessment, planning stages) and annex 4.4 (case studies on CAN, FRA, SVN, EST, LVA).

Chapter 5: Not so Green Defense?⁴

A Literature Review on Ecologically Relevant Military Activities

Abstract

Military forces have a complex relation to the environment. They have a destructive impact on ecosystems. At the same time, many react ambiguously to environmental degradation and climate change. This article provides a framework for the study of military-environment interactions. Drawing on the literatures from political geography, decolonial studies, climate conflicts, environmental peacebuilding, securitization and climate human security, it presents a conceptual, three-dimensional typology of ecologically relevant military activities. The article argues that these activities can be differentiated by (1) whom they affect, (2) why they are undertaken, and (3) how, i.e. by what means, they are conducted. Guided by this typology, the article presents the first literature review of ecologically relevant military activities. It finds that existing research documented four military roles vis-à-vis the environment. Militaries conduct climate security policies, but also remain complicit in environmental destruction, are engaged in Anthropocene geopolitics, and, at times, obstruct conventional climate policies by lobbying. Together, the findings suggest that militaries struggle to accommodate their national security mandates with the Anthropocene's global security requirements.

5.1 Introduction

The Anthropocene is characterized by a number of existential dangers stemming from human agency (Sears 2021). Climate change and environmental degradation feature prominently among these processes of global insecurity (Goldstein 2016; McDonald 2021b). These challenges, however, inherently evade conventional security policy. Anthropogenic emissions and environmental degradation endanger ecosystem integrity and human security (McDonald 2018; Daoudy, Sowers, and Weinthal 2022). They entrap vulnerable populations and aggravate violence in fragile political settings (Koubi et al. 2022; Wiederkehr et al. 2022).

Stemming from unsustainable modes of production and complex political problems (Dalby 2018c; Ide et al. 2020; Wiederkehr et al. 2022), climate change is a textbook example for global security challenges whose “forces of destruction” are at odds with conventional state-driven “modes of protection” (Sears 2021, 2). This challenges the centrality of nation states as security providers (Cappella Zielinski, Schilde, and Ripsman 2021; Hameiri, Jones, and Sandor 2018) and casts doubt on conventional norms of security (Burke, Lee-Koo, and McDonald 2016; Floyd 2019) as it cannot be addressed by militaristic means of security (Simangan 2022).

⁴ This chapter is under review as single-authored article in the double-blind peer-reviewed journal *Contemporary Security Policy*. Formatting and table and figure names slightly adjusted to match the cumulative dissertation's layout.

Moreover military forces are an important actor in generating environmental insecurity (Rajaeifar et al. 2022; Alvarez, Shtob, and Theis 2022). For example, a report by the Conflict and Environment Observatory estimates that military forces around the world would be the fourth largest emitter of carbon dioxide, if merged into a single nation (Parkinson and Cottrell 2022). The Russian invasion of Ukraine is just the latest case of warfare-related damages to the local environment and the global climate (Pereira et al. 2022). Not least, military spending prevents enormous budgets from being spent on climate and environment (SIPRI 2023).

Nevertheless, research found military forces to engage with environmental change (Depledge 2023; Burnett and Mach 2021; Jayaram 2020). Beyond adjusting their strategic planning (Brzoska 2015; Gilbert 2012), armed forces are, for instance, expanding their disaster response capabilities (Busby 2021; McDonald 2021a) and are reducing their environmental impacts (Powell-Turner, Antill, and Fisher 2016; Hinata-Yamaguchi 2016). As a further complication, some military responses to environmental change have been found to *increase* insecurity (Estève 2021; Bigger and Neimark 2017; Harris 2015).

This means that military forces are contributing to a problem that they cannot effectively solve—while they simultaneously respond to it with ambiguous results. Scholars discuss these ambivalent military-environmental interactions (Depledge 2023; Söder 2023) but rarely compare across militaries or make systematizing arguments (see however Jayaram and Brisbois 2021; Brzoska 2015). Discussions on armed forces are virtually absent even in otherwise excellent reviews of environmental peace and conflict literature, indicating profound uncertainty about the role of military forces as a national level responder to the global security challenge of environmental change (see e.g. von Uexkull and Buhaug 2021; Sharifi, Simangan, and Kaneko 2021; Mach et al. 2020; Koubi 2019).

This is the gap that this article seeks to fill. It asks how military forces interact with the environment and what these interactions imply for global security. Drawing on environmental peace and conflict research, the paper develops a typology of ecologically relevant military activities. Structured by this typology, it provides the first literature review of existing research on military-environment interactions. By analyzing the fast-growing but highly fractured literature, the review finds military forces environmentally entangled through the four roles of (1) complicity in environmental damage caused by military conduct; (2) military climate security policies; (3) the militarization of the Arctic as a case of Anthropocene geopolitics; (4) obstruction of domestic climate policies by lobbying efforts.

Together, these activities indicate how militaries inherently harm the environment in pursuit of a country's national security and how they simultaneously respond to environmental change but often struggle with, and sometimes even interfere with, environmental protection.

After this introduction, the article outlines how different streams of environmental peace and conflict research implicitly conceptualize the role of armed forces and develops the typology of ecologically relevant military activities. Subsequently the article presents the method used to review the literature and then presents the four major topics in existing research on the military-environment nexus. Drawing on the review, the article concludes that military forces play an often questionable role in responding to environmental change and, thereby, in maintaining global security.

5.2 Theorizing the Military as Ecologically Relevant Actor

Environmental peace and conflict research expanded rapidly over the last decades (see, e.g., von Uexkull and Buhaug 2021; Ide et al. 2021) and firmly established itself in several major research streams (Ide et al. 2023). Simultaneously, the literature on military forces as ecologically relevant actors is growing (Söder 2023; Depledge 2023; Jayaram and Brisbois 2021). The latter is, however, insufficiently linked to the former. Tellingly, prominent reviews of the environmental peace and conflict literature barely discuss the specific role of armed forces (see e.g. von Uexkull and Buhaug 2021; Sharifi, Simangan, and Kaneko 2021; Mach et al. 2020; Koubi 2019).

This disconnect disguises, arguably, that environmental peace and conflict research implies the study of ecologically relevant military activities (see e.g. Ali and Pincus 2018). One reason might be that the streams are inherently inclined to focus on different aspects of ecologically relevant military activities. The conceptual space for such activities remains therefore fractured and at times implicit. To make these arguments explicit and to transform them into an integrated framework, this section discusses the contributions of environmental security's different sub-fields to an understanding of armed forces as an environmentally relevant actor.

Political ecology and decolonial approaches seem particularly outspoken about military conduct. They both explain environmental conflict by means of underlying power structures reflecting ongoing injustices (Ide et al. 2023). While they make different emphases when characterizing the roots of these injustices, they arrive at similarly fundamental critiques of prevailing political structures. Political ecologists link unjust access to natural resources and their unsustainable use to neoliberal and capitalist policies (Tschakert 2012; Le Billon and Duffy 2018).

Decolonial approaches emphasize prevailing colonial power relations that manifest in structural and cultural hegemonies (Rodríguez and Inturias 2018).

Both critiques therefore identify military forces as inevitably tied to the (re-)production of these inequalities, for example via their role in enforcing neoliberal peacebuilding regimes (Vélez-Torres et al. 2022), Western interventionism in defense of existing power structures (Hartmann 2010), or the logic of unilateralism (Surprise 2020). Arguably, this perspective is particularly conducive to identifying and explaining ecologically relevant military activities that have an external focus and aim at maintaining the status quo.

The research streams of climate conflict research and environmental peacebuilding share the focus on local institutions but seem less concerned with the global structures behind them. Contemporary climate conflict research provides an understanding of the societal and institutional circumstances under which environmental change affects conflict dynamics (Mach et al. 2020; von Uexkull and Buhaug 2021). This was certainly incentivized by the environmental peacebuilding literature that responded to earlier, less nuanced studies (Ide, Bruch, et al. 2021). This research stream emphasizes a relation in the opposite direction, i.e., of warfare on the environment (Ide et al. 2023)—and points to pacifying potentials of institutionalized practices such as natural resource management (Johnson, Rodríguez, and Quijano Hoyos 2021; Krampe, Hegazi, and VanDeveer 2021).

Climate conflict and environmental peacebuilding research observe the impacts of local institutional contexts on conflict dynamics and arrive at ideas about what sets alienating and pacifying institutional designs apart (Schleussner et al. 2016; Ide et al. 2020). Explicit discussions of military forces in this stream are surprisingly rare (see however Ali and Pincus 2018; Charbonneau 2021) but this is not a fundamental obstacle to recognizing that military organizations can impact on conflict dynamics in different ways depending on factors such as democratic control or ethnic composition (Morency-Laflamme and McLauchlin 2020; however Hazelton 2019). These approaches are set up to trace the diversity of impacts from military activities on the natural environment and also to evaluate them for their impact on institutional scope conditions of environmental conflict.

Studies of climate securitization and its impacts on human security discuss the very meaning of security. Securitization studies reveal the processes through which goals and means of security policies are shaped and transformed (Buzan, Wæver, and Wilde 1998; McDonald 2013). These approaches are complemented by investigations of climate change impacts on human security

(Adger et al. 2022; Dalby 2013a). Securitization approaches warn that reframing climate impacts as national security issues might serve to justify misguided policy responses detrimental to human security (Daoudy, Sowers, and Weinthal 2022).

Securitization studies place military reactions to climate change in this category of ill-intended responses for a number of good reasons (Detraz and Betsill 2009). Military forces are heavy emitters (Barnett 2003; Dalby 2018c) and divert governmental budgets away from climate policy (Brzoska 2009; Floyd 2010, 192). Studies also describe a military inclination to assess environmental change as yet another issue best addressed by using force (Estève 2021).

However, climate securitization researchers do not consider this to be inevitable. Security practices can be transformed, and the political consequences of securitization vary from case to case (Floyd 2010; Trombetta 2008; see also Egeland 2022). Securitization studies also find military approaches to climate security to be heterogeneous (von Lucke, Wellmann, and Diez 2014, 865; Brzoska 2015) and sometimes even reluctant (Rothe 2017, 190). Studies of climate securitization are thus conceptually equipped to grasp environmentally harmful military activities without precluding the emergence of practices with more constructive impacts on human and environmental security.

These observations show, again, how several streams of environmental peace and conflict research complement each other. Every one of the outlined research branches contributes to a better understanding of ecologically relevant military activities (see also table 5.1).

Table 5.1: Perspectives of environmental peace and conflict research streams on military forces

Streams	Predominant conceptualization of military forces
Decolonial approaches and political ecology	Focus on military activities that lead to environmental destruction and the reproduction of injustices/hierarchies of exploitation.
Climate conflict and environmental peacebuilding	Rarely makes explicit remarks on the military. Focus on features of institutions (implicitly including militaries) that are conducive/detrimental to preventing climate-related violence.
Securitization and human security	Military may change its means or relabel old issues (“climatization”). Ambiguity regarding their ability to adapt their institutional purpose towards inclusive security

5.2.1 A Typology of Ecologically Relevant Military Activities

A comprehensive understanding of how military forces' actions affect the environment requires, however, interdisciplinary dialogue across these streams. Drawing on existing literature, this article suggests a conceptual, three-dimensional *typology of ecologically relevant military activities*. The core purpose of this conceptual typology is to “explicate the meaning of a concept by mapping out its dimensions” (Collier, LaPorte, and Seawright 2012, 218). It focuses on the concept of ecologically relevant military activities defined as all activities undertaken by regular military organizations that have a positive or negative impact on the natural environment.

This article argues that the dimensions of ecologically relevant military activities are (1) whom they affect, (2) why they are undertaken, and (3) how, i.e. by what means, they are conducted: These three different dimensions are mutually exclusive and collectively exhaustive. Accordingly, they “serve to identify and describe the phenomena under analysis” (Collier, LaPorte, and Seawright 2012, 218) and enable a parsimonious yet comprehensive categorization of observed ecologically relevant military activities.

The first dimension focuses on whom a given activity affects. Ecologically relevant military activities can either predominantly affect the military itself or a third party. Internal activities are those that primarily strive to adjust a military force's own conduct, for example, by introducing waste treatment guidelines (Powell-Turner, Antill, and Fisher 2016) or measures that ensure military operability under a changing climate (VanDervort 2020). Outward-directed activities are primarily intended to affect other national or international stakeholders, for example by disaster response (Busby 2021), violent operations against irregular logging or cattle raids (Spring 2021; Egeru 2016) or environmentally destructive warfare (Pereira et al. 2022).

The second dimension differentiates ecologically relevant military activities regarding to the purpose for which they are undertaken. While possible purposes cover a virtually unlimited range and are often far from transparent, they can often be distinguished by the degree to which they go beyond a military's original purpose—to organize and apply force as directed by a national government. Many ecologically relevant military activities serve entirely this original purpose. In its most drastic form, this includes the—externally focused—activity of intentional large-scale environmental destruction during warfighting, such as the defoliation of forests in Vietnam (Frey 2013).

However, ecologically relevant military activities can (also) serve the novel purpose of seeking to alleviate environmental harms inflicted as a result of military conduct. Many ecologically relevant military activities that reduce environmental harms are dual purpose, as the pursuit of the ecologically relevant goal has beneficial side-effects for a military’s original purpose. The introduction of biofuels is a case in point (Bigger and Neimark 2017). Moreover, some activities are primarily aimed at reducing environmental harms. For example, the internal introduction of environmental compliance audits arguably serves to reduce environmental harm from military conduct (Hepler and Neumann 2003; see however Durant 2008).

The third and final dimension distinguishes ecologically relevant military activities by the novelty of employed means. Regardless of recipient and purpose, ecologically relevant military activities can consist of long-established conventional activities that happen to be ecologically relevant, or adopt new procedures. The most prominent ecologically relevant use of conventional means is the environmentally destructive application of force. Reactive activities include, for example, conventional military operations carried out by the Ghanaian armed forces against artisanal mining, allegedly responding to the need to protect increasingly scarce water resources (Hilson and Maconachie 2020). By contrast, reactive activities can also entail entirely new activities, such as afforestation (Brzoska 2012b; United Nations Peacekeeping 2020).

The remainder of the article draws on this typology (see also table 5.2) to structure a literature review of studies on ecologically relevant militaries. Existing studies frequently identify them as ecologically harmful byproducts of the military's pursuit of national security, thereby jeopardizing the environment. Others have been found to arise from responses to environmental change, yet they can prove dysfunctional or even outright ecologically detrimental. This underscores the challenge armed forces face in effectively protecting the environment, even when they intend to do so. Together, these observations indicate that ecologically relevant military activities create and exacerbate tensions between national security and the environmental component of global security.

Table 5.2: Ecologically relevant military activities

Ecologically relevant military activity	Recipient <i>Is this activity primarily directed at the military or at external actors?</i>	Novelty of purpose <i>Does the activity primarily aim at maintaining/ applying force or at alleviating environmental impacts?</i>	Novelty of means <i>Does the activity involve techniques newly adopted in response to environmental change?</i>
Negative environmental or climate-related impacts as byproduct of military conduct	External actors	Maintain/apply force	No
Emerging military climate security practices	Both	Sometimes	Sometimes
Arctic militarization	External actors	Maintain/apply force	No, but applies old techniques to a new area
Military interference with climate policy	External actors	Maintain/apply force	No

5.3 Study Design

This article reviews the literature on ecologically relevant military activities to discuss how these interactions play out and affect global security. This review compiles a list of all peer-reviewed journal articles that refer to both armed forces and environmental issues in their title or abstract. Three different search strings were used to collect such articles from the Web of Science database (see annex 5.1 for detailed search strategy and bibliometric details).

The search results included a number of irrelevant papers, which were then removed manually. The revised list of 210 academic journal articles on the military-environment nexus portrays a fast-growing but highly fractured field. Over 40 percent of these papers were published between 2018 and 2022 (see annex 5.2 for a full list of these papers). These papers are thinly spread across over a range of 143 different journals. After the MDPI⁵ journal *Sustainability* (8 articles), the *Bulletin of the Atomic Scientists* (6 articles), the *Journal of Peace Research*, *Political Geography*, *Environmental Science and Pollution Research* and *Science of the Total Environment* (5 articles each) published the most articles on the subject.

The topics covered in each paper were summarized in brief notes and these then condensed into four main themes that represent the state of research on ecologically relevant military activities. Each of these themes serves to substantiate a claim on the role that military forces play in the struggle for global security in the Anthropocene.

5.4 Military Forces as a Tension Point between National and Global Security

Existing research on ecologically relevant military activities predominantly focused on four topics. Each of them reflects a set of ecologically relevant military activities that can be characterized by drawing on the three features of the typology outlined in the theory section.

It is conducive to the argument of this analysis to sort these topics by the dimension of purpose. As a first major topic, research has documented negative environmental or climate-related impacts as a byproduct of military conduct. This topic differs from the others as it comprises a long-standing status quo resulting from military activities in the pursuit of a country's national security at the expense of the environment.

⁵ The literature search results included eight articles from journals published by MDPI (included in annex 5.2). This review article excludes these articles from further discussion, as there is substantial concern over the predatory nature of MDPI (Oviedo-García 2021).

In contrast, the other three topics all revolve around militaries' various responses to environmental change. This group of topics comprises substantial evidence for how armed forces respond to environmental change but often struggle with, and sometimes even interfere with, environmental protection. This includes, as second topic, a range of military activities aimed at alleviating environmental impacts through emerging climate practices. Topic three shows, however, the militarization of the melting Arctic as another form of response. Finally, studies traced cases where military forces and defense departments interfered with climate policies.

5.4.1 Complicity: Environmental change as byproduct of military conduct

Substantial literature documents the inherently damaging impacts of military activities to the natural environment, sometimes even intentionally. In the typology, these activities are directed at external actors and the dimensions of means and purposes are conventional. They embody the pursuit of national security at the expense of the environment. However, several cases of successful civil resistance against environmentally destructive military construction projects show that military-driven environmental harm is not inevitable.

One central but poorly documented aspect is the case of military emissions. Reporting requirements under the UNFCCC are, at best, limited (CEOBS and Concrete Impacts 2022) and the accuracy of accounting mechanisms has been questioned (Weir 2022). According to estimations, the aggregated annual emissions of the world's militaries would rank them fourth in a country ranking (Parkinson and Cottrell 2022) and the US Department of Defense is the "world's single largest greenhouse gas emitter" (Crawford 2022, xvi).

Case studies documented how military bases generate harms to human or environmental security as a byproduct of conventional, internal military activities. Decolonial approaches traced, how the construction of a US Navy base at Vieques, a small island east of Puerto Rico, caused the forced displacement of locals, thereby merging colonial legacies with environmental injustice (Yelin and Miller 2009). Another study found that census tracts closer to Nellis Airforce Base in Las Vegas had higher estimated risks of cancer from toxic pollutants (Alvarez 2021) and described the environmental impacts of a US military base on Okinawa island (Hook 2010). Studies also emphasized the longevity of the harms done by national security facilities to human and environmental security. The vegetation of former military camps shows impacts even six decades later (Ylisirniö and Allén 2016). In a case study on two closed Californian military bases, Lindsey Dillon pointed out how the reconstruction of these areas produced substantial toxic waste that is relocated to other areas in a process of "slow violence" (Dillon 2015). Another study pointed out how climate change-related glacier melting might cause waste from

secret US military bases on Greenland to resurface and could lead to international tensions (Colgan 2018).

Beyond this peacetime conduct, actual warfighting and other operations severely harm the environment and climate. Recent studies have discussed the devastating impacts of the Russian invasion of Ukraine on forests, soils, and biodiversity (Rawtani et al. 2022; Pereira et al. 2022) or “slow violence” as byproduct of the heavy militarization of the Himalaya border regions between China, India, and Pakistan (Davis et al. 2021).

Environmental damage arises during violent conflict not always unintendedly but has also repeatedly been caused intentionally. Studies have traced how conflicts create opportunities for environmental crimes, such as illegal waste dumping or ore-trafficking by militias (Hägerdal 2021; Mantz 2018, 543). The United States’ “war on drugs” involved intentional fumigation of coca plantations in Colombia by aerial disposal of glyphosate and other pesticides with destructive side-effects on local ecosystems (Smith, Hooks, and Lengefeld 2014). Moreover, there is a debate over whether wildfire damage inflicted during Turkish operations against Kurdish groups was caused intentionally (Dinc et al. 2021; van Etten et al. 2008).

There is a particular focus in the literature on US military operations in Vietnam, the Gulf War, and elsewhere. The intentional use of defoliating herbicides in Vietnam is an archetypical case for research on environmental warfare (Frey 2013). While it offered limited strategic value (Martini 2012) it devastated the environment (Truong and Dinh 2021).

Environmental warfare impacts human security as well. Gulf War veterans struggled for recognition of “Gulf War Illness,” which was caused by exposure to a variety of chemical agents and oil well fires (Shriver 2001; see also Weisskopf and Sullivan 2022). This legacy of war-related damage to health and the environment continued when US troops burned solid waste in open fires in Afghanistan and Iraq. These disposal practices caused illnesses among soldiers and most likely among local populations as well (Bonds 2016b).

Challenging these impacts from the pursuit of national security, environmental activists have successfully intervened on behalf of ecological security. The expansion of United States military facilities at Okinawa, Japan, caused fierce local protests and 2008 a United States federal court decided that the United States National Historic Preservation Act applies to sites abroad as well (Tanji 2008). A few years later, another U.S. military construction project at Jeju Island, South Korea, required the destruction of Gureombi, a unique lava rock formation. Again, local activists successfully intervened (Kim 2021).

5.4.2 Military climate security policies: Sometimes dysfunctional, sometimes harmful

Military organizations not only contribute to environmental destruction, they also respond to it. Many forces initiated a whole range of practices of their own, aimed at maintaining security vis-à-vis environmental and climate change (Depledge 2023; Busby 2021) and have also positioned themselves as players in global climate governance (Jayaram and Brisbois 2021). These activities span over all dimensions of the typology. Some aim at the military force itself, others at external actors, some serve primarily conventional purposes and others the alleviation of environmental impacts. While they mostly rely on conventional means, some even integrate new military means.

Militaries undeniably adopted some new, internal practices that are primarily aimed at reducing their environmental impacts. The South Korean forces, for example, envisioned a range of potential measures (Hinata-Yamaguchi 2016). The United States military applied auditing tools to increase compliance with environmental guidelines (Hepler and Neumann 2003) and monitors its own ability to collaborate with civil agencies and other stakeholders on environmental projects (DuPraw et al. 2012). Other Western forces are also implementing various measures such as greener procurement (Hochschorner and Finnveden 2006), improved electrical waste treatment (Powell-Turner, Antill, and Fisher 2016), or emission reductions at military hospitals (Bozoudis, Sebos, and Tsakanikas 2022; Bozoudis and Sebos 2021).

The growing military awareness of environmental issues manifests in interactions with civil society. There is a growing consciousness and support for environmental issues among members of many militaries (Smit 2018; Jalili 2022; Teicher 2022). Classroom discussions between enrolled special forces officers and other students of environmental geopolitics can be productive encounters (O’Lear 2016). Recent studies analyzed—mostly for the United States—whether endorsement by soldiers helped to provide climate policy statements with credibility (Motta, Ralston, and Spindel 2021; Gainous, Payne, and Merry 2021).

It is plausible that the aforementioned practices are primarily motivated by a desire to reduce environmental harm. However, in other cases, military forces have adopted new, internal practices for mostly conventional purposes. In these cases, environmental benefits are convenient or even unintended side-effects rather than the result of an environmental ethos.

This applies, for example, to the development and upscaling of advanced biofuels by the US Navy (Bigger and Neimark 2017), greywater reuse projects (Church et al. 2015), or the creation of environmental reserves on militarized US islands of geostrategic importance (Harris 2014; 2015). Similarly, artificially created environments conducive to endangered-species protection

on training areas were argued to be rather a welcome side-effect of operational considerations by defense managers than intended for conservation purposes (Rabung and Toman 2022). Another study traced how the United States military “hijacked” President Clinton’s efforts towards a greener military “as weapons for advancing their policy goals in intraorganizational battles” (Durant 2008, 290).

When militaries provide support to external actors, this assistance consists in most cases of longstanding conventional means such as surveillance, mobility, and force reapplied to serve new purposes. In contrast, such outreaching military activities rarely entail entirely new means. Two documented cases are the deployment of military labor for afforestation efforts (Brzoska 2012b; Osborne 2018; United Nations Peacekeeping 2020) and environmental restoration of former military training areas (LeBlanc et al. 2006; see however Aasetre, Hagen, and Bye 2022).

Such activities that draw on conventional practices have repeatedly been found ineffective due to the absence of comprehensive political strategies and/or limited military capabilities. Even disaster response is no exception. To be sure, military forces have the potential to offer vital ad hoc contributions in disastrous situations of existential need (Foster 2001; Smith 2011; Busby et al. 2013), and many countries’ forces have been preparing for an increase in such missions (Brzoska 2015; see also Vogler 2023a).

Nevertheless, armed forces’ disaster response capabilities are finite (McDonald 2021a, 8) and their organizational mindset can clash with disaster relief needs (Eldridge 2017; Puckett 2021). In the heavily militarized Ladakh region, forces demonstrated their ability to provide important ad hoc support but interfered with civil programs, because political authorities became reliant on the military’s reactive approach. Militarized disaster response thus hampered broader disaster prevention (Field and Kelman 2018).

Military-led programs to protect vulnerable populations face similar deficits in capabilities and comprehensive political support. After experiencing coastal erosion for decades, residents of Kivalina, an Alaskan island village, began to seek relocation in 1992. In the absence of sudden-onset disasters, no governmental funding was available. It was only after the disaster became more evident in the early 2000s that US Army Engineers received clearance to construct revetments around parts of the village, but the absence of a coordinating lead agency limited further response (Shearer 2012).

In another case, Fijian forces caused substantial environmental destruction during a relocation project on Ono island. The military first severely damaged a coral reef while unloading heavy

machinery onto the island, then cut through mangrove forests and finally damaged rock formations with explosives. Unfortunately, the cleared sites turned out to be unstable or too small for the planned construction work and the project soon stalled over lack of funding (Bertana 2019).

Violent campaigns against irregular loggers or miners are another case where militaries repurpose conventional activities under the label of environmental protection. These violent operations show very limited results, again usually because they lack the necessary political support and capabilities. A Peruvian military campaign destroyed artisanal mining camps but political efforts to formalize the mining sector failed (Damonte 2021).

Similarly, the Ghanaian military launched *Operation Vanguard* against artisanal mining, officially to protect Ghana's water bodies, but economic motivations seemed more plausible (Hilson and Maconachie 2020). The mission was obstructed by politically powerful mining stakeholders and failed to disincentivize irregular miners by addressing the underlying structural drivers of youth unemployment and illiteracy (Eduful et al. 2020; Ros-Tonen et al. 2021).

Limitations in military capability constrain the effectiveness of such violent activities as well. Experiences from Afghanistan or Mali indicate that even the most powerful militaries struggle to entirely suppress the activities of small informal groups spread out over vast territories. Brazil's military *Operation Green Brazil* failed for similar reasons. Announced by then-president Jair Bolsonaro as "an operation to guarantee law and order" in the Amazon rainforest, the deployed soldiers were incapable of keeping up with the small, mobile groups of illegal loggers and insufficiently trained to reliably identify illegally logged timber (Spring 2021).

5.4.3 Anthropocene Geopolitics through Arctic Militarization

The polar regions, and particularly the Arctic, are sites where military reactions to environmental change occur in a particularly condensed form. Consequentially, it has attracted its own literature. Polar thawing provides the Arctic with new shipping routes and access to untapped resource fields, thereby elevating its geostrategic relevance. Motivated by these changes, military activities in the region fall into the category of ecologically relevant military activities that pursue a conventional purpose and aim at external actors mostly by conventional means –just in a new region.

The US, Russia, and Canada are all expanding their military capabilities in the region (Brzoska 2012b; Sergunin 2021; Vylegzhanin, Young, and Berkman 2021). This could be interpreted as

just another manifestation of inflexible and inevitable courses of action where extractivist economic actors and geopolitical zero-sum games require economic and security actors to expand into a newly opening space – if this increasingly accessible, resource-rich area (Schach and Madlener 2018) was not located directly between adjacent Western powers and Russia.

But its location makes the region's geographical changes relevant to both economic and security actors (Féron 2018). Military activities are therefore not merely ensuring economic exploitability (Bonds 2016a). They are also responding to the growing geopolitical vulnerabilities, and opportunities, at their nations' northern flanks that results from Arctic thawing as one of the Anthropocene's most visible processes (Backus 2012; Huebert 2012; Morozov 2012; Sergunin 2021).

The changing polar geography resonates with two environmental sociology paradigms. These argue that economic actors and militaries operate in “treadmills of production” or “destruction”, respectively and that this contributed to environmental change (Hooks and Smith 2005; Hooks, Lengefeld, and Smith 2021). Arctic militarization closes those feedback cycle as it is itself motivated by environmental change: The treadmill of production motivated extractivism to a point where the resulting environmental change enabled additional extractivism and fueled the treadmill of destruction —with the looming threat of further environmental harm (Dalby 2022; McDonald 2021b make similar arguments).

Arctic militarization illustrates how military forces respond to biophysical changes but the development also illustrates how ecologically relevant military activities are by no means determined by geography. Several studies point to the conditional and constructed character of Arctic securitization. First, the level of Arctic militarization was subject to fluctuation long before environmental change altered the region. It had its high tide during the Cold War (Hird 2016), ebbed in the phase of desecuritization that followed (Åtland 2008), and returned over geostrategic tensions following the Russo-Georgian War of 2008 (Blunden 2009).

Second, this return resulted from conscious securitization efforts (e.g. McCormack 2020) and growing international tensions (Scopelliti and Conde Pérez 2016; Sergunin 2021). Third, the military buildup was long paralleled by the expansion of cooperative structures such as the Arctic Council (Nicol and Heininen 2014). Not local dynamics, but the Russian invasion of Ukraine motivated Western powers to drastically limit their Arctic Council participation (Government of Canada 2022; see also Wilhelmsen 2021).

Resonating with environmental studies on military bases, Cold War era Arctic military installations are posing an ongoing and sometimes increasing environmental risk (Hird 2016; Colgan 2018). Researchers have documented how the melting of Arctic ice has brought new risks to the environment. This resonates with decolonial studies by highlighting how the longstanding sidelining of local and indigenous population's interests and safety continues (Hird 2016; Féron 2018; Sergunin 2021). These populations are facing an array of human security challenges resulting from a history of colonialization and political neglect. Moreover, the “potential ‘bonanza’” of economic exploitation might well “serve to effectively ‘re-colonise’ the north and re-marginalise its peoples” (Nicol and Heininen 2014, 84).

5.4.4 Obstruction: Military Interference in Climate Policies

While some militaries' responses have unintendedly dysfunctional consequences for the environment, others are outright harmful. Some military forces have been found involved in efforts to obstruct domestic efforts at climate adaptation, mitigation, and general climate policy. The dimensions of these activities can be categorized as pursuing a conventional purpose and employ the conventional means of lobbying and power play against external actors – just within the same government.

Military forces do not only contribute to environmental and climate damage, defense also competes with environmental policy over limited budgets (Barnett 2003; Brzoska 2009; Floyd 2010, 192). Regarding adaptation, the interference of Myanmar's military in domestic landscape planning has been studied as representative of how overly powerful authoritarian regime stakeholders can hinder inclusive adaptation planning (Forsyth and Springate-Baginski 2021). It has also been used to discuss the inherent challenges to decentralized and coordinated adaptation programming posed by decades of military rule (Gilfillan 2019).

Other studies have illustrated how military service adds to existing climate vulnerabilities in Eritrea (Tesfamariam and Hurlbert 2017), how the military interferes with forest protection in Laos (Dwyer, Ingalls, and Baird 2016) or how it is complicit in hijacking climate adaptation for the purpose of land capture in Bangladesh (Sovacool 2018).

Mitigation has also repeatedly been subject to military interference. Available land is often scarce in industrialized nations, while militaries need large territories for their training purposes. This can lead to political conflicts over land use for defense versus energy generation purposes. Conflicts between military and other stakeholders over land-use for solar farms in Israel have been analyzed as a case of contestation between competing security discourses (Fischhendler, Boymel, and Boykoff 2016; McDonald 2012). Similar cases and potential solutions have been

discussed for wind farms on areas in Denmark, Germany, Finland, Norway, and Sweden (Lindgren et al. 2013).

Military organizations have also interfered with national climate policies in more general ways. They have played a role in directing the production of climate-related knowledge to frame the policy problem of global governance as a geophysical rather than a bioecological one (Allan 2017). In Brazil, elements of the military were involved in a broad coalition to oppose stronger commitments to international agreements on Brazil's domestic Amazon conservation programs (Vieira 2013; see also Conklin 2002).

These cases of military interference with climate policy were often motivated by the purpose of maintaining the status quo against changing political circumstances. Myanmar's junta defended its political influence against decentralization, the Eritrean military maintained conscription although it made climate adaptation more challenging. Western countries' forces defended their land use interests against wind and solar farms, while a perceived loss of sovereignty motivated elements of the Brazilian military to disapprove of international agreements.

These incidents of resistance to change seem rational from an institutional point of view (Vogler 2023b). Moreover, they point to the essential contradiction of military responses to environmental change. On the one hand, militaries are tasked to be ready to fight and to do so upon order. The Russian full-scale invasion of Ukraine serves as a stark reminder that the conduct of this task can be quite legitimate.

On the other hand, the observations support longstanding concerns that militaries act rather towards defending or enabling the status quo of environmental exploitation and destruction for reasons of national security against efforts towards protecting human or environmental security in times of planetary change.

5.5 Discussion and Conclusion

This chapter asked how military forces interact with the environment and what these interactions imply for global security. To answer these questions, the chapter developed the seemingly first literature review on military-environment interactions in two stages. First, it developed from existing environmental peace and conflict research a conceptual, three-dimensional typology of ecologically relevant military activities. The article argued that these activities can be comprehensively captured by the mutually exclusive and collectively exhaustive categories of (1) whom these activities affect, (2) why they are undertaken, and (3) how, i.e. by what means, they are conducted.

In a second step, the article reported the results from the literature review. The review found that there is a fast-growing but hardly integrated literature that is thinly spread across many documents. This previous research on ecologically relevant military activities identified four major roles in which militaries interact with the environment: (1) They are complicit in environmental damage through military conduct; (2) they respond to environmental change through the conduct of military climate security policies; (3) they are involved in Anthropocene geopolitics, manifest in the Arctic's militarization; (4) by interference, some militaries obstruct domestic climate policies.

These different topics focus on military activities that relate differently to the introduced typology. Activities that cause environmental damage as a byproduct of military conduct are typically focused on external actors, seek to conventionally maintain or apply force and employ conventional means.

Military responses to environmental change are, in contrast, far more ambiguous. Militaries' climate security policies aim sometimes primarily at the military force, other times at external actors – a share of them pursues new purposes but most rely on conventional means. Activities related to the militarization of the Arctic focus on external actors, pursue a conventional purpose and apply conventional means to a new area. Finally, incidents where elements of individual militaries obstruct climate policy are categorized as aiming at external actors (though within the same government), pursuing the maintenance of military force and introducing military lobbying as a conventional mean into a new policy area (see also table 5.2).

This review of military activities has several implications for the study of national level security policies. First, previous studies have noted a transformation and decline in the ability of states, and their military forces in particular, to respond to nontraditional security issues (Cappella Zielinski, Schilde, and Ripsman 2021; Hameiri, Jones, and Sandor 2018). Literature has identified environmental change as one important driver of this decline (Dalby 2022; McDonald 2018). By systematizing the existing research on the often problematic military responses, this article identifies them as one site of this decline.

Second, the review raises questions on how states *should* respond to these challenges of their ability to provide security. This review recapitulated how military security provision by application of force comes along with severe environmental damage. Researchers have therefore long called on states to adjust their means to provide security by transforming conventional security practices and to include new considerations into security policy (Egeland 2022; Floyd 2019; Trombetta 2008; Barnett 2003; see also Deudney 1990; Ullman 1983).

However, rising global tensions have not made it easier to argue for a demilitarization of security policy (see however Scheffran 2023). In a time where interstate war is still common and defense expenditure at an all-time high (SIPRI 2023), new responses are needed to maintain peace and security in an age of “existential threats” (Sears 2021; see also Simangan 2022).

Third, by identifying and systematizing the substantial literature on military-environment interactions, this article contributes to environmental peace and conflict research. Substantiated by the literature review, the typology has shown, how ecologically relevant military activities relate to all subfields of this diverse and rapidly expanding field of discipline. They all studied military activities at least briefly but integrated assessments are, at best, rare (Estève 2021; Alvarez 2021; Ali and Pincus 2018; Bigger and Neimark 2017; Egeru 2016; Bugday 2016; Barnett 2003).

Maybe, this is the reason why many empirical studies of military-environment interactions do not explicitly link their insights to the concepts and paradigms of environmental peace and conflict research. Arguably, both sides would benefit from greater integration which would also enable new theoretical arguments on the difficult relation between military conduct and global security.

Finally, the conceptualization could be adapted to guide the study of other security-related issues where the military interacts with other actors. The typology could be adjusted to study other sites of military entanglement with global security issues such as in the realms of cyber, space or development. For example, developmentally relevant military activities could be differentiated by whether the armed forces are themselves main recipients or whether they assist development programs in remote regions. Analyzing the purposes of developmentally relevant military activities would likely contrast well-intended development assistance with cases of warfare-related destruction. Finally, the typology would point to diverse means, ranging from the application of force to training other security stakeholders.

The article provided a typology that helps uncovering military activities. Unfortunately, current developments make a demilitarization of global security politics unlikely. Militaries are here to stay – and so are the existential threats (Sears 2021). Therefore, a better understanding of their role as actor in global security is needed. This article offers inroads to that research.

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Declaration of competing interest

None.

Supplementary material

Annex 5.1 (search strategy used to identify literature) and annex 5.2 (list of identified studies).

Chapter 6:⁶

Contextualizing Climate Security: Global Environmental Change affects Human Security differently on Vanuatu and Guam

Abstract

Despite similarities in physical exposure, global environmental change impacts human security of Vanuatu and Guam societies very differently. Individual aspects of human security impacts on Vanuatu are well-researched. Less is known about the human security impacts on Guam. This paper studies both regions through a thematic analysis of problem-centered expert interviews with local political and administrative stakeholders. It provides a comprehensive assessment of impacts on human security in both regions. Climate change impacts are found to be omnipresent in Vanuatu and coproduced by fast lifestyle change and developmental challenges. In contrast, Guam is a highly developed US territory which reduces climate vulnerability but generates other forms of environmental change from heavy military and touristic use. The article argues that human insecurity on Vanuatu and Guam is coproduced by economic and political underdevelopment, and (post-)colonial ties. The implications of these observations for climate security policy are discussed in a final section.

6.1 Introduction

Climate change affects multiple dimensions of human security (Adger et al. 2022; O'Brien and Barnett 2013). One region of particular exposure are Pacific islands. Research has documented multiple ways in which climate change impacts the human security on their inhabitants. They face coastal flooding from sea level rise (Ritman et al. 2022) and changing weather patterns (Paltán et al. 2021; Martin et al. 2018). These meteorological changes translate into freshwater shortages (Pearce et al. 2018). They also challenge food security (Barnett 2020a) and livelihoods (Islam et al. 2023). In turn, these impacts generate health risks (McIver et al. 2016) and some populations are being displaced (Dannenbergh et al. 2019; Endacott and Alam 2023). Together, these multiple challenges also disrupt traditional ways of living and knowing on Pacific islands (de Scally and Doberstein 2022). Therefore, Pacific islands display impacts from global environmental change in an condensed and early form.

While human security challenges on Pacific islands are well documented, researchers have rejected their narrow attribution to climate change alone. Studies documented the coproduction of human insecurity by the interaction of climate change with political and economic circum-

⁶ This chapter is submitted as research article to the peer-reviewed journal *Global Environmental Change* and currently undergoing the initial check by the editor. Formatting and table and figure names slightly adjusted to match the cumulative dissertation's layout.

stances. Particularly the streams of political ecology and decolonial approaches have specialized in identifying – and criticizing – these dynamics (Benjaminsen and Svarstad 2021; Sultana 2021a). For example, they identified how prevailing “colonial histories of knowledge, environmental determinism and hegemonic institutions” mask the analysis of underlying drivers of climate-related human insecurity in the Himalayas (Chakraborty et al. 2021, 43) and found colonial legacies “at the root of many agrarian and environmental problems” (Clover and Eriksen 2009, 53).

Similar studies traced individual aspects of human insecurity on Pacific islands back to their roots in exploitation, inequality and colonial legacies. For example, freshwater scarcity on Tonga results not only from climate change but also from unsustainable extraction (Sharan, Lal, and Datta 2023). Socioeconomic factors are also influential in shaping food and nutrition insecurity on Vanuatu (Savage et al. 2021) and colonialism caused the decline of traditional knowledge systems on Guam (Owen 2010). Less common are, however, integrated assessments that study the various dimensions of human insecurity together and locate their coproduction in a complex interplay of climate change, political inequality and colonial legacies.

This is what this paper sets out to do. It asks how climate change, political inequalities and ongoing colonial legacies coproduce human security vulnerabilities on Pacific islands. The study focuses on the Pacific islands of Vanuatu and Guam. Albeit with some differences, both islands face human security problems and are exposed to climate change. More importantly, they are embedded in complex dependencies on global economies and (post-)colonial contexts. Vanuatu has become a noticeable voice in international climate politics (Wewerinke-Singh and Salili 2020). In contrast, Guam remains an organized, unincorporated territory of the United States which has prevented it from developing a noticeable voice in climate policy (Schwebel 2018). The study draws on problem-centered expert interviews with stakeholders in the administrative and formal/informal (i.e. indigenous governance structures) sectors of both islands and triangulating literature to analyze the different human security impacts on Vanuatu and Guam.

The paper finds both Vanuatu and Guam exposed to a multitude of parallel challenges which are aggravated by climate change. Interviewees shared their professional and personal observations on a multitude of environmental changes but also remarked on challenging political contexts. Their statements and additional literature portrayed Vanuatu as a developing island nation where climate change and socioeconomic factors transformed traditional lifestyles into a state of underdevelopment that interacts with multiple disruptors to turn climate exposure into a human security issue. In contrast, Guam is characterized by a much higher state of economic

development that reduced climate vulnerability but created a series of other environmental damages from heavy militarization and tourism. Drawing on these very different cases, the paper argues that comprehensive assessments of how climate change impacts human security even in places as exposed as the Pacific islands require an understanding of their historically grown economic entanglements (O'Brien and Barnett 2013; Benjaminsen and Svarstad 2021; Sultana 2021b).

The paper is structured as follows. A first section reviews the conceptualization of global environmental change as a human security issue and associates these impacts to the research into their underlying drivers from political ecology and decolonial studies. The subsequent section briefly outlines the research design by which the problem-centered expert interviews were integrated with existing research into case analyses. The analysis chapter presents the insights on climate-related human security impacts on Vanuatu first and then outlines how these impacts are coproduced by economic inequalities and colonial legacies. Afterwards, the case study on Vanuatu is contrasted with the quite different observations on Guam, again first assessing environment-related human security issues and then locating them in their economic and colonial context.

6.2 Global Environmental Change and Human (In-)Security

Scholars have long advocated for an understanding of global environmental change impacts as a human security issue while rejecting approaches that center the analysis of these impacts on the notion of national security. The latter, scholars argued, comes along with a specific framework and set of responses that would be neither conducive nor sustainable (McDonald 2013; Barnett 2003; Deudney 1990).

Understanding global environmental change impacts as a human security problem would be more empirically sound (Daoudy, Sowers, and Weinthal 2022; Barnett and Adger 2007), bears the potential to transform existing security practices (Barnett 2019; Trombetta 2008) and seems ethically defensible (Floyd 2019; Burke, Lee-Koo, and McDonald 2016; see however McDonald 2021a; 2018a).

Such research on the human security impacts of climate change is now established as a major research stream in environmental peace and conflict research (Ide et al. 2023). This approach centers the analysis on the ability of “people and communities [...] to manage stresses to their needs, rights, and values” (Barnett and Adger 2007). Consequentially, the research agenda related to human security has produced a large body of evidence tracing how global environmen-

tal change produces different stressors that impede the “health, safety, place, self and belonging” (Adger et al. 2022, 1465) of individuals and communities in vulnerable spaces (Adger et al. 2014; O’Brien and Barnett 2013).

It is an important element of this literature to emphasize how global environmental change has locally different impacts on human security, depending not only on the exposure of local populations to impacts but also their respective vulnerability (IPCC 2022a; Kelman et al. 2016). For example, hazardous heat waves strike countries regardless of their developmental status. Globally, they killed up to 345,000 people in 2019. However, the share of prevented potential heat-related deaths is much higher in those countries with a higher prevalence of air conditioning systems (Romanello et al. 2021). Moreover, impacts from global environmental change differ not only between places but also within the same place, depending on the exposed’ social, class and gender status (O’Brien 2006; Daoud 2021). In acknowledging this, the human security research agenda is inherently oriented towards the local and political contexts of climate-related human insecurity (O’Brien and Barnett 2013).

6.3 Underlying Drivers of Human Insecurity

6.3.1 Political ecology

This focus on the local specificities of climate-related insecurities resonates with studies of the underlying political drivers causing these unequal vulnerabilities. Political ecology produced a literature that traced the manifestation of local impacts from environmental change on human security back to these underlying power relations (Taylor 2013; Broto 2013) and documented how the exploitation of ecological resources by the powerful translates into insecurities for the powerless (Benjaminsen and Svarstad 2021).

Political ecology has successfully revealed how societal dynamics associated with global environmental change are often rather the result of intervening political factors. Regarding security-related impacts, these efforts prominently focused on challenging the notion that climate change would in itself be a major driver of violent conflict (Le Billon and Duffy 2018). Such assumptions have been questioned by studies that outline the involvement of underlying political factors of exploitation and inequality (Wiederkehr et al. 2022; Selby 2019; Benjaminsen and Ba 2019; Selby et al. 2017).

In contrast, the application of political ecology towards issues of environment-related security beyond conflicts is only emerging. Quite recently, scholars emphasized the collaborative potentials between political ecology and human security research where the study of underlying

political ecologies “outlines the socio-economic and ideational structure reproducing human insecurity” while a human security focus ensures that this analysis moves from a general critique of global economic structures to a study of specific human security impacts on people in their local contexts (Ide et al. 2023). One of the few studies that explicitly linked the frameworks of human security and political ecology into an integrated framework contextualized local insecurities related to the fossil fuel industry in Bolivia and Kenya and the artisanal mining sector in Peru in their ‘glocal’ contexts (Schilling et al. 2021). Still, as Rosaleen Duffy and Dan Brockington recently pointed out, political ecology has yet “not fully engaged with thinking about security” (Duffy and Brockington 2022, 21).

6.3.2 Decolonial studies

Where political ecology locates human security impacts in political contexts, decolonial approaches put them into their historically grown and continuing colonial contexts. The literatures of decolonial studies and political ecology share the critical agenda to reveal underlying factors that reproduce unequal structures which impact human security (Ide et al. 2023). More than the latter, post-/decolonial approaches specialize in analyzing exploitative power relations in their historical contexts. Related analyses have revealed how enduring colonial legacies cause and reproduce human security challenges in the context of environmental change, for instance via problematic land tenure practices in southern African savannas or through Nile water management regulations inherited from colonial times (Clover and Eriksen 2009; Pemunta et al. 2021).

Decolonial approaches also question the notion of development itself and situate it in the ongoing colonial “project of modernity” (Rodríguez and Inturias 2018). Decolonial scholars move beyond assessing historically inherited inequalities along a settler-colonial framework. Instead, their analyses also trace how the dissemination of “colonial/modern values and worldviews” leads to the “subordination and marginalization” of indigenous cultures, “their knowledges and cultures, and of non-humans” (Ide et al. 2023, 19). In this sense, decolonial approaches advocate to adjust the analysis of local impacts on human security to include not only a view on (post-) colonial contexts but also acknowledge local stakeholders’ perspectives on what it means to be secure. Importantly, decolonial scholars do thereby not call for uncritically adopting and “romanticizing” indigenous world views as they “can also practice unequal and exploitative [...] power relations (Sultana 2021a, 160).

Decolonial studies have documented the shortcomings of outsider epistemologies in capturing indigenous perspectives, needs and solutions for environment-related challenges in various contexts. Scholars have identified the influence of external political visions among the many obstacles to improving human security in African urban spaces (Eyita-Okon 2022), have documented how local leadership is not adequately encouraged in the relocation of Greenlanders and Icelanders from deglaciated areas (Matti et al. 2023), and generally called for a greater inclusion of local knowledge into climate-related food security and climate justice research efforts (Chakraborty et al. 2021; Zimmermann et al. 2023).

6.3.3 Contextualizing global environmental change impacts on Vanuatu and Guam

A substantial body of studies revealed the entanglements of Vanuatu in post-/decolonial and political ecology aspects. Power inequalities continue to manifest, for instance in the setup of electricity infrastructure on Vanuatu's largest island Espiritu Santo (Munro 2021), and in the precarious employment of ni-Vanuatu seasonal workers in Australia's food industry (Stead 2021). In the case of rural female farmers back in Vanuatu, these struggles intersect with colonial legacies (Addinsall et al. 2023) which have also been found to echo in existing imaginations of masculinities that persist in the island state (Jolly 2016).

Similarly, Guam's current status of limited political participation in the United States' political system stimulated research on the United States 'organized, unincorporated territory's' (post-)colonial context. Studies have documented how inhabitants of Guam and other "forgotten Americans" continue to enjoy fewer political rights than other US citizens (Lin 2019, 1249; see also Ponsa-Kraus 2022) and particularly criticized this legal discrimination as an enabler to the continued reliance of the United States armed forces on the heavily militarized island (Grydehøj et al. 2021; Alexander 2016; Davis 2011).

Less common are studies that explicitly connect these entanglements of Vanuatu and Guam in colonial and political ecology contexts to environmental change, to reveal how "vulnerability to climate change is fundamentally a matter of political economy" (Barnett 2020b, 1172). The few existing studies observed, for instance, a disproportionately higher share of environmental crimes across unincorporated US territories, including Guam, referring to this situation befittingly as "toxic colonialism" (Thomson and Samuels-Jones 2022) and compiled evidence that suggests a considerable exposure to carcinogenic asbestos on Guam and other Micronesian islands (David, Ogawa, and Takahashi 2012). In light of these entanglements, scholars argued how decolonialization of Guam would not only serve to empower the indigenous CHamoru

culture but also contribute to ending destructive environmental practices (Delgado 2022; Amin-Hong 2023).

In the case of Vanuatu, scholars drew on political ecology frameworks to uncover different layers of unequal power distribution within ni-Vanuatu communities during post-disaster scenarios (McDonnell 2021) but also between them and other countries in the conduct of local climate research efforts and even through the reception of climate financial aid (Sovacool et al. 2017; Pfalzgraf 2021). However, scholars also observed “decolonized [counter-]visions of Pacific cities” and the increasing, if still limited incorporation of indigenous and traditional knowledge into ecosystem-based adaptation projects (Trundle and Organo 2023, 492; Nalau et al. 2018).

These works contributed in-depth accounts of entanglements between colonial legacies and/or inequalities related to political ecology in specific sectors such as rural feminist intersectionism, labor migration or environmental crime. They have paved the way for studying more generally how climate change exposure translates into human security vulnerabilities in the context of political inequalities and ongoing colonial legacies across societal sectors in Vanuatu and Guam.

This is what the remainder of this study sets out to do. It analyzes impacts from global environmental change on both islands. To ensure fair representation of indigenous and other local perspectives, the study draws on interviews with local administrative and political stakeholders from both islands. The study finds that different impacts from global environmental change dominate the respective stakeholders’ concerns and that they also situate them in different global entanglements. This shows that global environmental change affects human security quite differently depending on historical and economic entanglements, even in contexts of fairly similar physical exposure.

6.4 Methodological Framework

This study conducted problem-centered expert interviews (PCEI, Döringer 2021) to collect local stakeholders’ observations of environmental change impacts and their contextualizations of these problems in global entanglements. In line with established practice, the collected insights were subsequently studied by thematic analysis (Ghaidar et al. 2022; Paluch et al. 2022; Sippel et al. 2021) and then triangulated with external sources.

6.4.1 Interviews and sampling

PCEI are a specific form of problem-centered interviews (PCI). Commonly shared among PCI is the intention to investigate “societal problem[s] with immediate relevance for individuals” with the intention of “disclosing and understanding the respondent’s perspective on the problem” in order to gain an appropriately broad and deep understanding of the problem at hand (Witzel and Reiter 2012, 5). In contrast to other PCI approaches, the utilized PCEI focused exclusively on stakeholders in the administrative and formal and indigenous governance structures political sectors of Vanuatu and Guam who are encountering impacts from global environmental change and their global entanglements in a daily professional capacity.

In order to make stakeholder views on the studied issues explicit, interviews set out with the question: “*How do you think, climate change and other environmental change will affect Vanuatu/Guam?*” Motivated by the research interest, this open-ended question was chosen to avoid priming. Repeatedly, the future-oriented phrasing provoked interviewees to outline how impacts are already manifest and severe. Informed by knowledge obtained from previous study and earlier interviews, more specific follow-up questions were then asked to clarify aspects and/or to confront the interviewee with anonymized and paraphrased statements by other stakeholders in order to obtain robustly generalizable insights. Interviews were concluded with a brief questionnaire to locate the interviewees’ position within the administrative and/or political apparatus of their respective polity (Witzel and Reiter 2012; Döringer 2021).

A first group of potential interviewees was identified by online search on the administrative, informal and formal political and NGO sectors of both islands. Previous to the research visit, members of these sectors were “cold” contacted without previously established contact by email and voice over IP calls. Upon arrival, further contact calls were made from a local SIM card. While no-response was quite common, successfully reached interviewees almost always agreed to be interviewed after receiving the project outline. In order to expand the sample, interviewees were asked to suggest further relevant stakeholders (King, Horrocks, and Brooks 2018, 30).

Overall, this resulted in 23 interviews with 15 stakeholders from Vanuatu and 8 from Guam. Interviewees sometimes covered several roles. For example, some NGO representatives used to hold a public office or former administration members shared substantial insights from their private lives. According to their occupation and/or primary roles, the interviewed people distributed well across several sectors (see table 6.1) but with less voices of ni-Vanuatu public officials and NGO stakeholders from Guam.

Table 6.1: Sectoral affiliations of interviewees from Vanuatu and Guam

	Vanuatu	Guam
<i>Overall interviews</i>	15	8
Former or active holder of formal/informal public office	2	4
Former or active member of the public administration	5	4
NGO representatives	7	3
Scientist	0	2
Private person	1	1

Note: Sometimes multiple affiliations per person

6.4.2 Thematic Analysis and triangulation

The anonymized interviews were transcribed with an AI service and then manually controlled for transcription errors. The generated text corpus was studied by “thematic analysis”, a procedure that aims at “identifying patterns (‘themes’) across qualitative datasets” (Braun et al. 2019, 844) without committing to an exclusively deductive or inductive codebook generation. Instead, thematic analyses can set out with “some a priori themes, identified in advance” which “are always tentative, and may be redefined or removed” if reasonable (Brooks et al. 2015, 203). This flexibility enables framework analysis to simultaneously analyze latent and manifest topics in textual data (Brooks et al. 2015, 203) and allowed capturing statements on impacts from global environmental change as well as analyzing references to their more abstract entanglements in global and colonial contexts.

The thematic analysis resulted in a structure of aspects raised by different stakeholders. This structure reflects the complex and abstract nature of the studied impacts and entanglements. In contrast to more stringent deductive content analyses, different entries under the same category do not necessarily represent the same statement. They rather subsume a range of references and opinions revolving around the same theme. For example, the emerging theme of temporary labor migration to Australia and New Zealand includes both stakeholder statements that praise its economic potentials and voices criticizing the same phenomenon as neocolonial exploitation.

To contextualize such diverging claims and to ensure general plausibility, interviewees’ statements were triangulated with insights from other studies. In this form, the thematic analysis avoids streamlining observations into rigid categories and therefore aligns well with the goal of PCI to generate an understanding of the problems at hand in a collaborative way. Simultaneously, the two-staged approach allowed the researcher to double-check the collected statements

and to discard those that were implausible, for instance that climate change manifests in increased volcanic eruptions, or with yet insufficient additional scientific evidence such as that invasive wild pigs were responsible for transmitting cases of leptospirosis.

6.5. Vanuatu: Ubiquitous Changes from Climate Change and Development

Interviews captured that Vanuatu is experiencing fast and fundamental changes. The Melanesian island nation witnesses direct and indirect impacts from climate change on ni-Vanuatu human security. These impacts are, in turn, embedded into broader contexts of development, cultural change, and global economic inequalities (see figure 6.1).

6.5.1 Direct and indirect impacts from climate change on human security in Vanuatu

Asked about their observations of climate impacts, ni-Vanuatu stakeholders expressed their concerns over a range of human security challenges that arise as direct or indirect consequences from climate change and other environment-related processes. A major concern was sea level rise and a receding shoreline. Echoing the central role that the coastal intersection of land and water plays in cultures of “islandness” (Foley et al. 2023, 5), most interviewees brought up their concerns over losing coastal areas to ongoing sea level rise and reported observations of flooded coastal settlements and even burial grounds (VUT: 1; 3-6; 8-15). Ni-Vanuatu administrative and political stakeholders also referred to changing weather patterns (VUT: 1; 4; 6-8; 10-12; 15) and the increased frequency and severity of disasters, for instance 2015 cyclone Pam which remained very present in the interviewees’ statements (VUT: 1-6; 8; 10-12).

Interviewees also highlighted the destruction of coral reefs which closely interacts with sea level rise. Both are partly driven by rising water temperatures (IPCC 2022a, 17) and coral bleaching impairs the function that these reefs play as wave breakers – which in turn increases inundation risks (Harris et al. 2018; Faivre et al. 2020). Several stakeholders highlighted coral reef destruction in their observations (VUT: 7-8; 10; 12; 15).

This destruction of coral reefs is not only related to land loss, it also affects food supply security which was the second-most emphasized human security aspect (VUT: 3-8; 10-15). Coral reefs generally serve as major food source for sustenance and small-scale fishery. Their loss combines with other pathways to food-related risks such as sudden-onset disasters, droughts and deteriorating freshwater supplies (VUT: 1; 3-5; 7; 10-11; 12; 15; see also Ruehr 2022; Savage, Bambrick, and Gallegos 2021). Interviewees also referred to the lacking transport infrastructure which prevents local food transport (VUT: 5; see also Langford 2022).

Besides food scarcity, interviewees noted a general decline in dietary quality towards more processed and less healthy food (VUT: 7; 10; 15; see also Savage et al. 2021; Savage, Bambrick, and Gallegos 2020). Food scarcities also affect the performance of traditional rituals that require certain food (VUT: 3; 4; 8). As one interviewee noted, “Now you will see rice and chicken wings [...] which it's not some practice that we used, but we now have to because the climate is affecting our food security.” Notably, this includes kava, a root whose extract was traditionally consumed for ceremonial purposes but now increasingly serves recreational consumption as well. Interviewees reported increasing kava prices and a degrading quality of the product but also increasingly excessive consumption (VUT: 10; 14-15; see also Teschke, Sarris, and Lebot 2011).

Together with socioeconomic changes, climate change coproduces tensions within indigenous and traditional knowledge systems (Savage et al. 2021). Resonating with previous studies, interviewees shared the observation that indigenous and traditional knowledge is losing its ability to provide guidance for living sustainably and safely within local ecosystems in a changed climate (Granderson 2017; 2018). This process includes an increasing disconnect between the altered gardening seasons and traditional ritual calendars (VUT: 3; 4; 6; 10; 12; 14; 15). Consequently, some interviewees shared their observation that some traditional knowledge loses applicability and is increasingly forgotten (VUT: 2; 8; 14).

Climate change impacts human security on Vanuatu also in more indirect ways. Interviewees reported how extreme weathers affect the island state's fragile coastal roads and bridges (VUT: 3; 5; 7; 12; 15; see also Australian Government and Australian Aid 2015). One international NGO representative described how this directly affects human security: “[The road] can be inaccessible for a week. Imagine if a pregnant mother or someone seeking to get access, you know, people [...] need some things and then carry it across a creek [...] because the truck cannot go.” Climate change also affects inter-island connectivity which is so crucial to a nation of 83 islands. Most airfields on Vanuatu islands are unpaved and face now more frequent inundation, leading to additional delays in touristic and administrative flights (VUT: 5; 12; 15). Similarly, jetties and wharves are affected by the changing coast line and often require repairs or relocation (VUT: 3; 11).

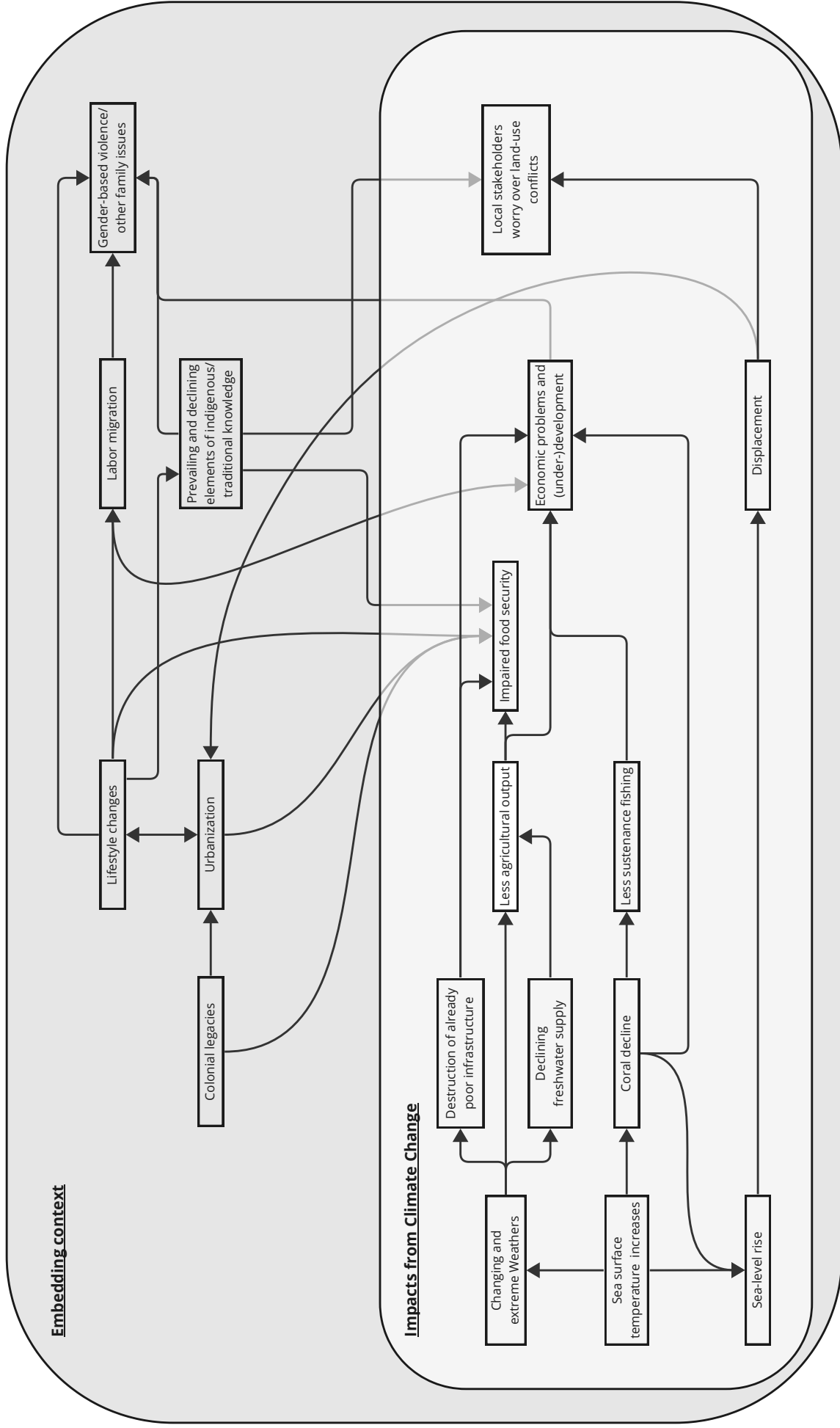
The impaired transport infrastructure combines with other climate impacts into a serious challenge to Vanuatu's developing economy. The island state's gross domestic product per capita almost tripled during the 2000s but hovers around 3,000 USD ever since (World Bank 2023). Its economy relies mostly on agricultural production and “fisheries is fundamentally important

to the nation's economy" (Rosegrant et al. 2016, 179; Langford 2022). Accordingly, administrative and political stakeholders characterized the reduced harvests also as an economic problem (VUT: 4; 5; 11). Besides agricultural produce, tourism is the main pillar to Vanuatu's economy and is affected by climate change as well (Loehr 2020). Interviewees expressed concerns over the sector's future as severe weathers might impair accessibility to tourism sites and reduce the destinations' attractiveness (VUT: 7; 12; 15).

These dynamics also relate to climate-related forms of migration. This connection is not straightforward and does not allow deterministic claims about climate change inducing large-scale migration. In a recent study, citizens of Port Vila, Vanuatu's capitol, expressed their "unwillingness to resettle as a result of climate change unless as a last resort" (Perumal 2018, 45; see also Pemberton et al. 2021; Koubi et al. 2022). Still, some ni-Vanuatu communities are increasingly facing disaster-related internal displacement (Endacott and Alam 2023) which is aggravated by the increasing stressors to coastal lands, to food security, to connectivity and to the economy in general (McDonnell 2021). The interviews frequently reflected these developments and referred particularly to cases where sea level rise and sudden-onset disasters forced coastal populations to relocate inlands or to other ni-Vanuatu islands (VUT: 1-12; 14).

Climate-related displacement produces human security challenges in all contexts. In the case of Vanuatu, one challenge is linked to the culturally important traditional land ownership tenure system. Under this system, most land is held by custom landowners indefinitely. A recent study expressed the concern that Vanuatu's resettlement policy for climate-displaced people falls short of accounting for these circumstances (McDonnell 2021). Research has often documented how there is no straightforward connection from migration to violent conflict onset and that political factors across scales play a crucial role (Wiederkehr et al. 2022; Ide, Kristensen, and Bartusevičius 2021; von Uexkull and Buhaug 2021). Still, interviewees worry that internal displacement might lead to future land-use conflicts between traditional land owners and internally displaced communities (VUT: 1; 4; 6; 11).

Figure 6.1: Climate change impacts in Vanuatu in their context



Note: This figure is tentative and explorative. It conveys the complex embeddedness of environmental change on Vanuatu. It is not to be taken out of context. See annex 6.1 for further information. Figure designed with Miro (www.miro.com).

6.5.2 Not only the climate changes: Embeddedness of human security impacts in Vanuatu

A range of specific circumstances translates Vanuatu's exposure to climate change into a high vulnerability. Notre Dame University's ND-Gain ranking places Vanuatu as one of the most vulnerable countries on rank 164 of 185 listed countries. This high vulnerability is coproduced by a range of parallel processes related to international economic inequalities and colonial legacies. Therefore, human insecurity on Vanuatu results from several parallel processes that are connected to climate change impacts.

One important connection involves the efforts to develop Vanuatu's economy. Climate-related internal displacement seems to be one of the drivers that brings more people into Vanuatu's rapidly changing urban settings (McMichael, Barnett, and McMichael 2012) but the process seems also driven by colonial legacies (Trundle and Organo 2023; Savage, Bambrick, and Gallegos 2021). The resulting urbanization ties ni-Vanuatu closer to a cash-based economy, turning traditional lifestyles into underdevelopment and increasing the urgency of economic development (Savage et al. 2021), resonating with decolonial critiques of the "project of modernity" (Rodríguez and Inturias 2018, 90). Interviewees often reflected on related problems (VUT: 2-4; 10-12; 14-15).

This urbanization brings along challenges to Vanuatu's food and nutrition security which is another factor of human insecurity that cannot be accounted to climate change alone. Amy Savage and her colleagues documented in a series of studies how the declining dietary quality in Vanuatu is driven by the increasing need for money that affects food budgets, to the increasing need for paid jobs that reduces available gardening time, and to urbanization that reduces the available gardening space (Savage et al. 2021; 2020). They also documented, how many of the current climate-related causes of food insecurity are rooted in colonial legacies as well (Savage, Bambrick, and Gallegos 2021).

Labor mobility programs are one response to the underdevelopment and poverty coproduced by climate change in the context of colonial legacies and economic inequalities. These programs involve the temporal migration of ni-Vanuatu to Australia or New Zealand where they typically do unskilled work in the agricultural sector. Principally, they could improve human security by generating remittances. Previous studies documented how these programs contribute to knowledge transfer (Davila et al. 2023) and argued that they would ease the process of climate adaptation (Weber 2017).

Interviewees expressed the hope that these programs would generate revenue but also doubted whether the programs actually contributed to qualification and noted challenges to turning the

remittances into a sustainable income source (VUT: 2; 5; 14). Moreover, interviewees also noted how these labor programs generated a brain drain that drew qualified workers from Vanuatu's tourism sector into the unskilled agricultural sector of Australia and New Zealand (VUT: 7; 10; 14), creating unwanted challenges for the tourism sector which is of central importance to the ni-Vanuatu economy (Loehr 2020). Drawing Pacific islanders into industrialized countries to do unskilled agrarian labor also reproduces political ecologies of inequality where powerful economies reduce their wage costs, potentially at the (unintended) expense of the developing economy (see also Kelley et al. 2020; Radel et al. 2018) while exposing ni-Vanuatu labor migrants to precarious and discriminating conditions (Smith 2019; Petrou and Connell 2018).

These combined impacts of climate change and contexts of inequality and colonial legacies (Granderson 2018) result in rapid lifestyle changes. This is in itself a human security issue as these changes are – at least partially – forced upon ni-Vanuatu and thereby interfere with their “self-efficacy and positive emotions” which is an important well-being concept and thereby part of human security (Adger et al. 2022, 1467). Moreover, this involuntary lifestyle change negatively affects ni-Vanuatus' ability to retain local and traditional knowledge (Granderson 2017). Beyond the already discussed impacts on food security, this negatively affects ecosystem-based approaches which, in turn undermines communities' socio-ecological resilience (Komugabe-Dixson et al. 2019).

Finally, these impacts of embedded climate change have been found contributing to gender-based violence and family-related problems. In 2011, a nation-wide survey by the Government of Vanuatu revealed high levels of gender-based inequality and violence against women (Government of Vanuatu 2011; see also Addinsall et al. 2023). According to one interviewee, there is a new study under preparation and considerable efforts have been undertaken to improve women's security (GUM: 13). Still, several interviewees corroborated these findings with their own recent observations (GUM: 2; 4; 6; 10; 13). Of course, the final responsibility for the conduct of domestic violence always lies with the perpetrator. However, studies point to a range of contextual factors that create and reproduce a context conducive to gender-based violence.

Climate change is just one indirect factor behind some of them. Rates of violence against women increase in post-disaster settings (van Daalen et al. 2022; Alston, Fuller, and Kwarney 2023). Moreover, one of five interviewed ni-Vanuatu women reported having not enough food at home as a trigger for domestic violence (Government of Vanuatu 2011, 165). But, as documented, Vanuatu's disaster vulnerability and food-related insecurity results not from climate

change alone and is coproduced by a broad context of socioeconomic changes, for instance resulting in food price hikes and in women entering the work force which reduces their availability for fulfilling traditional food-related roles (VUT: 13; see also Savage et al. 2021). Interviewees also linked gender-based violence to labor migration, which is another factor coproduced by climate change and contexts of political ecology. They repeatedly noted how the long absence of a spouse leads to breakups or extramarital affairs, resulting in domestic violence (VUT: 6; 13-15).

6.6 Guam: Colonial Legacies cause Environmental Destruction and mask Climate Change

The story of Guam is very different (see figure 6.2). Political and administrative stakeholders of the United States' unincorporated territory showed notably less inclination to participate in a conversation about climate change. While some interviewees observed and expected climate impacts in great detail, a majority of stakeholders described an eerie disconnect of the local population from near-term and future climate change impacts on their island. They suggested that this might be because climate change impacts are not so visible yet (GUM: 17; 21; 22) and also that people might perceive economic hardships to be a more immediate concern (GUM: 18). These observations resonate with a recent study which observed, that “up until very recently, climate change was not readily discussed“ on Guam (Schwebel 2018, 135).

6.6.1 Direct and indirect impacts from climate change on human security in Guam

Yet, climate change is very much a reality in Micronesia, including Guam. Studies observed rising temperatures and increasing precipitation (Yeo et al. 2023) and models project future sea surface temperature and precipitation increases (Dhage and Widlansky 2022). Despite its high island topography, 58 percent of Guam's infrastructure would be impacted by a sea level rise by 3 feet – approximately 91 centimeter – (King, et al. 2019), which is possible even within a low emission pathway scenario (SSP1-2.6) by 2150 (IPCC 2021, 21). Accordingly, interviewees noted that some areas, such as the touristy Tumon bay or the more remote Talofofo bay are facing inundation (GUM: 21-23).

The most explicit connection between climate impacts and human security was associated to livelihood challenges arising from economic impacts. Interviewees reflected on the impacts of climate change the island's coral reefs and broader economic implications. The coral reefs are already damaged (Towle et al. 2022) and expected to further degrade (Weijerman et al. 2015; Wongbusarakum et al. 2021). Coral reef destruction does not only interact with sea level rise but also threatens snorkeling as a major tourist attraction. Therefore, interviewees reflected on

the loss of corals in general (GUM: 21; 23) and also in regard to the loss of a “fun, interactive, engaging attraction” that attracts both visitors and local people (GUM: 18). Therefore, coral reef degradation was besides storm damages part of stakeholders’ reasoning that climate change could harm tourism revenue (GUM: 22-23; see also Weijerman et al. 2016). Moreover, coral decline (GUM: 23) and extreme weathers such as typhoon Mawar seem to affect locals’ livelihoods and job security (O’Connor 2023; Matsuki 2023).

Interviewees had much more to say about local environmental problems. They spoke about an entangled process where the impacts of invasive species and military land use contribute to ecosystem degradation, affecting multiple dimensions of human security such as sense of place, sense of self, livelihoods and long-term economic safety (Adger et al. 2022).

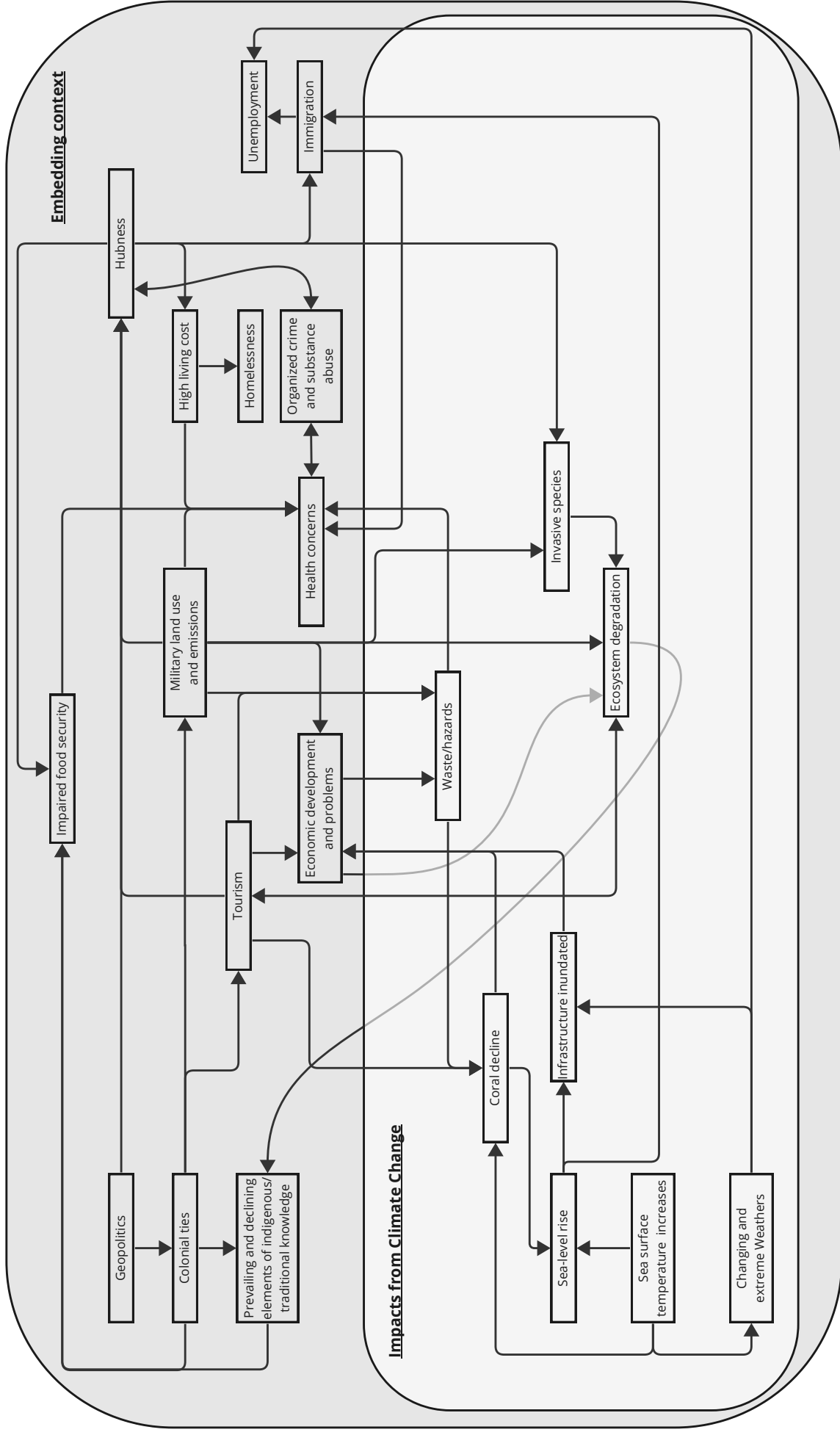
The most prominent nonnative species on Guam are the coconut palm rhinoceros beetle and the brown tree snake (GUM: 21-23). The former particularly affects the palm tree population (Marler, Matanane, and Terry 2020) but has apparently evolved an appetite for Guam cycad trees as well (Marshall et al. 2017). A Pacific Daily News article reported that the beetle could cause material shortages for traditional coconut weavers (Sablan 2015). The latter eliminated almost the entire native bird population of Guam (Savidge 1987; Wiles et al. 2003) which has cascading impacts on Guam’s forests (Rogers et al. 2021). Together, the loss of birds and specific trees endangers indigenous traditions and CHamoru culture (GUM: 21-23; Campbell and Hewitt 2018).

Intense land use by the United States armed forces and the local tourism industry contribute substantially to these environment-related human security concerns. This entails native limestone forest loss from land use (GUM: 22-23; see also Ossola 2018) and historical forest destruction during World War II carpet bombing (GUM: 20; 22; 23). Interviewees also mentioned hazardous emissions during live firing tests and pesticide use to clear the proverbial “fence” (see also Alexander 2016), and heavy military flight emissions (GUM: 19; 21-22). The likely high exposure of locals to asbestos serves as another example for the manifold human security impacts from development-related pollution and waste and might contribute to the high cancer rates on Guam (David, Ogawa, and Takahashi 2012; Van Dyne et al. 2020). Finally, they expressed the concern that further deployments of missile defense batteries, US marines and a growing extraction of groundwater would further aggravate these environmental problems (GUM: 21-23).

In contrast to ni-Vanuatu interviewees, stakeholders from Guam rarely specified the connections between the manifestations of environmental change and human security impacts. Two

associations, however, stood out. The first recurring issue related to climate-related migration which had already been found to play some role in Guam's politics in earlier studies (see also Schwebel 2018). Interviewees repeatedly expressed concerns over the well-being of *immigrants* from low-lying Micronesian atolls than to their own, less likely, climate-induced emigration (GUM: 21; 22). A second concern related to health issues. One interviewee mentioned "suspicions" about a possible link between the groundwater contamination and extensive pesticide use and elevated cancer rates (GUM: 21; see also Denton and Sian-Denton 2010). Indeed, cancer-related mortality rates on Guam are high in comparison to other Pacific islands and probably still underreported (Van Dyne et al. 2020; Tervonen et al. 2017) but a dedicated study tracing the connection between military-related pollution, human exposure and cancer incidence on Guam seems to have not yet been undertaken (for such a study on Nevada see Alvarez 2021).

Figure 6.2: Climate change impacts in Guam in their context



Note: This figure is tentative and explorative. It conveys the complex embeddedness of environmental change on Guam. It is not to be taken out of context. See annex 6.1 for further information. Figure designed with Miro (www.miro.com).

6.6.2 The tip of the spear that suffers from affluence: Human security impacts on Guam

Because of its geostrategic location, Guam received much interest by colonial powers. Guam's colonial history plays a central role in masking how climate change exposure translates into human security vulnerabilities. After being permanently colonized in the late 17th century by Spain, it was ceded to the United States after the Spanish-American war 1898. During World War II, the Japanese occupied the island for a few years before it was reconquered by the United States in 1944. Ever since, Guam has served as a heavily militarized base for the United States armed forces. With regard to the increasing tensions with China, Guam is also referred to as the United States' "tip of the spear" (Grydehøj et al. 2021; Gelardi 2021).

This use of Guam for military operations has been associated with a rapid economic development but lack of political power. Being an organized, unincorporated US territory provides statutory US citizenship to its inhabitant's but limits their political rights (Lin 2019) which means that inhabitants can muster less resistance against military deployments than, for instance, inhabitants of Hawaii or Okinawa (Davis 2011; Owen 2010). Consequently, some interviewees explicitly described their island's status as colonial (GUM: 17; 20; 21) and criticized their lack of influence (GUM: 17-23). One interviewee even referred to Guam's polity as "pseudo democracy" (GUM: 23).

At the same time, being part of the United States led to substantial development in Guam. After a Covid-related decline, the island still had a per capita GDP of almost 36,000 US dollar in 2021. With a large tourism sector and considerable military spending, Guam has a far wealthier economy than most Pacific island states but still experiences considerable social problems such as unemployment, homelessness and substance abuse (GUM: 16-23; see also Nennstiel 2019). Befittingly, one interviewee remarked on how "Guam's status as perhaps the wealthiest area of the Pacific islands is contrasted with the fact that when it comes to political power, it's impoverished" (GUM: 21).

This political and economic background takes noticeable influence on how exposure to global environmental change translates into human security issues. It led to a climate policy profile much lower than that of the surrounding Pacific island nations (Frain 2018; Schwebel 2018). In contrast, linkages of militarization and tourism to local ecological problems are well documented. This foregrounds environmental change from development and colonialism instead of climate change as a source of human insecurity. Unsustainable overuse and polluting practices are important factors behind the decline of Guam's coral reefs (Weijerman et al. 2016). Likewise, the invasive brown tree snake arrived by military transportation during world war II

(Richmond et al. 2015) and the first wave of coconut rhinoceros beetle probably came aboard a rubber transport ship from Sri Lanka (Catley 1969). Finally, local pollution and waste result directly from tourism and development but not from anthropogenic climate change (Thomson and Samuels-Jones 2022; Duprey et al. 2017; Morrison et al. 2013).

Evidence suggests that colonialization has drawn Guam far further away from traditional and indigenous lifestyle than Vanuatu (see also Frain 2016). One indication is that Guamanians almost completely abandoned subsistence farming and fishing under the United States rule (Marutani et al. 1997) and – helped by its smaller geography – there seem to be no remote villages on Guam that remain entirely disconnected from modern lifestyles. This is, however, not to say, that the CHamoru culture has vanished. Rather, several elements remain (Owen 2010) and a substantial decolonial-environmentalist movement has formed in resistance to overdevelopment and militarization (Frain 2018; Delgado 2022; Davis 2011).

The loss of indigenous culture and its consequences are severe human security impacts. But they relate differently to climate change than cultural loss on Vanuatu. They are not driven by climate change but by colonialization. They came along with a reliance on imported foods and therefore do not affect food security. Moreover, the traditional land tenure systems ceded to exist over centuries of colonial rule (Souder 1987). Any land use conflicts related to relocation would therefore not be mainly caused by traditional structures.

Finally, there is a regional dimension to how global environmental change impacts human security on Guam. The islands' geostrategic relevance and tourism-driven development turned Guam into a Pacific hub. For instance, deputy defense secretary Bob Work used this term in 2014 to express the central role of the island in the United States' geostrategic shift to China. Guam's A.B. Won Pat International Airport serves as a hub for several airlines and according to the Guam Visitors Bureau, the island had over 1.6 million arrivals in 2019 (Guam Visitors Bureau 2019). Moreover, the island is used as a hub for several submarine telecommunication cables connecting Asia, Australasia and North America (Partido 2019).

This status as a highly developed regional hub shapes affects whether and how human security challenges manifest that are typically associated with climate change. Food insecurity is one of these challenges. Guam's integration into trade routes from the continental United States and lifestyle changes related to Guam's status as United States territory have induced a situation that CHamoru scholar Craig Santos Perez referred to as "gastrocolonialism" (cited from Chao 2022). With subsistence farming and fishing mostly absent, food insecurity stems rather from colonial ties and economic struggles than from climate change. Consequentially, food security

on Guam is less an issue of food scarcity but of lacking nutrition and unhealthy diet (GUM: 23; Leon Guerrero et al. 2020; Pobocik, Trager, and Monson 2008; Lundeen et al. 2017) which results from the interplay of high living costs on Guam and low nutritional value of imported food (Leon Guerrero et al. 2009).

Guam's hubness and climate change are also coproducing human insecurity for immigrants. Citizens of Micronesian Compact of Free Association (COFA) countries have the right to enter the United States – and thereby Guam – permanently as “nonimmigrants”. After Hawaii, Guam holds the second largest group of migrants from COFA member states in the United States (United States GAO 2020). Arguably, the exposure of Micronesian islands to complex and diverse climate change impacts is increasingly likely to play a role in emigration decisions of COFA citizens and it is likely that they will often move to Guam. Already, Chuukese and other Micronesian immigrants live on Guam under often precarious and discriminating conditions (Smith and Castañeda 2021; Keck and Schieder 2015). Moreover, as typhoon Mawar hit Guam in May 2023, the two underserved immigrant neighborhoods Gill Baza and Zero Down were severely hit (Matsuki 2023; Cruz 2023).

6.7 Conclusion

This study drew on problem-centered expert interviews with stakeholders in the administrative and formal/informal political sectors of Vanuatu and Guam. It analyzed how global environmental change has different impacts on human security in the Pacific islands and linked these different impacts to both entities' different entanglements in global political ecologies and colonial legacies.

The interviewees and previous studies characterized Vanuatu as a politically independent island nation that undergoes a broad range of socioeconomic changes (see also Granderson 2018). These are partially caused by climate change through rising water temperatures, sea level rise, coral bleaching and extreme weather. They result, however, as well from an increasing post-colonial entanglement with the global economy and ongoing lifestyle changes. Together, these changes coproduce several human security challenge such as food-related insecurity, displacement, economic hardships and a loss of indigenous and traditional knowledge.

In contrast, interviewees described Guam's exposure to climate change as very much masked by its political status as organized, unincorporated United States territory. Its century-old colonial history has brought economic development, a solid transport infrastructure, concrete homes for much of its population and a constant flow of expensive industrialized food imports. It has, however, also caused militarization, an enormous influx of tourists and a status as regional hub.

These changes have altered the ways in which the Pacific island is exposed to environmental change. Different to Vanuatu, disasters and changing seasons seem to have no major impact on food security as most food is anyways imported. It is rather the reliance on imported food which leads to undernutrition, high rates of diabetes and other diseases of affluence. Moreover, colonialization caused extensive land use for military and touristic purposes and introduced invasive species with destructive results for the island's ecosystem.

These observations hold implications for climate change as a human security issue. Impacts differ depending on local contexts between Pacific islands (see already O'Brien and Barnett 2013). Moreover, they are coproduced by parallel crises such as high livelihood expenditure and gender-based violence (see also Sultana 2021b). Interviewees observed a climate change-related loss of indigenous and traditional knowledge applicability driven by rapid alteration of environmental circumstances and by displacing people into new contexts (Savage, Bambrick, and Gallegos 2021; Granderson 2018). But climate change is not the only driver of this decline. Instead, interviewees repeatedly pointed out how traditional structures also decline because young people seek different lifestyles. Finally, climate change coproduces different forms of displacement in both cases and interviewees expressed concerns over land-use conflicts (see also McDonnell 2021). However, climate change is neither the sole driver of migration nor would it be the most important one in conflicts over land use rights.

This situation leaves Pacific islands between a rock and a hard place. The case of Vanuatu shows how lifestyle changes and global interconnectivities create a powerful call for economic development as a means to overcome human insecurities, even more so as now climate change is aggravating these insecurities. However, as the history of development forced upon Guam shows, development bears its own extensive risks to human security and threatens to reproduce colonial ties (Rodríguez and Inturias 2018).

Impacts from environmental change on both islands are severe and continue to worsen due to factors such as rising sea levels, more severe disasters, continuously expanding land use and adapting invasive species. Observing how they manifest very differently depending on the forms of local exposure gives credence to a number of priorities that policies should live up to when they seek to aim at maintaining human security during environmental change.

The studies demonstrate how direct impacts from environmental change arise due to a complex interplay of factors. A higher sea surface temperature leads to an expanding oceanic water body and sea level rise and also to coral bleaching. The latter, in turn, contributes further to sea level

rise (Yates et al. 2017). Such multicausal and equifinal dynamics interact with immediate societal contexts such as overuse by tourists or excessive fishery reliance due to a loss of alternative food sources (Faivre et al. 2020; Weijerman et al. 2016) and generate further impacts. This indicates that policy responses should, as Matt McDonald puts it, be guided by reflexivity and humility (McDonald 2021b) and take into account the complex interplay between environmental change and its direct impacts.

Additionally, the comparison between Vanuatu and Guam displays how the exposure to climate and environmental change translates differently into vulnerability, depending on the availability of short-term remedies such as concrete homes and robust transportation infrastructure. Accordingly, a climate security policy focus on direct impacts must take care to not consider disasters as natural but consider them as coproduced by vulnerability-enhancing factors (see also Nohrstedt et al. 2022; Kelman et al. 2016).

The emergence of indirect impacts is even less straightforward. Internal displacement in Vanuatu and immigration from other Micronesian islands to Guam are driven by several of these factors and seem not exclusively determined by environmental change. Moreover, although often referred to by stakeholders, land-use related violent conflict seems to have not yet manifested on Vanuatu or Guam. In light of these observations, policies should prioritize preventing and alleviating the direct impacts from environmental change instead of overemphasizing and responding reactively to its potential indirect impacts. This means that, wherever policy addresses indirect consequences of environmental change, great care must be taken in avoiding misattributing phenomena to climate change to ensure choosing appropriate means (Daoust and Selby 2022; Charbonneau 2022; Benjaminsen and Ba 2019).

The case of Guam clearly shows how climate change as a phenomenon might be masked by other, more immediately visible environmental change. The exposure to military and touristic land use, pollution and waste, as well as the repeated import of invasive species substantially impact various dimensions of human security. There is evidence that climate change will affect Guam (Yeo et al. 2023; King, et al. 2019) but currently other environmental change seems to dominate among ecological factors that contribute to human insecurity. This observation serves as a strong reminder that policies should avoid an artificial limitation to climate-related impacts and consider impacts from other – local and global – environmental change as well. Adhering to this principle ensures that climate change is not scapegoated for cases of environmental damage that has far more proximate causes in “glocal” unsustainable practices.

Both Vanuatu and Guam are subjected to a range of ongoing and future changes. Urbanization, lifestyle change and economic development are likely to substantially change many corners of Vanuatu's islands (Granderson 2018). Guam is facing a resurgence of tourism after the Corona pandemic and awaits a further expanding US military presence (Gelardi 2021; Grydehøj et al. 2021). These examples show that human security in the context of environmental change is a moving target. Accordingly, policy needs to be designed reflexively and continuously adjusted (McDonald 2021b).

Finally, this study has shown how human security impacts are coproduced by environmental change and historically grown economic inequalities and colonial legacies (see also Barnett 2020b). These contextual factors still remain influential and therefore continue to harm human security in places of environmental change. This means that there are limits to policies that seek to tackle environmental change and its impacts isolated from its broader context. Consequentially, policy responses directed at human security need to comprehensively address underlying power inequalities and developmental challenges (Rantes, Nunn, and Addinsall 2022).

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Supplementary material

Annex 6.1 (references on the observed sources of climate-related human insecurity).

Chapter 7: Conclusion

Recognizing how the adoption of climate change onto national-level security agenda is equally unusual, important and understudied, this cumulative dissertation investigated how national level institutions approach climate security. Therefore, it asked the following question:

How are national-level civil and defense institutions approaching climate security and with what effects?

7.1 Climate security policy as an *ambiguous* national-level security agenda item

In response to this question, the cumulative dissertation makes a threefold argument: 1) National-level climate security policies are a widely but differently adopted item on various national-level institutions' agenda around the globe. However, conventional security institutions often conduct climate security policies in ways that are 2) neither sufficient to achieve their self-proclaimed goals 3) nor lead to outcomes that address deeper, underlying problems.

First, climate security policies are widely but differently adopted by various national-level institutions around the globe. By studying how the policy mode of framing manifests in high-level security strategy documents and national climate policy pledges, chapters 2 and 3 found climate change widely assessed as security issue by many governments, defense departments and civil ministries. Measured as degree of coverage, chapter 2 found 73 percent of all analyzed national security strategy documents (NSSD) published after 2007 to frame climate change as a security issue. Similarly, chapter 3 observed that four out of five nationally determined contributions (NDC) covered climate impacts on security.

But this frequent adoption of climate security policies is by no means a monolithic exercise. At the international level, different actors tie very different activities together under the label of climate security policy (Krampe and Mobjörk 2018; Dellmuth et al. 2018; Floyd 2015). These substantial differences persist also between climate security assessments of different nations. Chapter 2 differentiated the degree of coverage between direct and indirect impacts to study the differences in climate security frames adopted in NSSD. The chapter observed a wide diversity of referenced impacts with references to increasing extreme weathers as the most widely shared concern. Notably, framing climate-related migration as a security concern was much more common among governments from wealthy, industrialized regions while such framings were mostly absent in NSSD published by governments from developing regions. This resonates with earlier concerns regarding the stigmatizing and inappropriately narrow conceptualizations of climate

security impacts as drivers of insecurity permeating from fragile states (Daoudy, Sowers, and Weinthal 2022; Charbonneau 2022; Hartmann 2014).

Besides this international diversity, chapter 3 identified a notable subnational variation in the climate security frames adopted by different institutions of the same country. To capture these, the framework to analyze climate security frames was expanded to compare these frames regarding their focus, their readiness to reference anthropogenic origins, and their implied degrees of temporality and certainty. The analysis found civil institutions to be much more likely than defense ministries to frame climate security as an urgent matter, to focus rather on its direct than indirect impacts and to highlight its anthropogenic origins. In contrast, defense departments placed a much lower emphasis on climate change's anthropogenic origins and focused on second-order impacts.

Second, observations of military climate security policies suggest that conventional security institutions not only frame the problem more reactively but also conduct other modes of climate security policy in ways that are insufficient to achieve these self-proclaimed goals. Moving beyond the policy mode of framing, chapter 4 studied planning, implementation and evaluation activities in greater detail. To this end, it introduced a framework that differentiates institutional climate security responses by the addressed intervention points – mitigation, direct, and indirect impacts – and by the employed modes – including indications of basic awareness, assessments, planning efforts, actual implementation and monitoring. This framework was applied to study the climate security policy efforts of NATO armed forces. The case studies illustrated how their strict prioritization of capability maintenance stood in the way of ambitious emission reductions. Moreover, a majority of them announced a continued disaster response role but the case studies show how they struggle to allocate the required resources. Particularly after the Russian invasion of Ukraine, NATO military forces' priorities shifted and reduced available assets for climate-related measures.

Third, conventional security institutions were often found to adopt climate security policies that fall short of producing the outcomes that would address deeper underlying problems. This claim is grounded in two observations: The first observation is that conventional security institutions often concern themselves rather with the impacts on security than on the causes of these impacts. Several chapters observed how conventional security institutions prioritize responding to the impacts from climate change over preventing them. Chapter 2 noted how climate security framings in NSSD commonly referred to both direct and indirect impacts but fell short of suf-

ficiently elaborating on how disasters are often coproduced by political factors that turn exposure into vulnerability or by properly embedding climate change within the broader range of global environmental change. Most illustratively, perhaps, is how some nations' NSSD refer to people displaced by climate change but fail to discuss the drivers of this displacement. Chapter 3 added a closer investigation of climate security framings by ministries of defense. More than their civil counterparts, they warn of indirect and future issues while less than half of the studied defense strategies mention climate change's anthropogenic origins.

This prioritization is not limited to framing but is also reflected in defense institutions' planning and implementation modes. Chapter 4 observed how military forces predominantly focus on their reactive role in disaster response (albeit, again, with limited success). In contrast, their efforts at emission reductions remain limited and are, at times, designed in questionable ways that strive for efficiency gains without guaranteeing that the freed up energy is actually saved and not used instead for an expansion of capacity. Moreover, chapters 4 and 5 observed how national security institutions allocate substantial resources to climate security policies that address geopolitically relevant impacts such as the changing geopolitical importance of a melting Arctic in reactive, militarized, ways.

As a second observation, conventional security institutions continue to co-produce climate-related insecurities in many ways. Chapter 6 grounded the observed prioritization of reactive approaches in a wider context. Through two case studies on the Pacific island entities of Vanuatu and Guam, it illustrated two problem sets that incentivize involved institutions to prioritize responses over prevention. The chapter demonstrated how climate-related insecurities are coproduced, in two very different ways, on both islands by political and economic inequalities and by (post-)colonial legacies. The chapter focused on impacts affecting human security as these impacts are usually the most immediate societal impacts, are comparably well-documented and require a less complex chain of preceding developments to manifest than more abstract or partial forms of security, such as national security or economic security (Adger et al. 2022; Wiederkehr et al. 2022; Ansari and Holz 2020; Ghadge, Wurtmann, and Seuring 2020; Chen 2020; see however Kelman et al. 2016; Ide 2023b).

In the case of Vanuatu, a postcolonial context of underdevelopment, rapid lifestyle changes and international labor mobility translated climate impacts into threats to human security. Therefore, preventing the latter requires addressing the former: Preventive climate security policies that focus on reducing Vanuatu's vulnerability would inherently require the promotion of human development, the provision of economic prospects and programs that equip the coexisting

informal and formal government structures to deal with climate change impacts. This is already a considerable all-governmental challenge which is even further complicated by questions related to the preservation of a traditional culture that provides local identity but also – according to locals – lacks inclusiveness (Addinsall et al. 2023; Granderson 2017; Jolly 2016). Even more difficult to realize for Vanuatu are climate security policies that take another step back on the causal chain towards mitigating climate change as the original problem. While Vanuatu’s climate policy regularly punches over its weight and achieved remarkable successes in bringing the issue of climate justice to the international court of justice (Birnbaum 2023), this influence on global emissions remains, at best, limited.

The case of Guam illustrates how very different circumstances may result in a similar focus rather on reactive than preventive responses. Due to its geostrategically relevant position, the Micronesian island has been colonized for centuries (Ossola 2018; Marutani et al. 1997; Souder 1987). This status currently entails a powerful United States military presence and the omnipresence of tourism and (over-)development (Gelardi 2021; Grydehøj et al. 2021). With durable roads, robust apartment buildings, industrial-scale food imports and substantial state capacity, these circumstances reduced the island’s climate-related vulnerability and the political incentives for climate change adaptation efforts (Yeo et al. 2023; King, et al. 2019).

More prominent are impacts coproduced by other environmental change, most visible in the form of invasive species. Accordingly, reactive efforts to control or reduce them are among the most noticeable efforts aimed at the nexus between impacts from environmental change and insecurity. Preventive efforts through climate change mitigation are, in contrast, disincentivized. With no major production industries at the island, Guam’s major sources of emissions are related to its large tourism sector and its military use. Tackling the former sectors’ emissions would require local institutions to grapple with losses of revenue that is vital to the island’s economy. Responding to the latter lies beyond local institution’s power and outside the interest of the United States government which refers to the island as “tip of the spear” in its geopolitical conflict with China (Grydehøj et al. 2021).

7.2 Implications for environmental peace and conflict research

The findings of this cumulative dissertation relate to the different streams of environmental peace and conflict research (Ide et al. 2023). The observed conduct and effects of climate security policy suggest that climate security policy responses are omnipresent but often fall short of achieving their own goals or addressing the deeper underlying problems that global environmental change entails. This links the cumulative dissertation to the research stream focused on tracing the impacts of global environmental change on human security (Adger et al. 2022; 2014; O'Brien and Barnett 2013).

Chapters 2 and 3 showed how framings of climate security in high-level strategy documents commonly have features which are detrimental to initiating human security-enhancing responses. The case studies in chapter 4 demonstrated how even powerful NATO member forces struggle to adequately provide disaster response – which is arguably their most immediate potential to contribute to human security. The subsequent chapters embedded these narrow and reactive responses in their wider context. Chapter 5 reviewed and systematized the evidence base for a long-standing and substantial complicity of various armed forces in environmental destruction, often at the expense of local populations, and chapter 6 studied how impacts on human security from climate change and other global environmental change, respectively, on Vanuatu and Guam are coproduced by economic and political circumstances.

These latter case studies make another contribution to the connection between climate change and human security and seek to do so in a way that ensures fair representation of local stakeholders' perspectives through interviews. Existing research has meticulously studied the impacts from global environmental change on individual aspects of human security such as food security (Langford 2022; Savage et al. 2020) and traditional knowledge systems (Nalau et al. 2018; Granderson 2017). In contrast, studies of the impacts on human security in general remain rare (see however Komugabe-Dixson et al. 2019). Moreover, these impacts have so far been insufficiently linked back to underlying political and economic factors (see also Ide et al. 2023; Barnett 2020b). The case studies of chapter 6 address this gap and figures 6.1 and 6.2 illustrate the complex entanglement of impacts from climate change on human security in their wider context.

The dissertation also expands on research that traced the securitization of climate change. While the dissertation did not adopt a securitization framework, it followed the argument that speech acts influence the course of policy (Barnett 2019; McDonald 2018). Chapters 2 and 3 studied speech acts published in written form in NSSD and NDC and identified the aspects emphasized

by climate security policy actors. Previous climate securitization research has often been limited to the global North or suggested that climate securitization rarely resonated in the global South (von Lucke 2018; Schäfer, Scheffran, and Penniket 2016). More recently, however, case studies of Nigeria or India called this trend into question (Oramah, Olsen, and Gould 2022; Sahu 2019). This dissertation's study of NDC and, in particular, NSSD, goes beyond such individual observations and provides comparative evidence that shows how framings that link climate change to security did indeed find substantial purchase in many different world regions.

This has practical implications. Chapter 4 observed narrow and reactive responses similar to long-standing concerns over climate securitization backfiring or resulting in narrow, reactive responses (Estève 2021; Warner and Boas 2019; see also Detraz and Betsill 2009). These observations challenge the hope that securitizing climate change could transform long-standing security practices (Trombetta 2008). As climate security framings are not an exclusive endeavor of the global North, it follows, that their problematic side-effects are likely to manifest in the global South as well. However, on the other hand, a securitization of climate change by vulnerable developing states adds to the doubts about whether climate securitization can really be considered predominantly a vehicle of powerful national-level security institutions that seek to marginalize calls for more substantial change (see also Floyd 2019).

This cumulative dissertation also relates to the streams of political ecology and decolonial studies that both seek to contextualize linkages of global environmental change to peace, conflict, and security to underlying structures of economic exploitation and colonial legacies. Chapters 2 and 3 documented the wide absence of deliberations on these underlying or contextual factors in climate security frames. This lack of reflection notwithstanding, chapter 4 observed how (post-)colonial ties leave their mark on climate security policy as NATO militaries' efforts prioritize disaster preparedness and response efforts in (post-)colonial contexts (see also Charbonneau 2022). Chapter 5 provided a typology of military activities that enables political ecology and decolonial studies to systematize and explicate their so far often case- and aspect-related study of military forces' involvement in the reproduction of inequalities and injustices (e.g. Alvarez, Shtob, and Theis 2022; Bigger and Neimark 2017). Further studies could more comprehensively analyze militaries' involvement in roles of complicity, Anthropocene geopolitics or policy obstruction. Following a few earlier examples (Schilling et al. 2021; Barnett 2020), chapter 6 expanded the study of impacts from global environmental change on human security to document in a comparative design how these insecurities are coproduced by local contexts and to thereby broaden the application of political ecology from a conflict focus towards a general study of (in-)security (see also Duffy and Brockington 2022).

This cumulative dissertation also resonates with insights from research into global environmental change as a driver of displacement and violent conflict. It is well documented that global environmental change translates into violent conflict and displacement only in combination with contextual factors (von Uexkull and Buhaug 2021; Hoffmann et al. 2020). Among them, political factors have been found to play a major role (Wiederkehr et al. 2022; Ide et al. 2020). In that context, this cumulative dissertation's global assessment of climate security framings suggests, that national-level framings of climate change as security problem provide an additional risk factor for reactive and therefore misguided policy programming. Probing into the actual implementation of policy responses to these indirect impacts by NATO member forces in chapter 4 indicated that they have yet initiated little exceptional measures that would contribute to adaptation or mitigation in a meaningful way. Moreover, the literature review provided in chapter 5 demonstrates how there is a broad but hardly integrated body of literature on military-environment interactions and a surprising absence of knowledge about the specific roles that military forces play in violent environment-related conflicts. The chapter brought together this disintegrated literature and developed a typology of ecologically relevant military activities that could be used as a starting point for analyses of military forces' activities during the onset and manifestation of environment-related conflict scenarios.

Additionally, several observations of this dissertation suggest inroads to further research on the streams focused on conflict-dynamics related to environmental change and on environmental peacebuilding. With regard to the potential for violent conflicts and other forms of violence, chapter 6 documented widespread Ni-Vanuatu stakeholder concerns over increasing land-use conflicts as a result of internal displacement (see also McDonnell 2021). It would be informative to study the extent to which such land-use conflicts indeed manifest, how local *kastom* practices intervene with these conflict dynamics and whether the interplay of formal and informal institutions aggravates or reduces tensions (Addinsall et al. 2023; Savage, Bambrick, and Gallegos 2020). Moreover, local stakeholders' observations of the connection between gender-based violence and food insecurity on Vanuatu in a surrounding context of lifestyle change, international labor mobility and declining indigenous and traditional knowledge calls for further research on this multicausal nexus between environmental change and low-intensity violence.

Finally, for environmental peacebuilding research, chapter 2 identified references to the concept of environmental peacebuilding in the NSSD published by Peru (2005), the United Kingdom (2008), the Netherlands (2010), New Zealand (2014), South Korea (2014, 2016), and India

(2019). While these passages reveal not much, they indicate that further analysis of the authoring bureaucracies that drafted these NSSD might provide fruitful to environmental peacebuilding research. Particularly the case of Peru might provide an inroad to the still underresearched specificities of environmental peacebuilding in Latin America – just as studying policy responses to the nexus between gender-based violence, environmental change and food insecurity, observed in chapter 6, could contribute to the scarce research on such practices in the Pacific (Ide 2023c).

7.3 Implications for the wider disciplines and areas for further research

This cumulative dissertation's contributions are primarily to the interdisciplinary field of environmental peace and conflict research. It holds, however, insights that speak to the wider fields of policy studies, (critical) security studies, and foreign policy analysis. The findings also implicate areas of further research that could add to both the immediate research of climate security policy and to the wider debates.

7.3.1 Policy studies

In a first instance, the chapters of this dissertation offer implications to the study of policy. Through the recent decades, the discipline of policy studies, and its more critical branches in particular, made substantial progress to overcome structural functionalist assumptions that characterize “policymaking” as the linear, rationalist process epitomized by policy cycle models (Fischer et al. 2015). In the words of Evert A. Lindquist and Adam Wellstead, the heuristic of this cycle “seems primitive to most contemporary policy theorists” but, as they add, “it continues to occupy a central place and point of departure for more sophisticated understandings of how the policy process works” (Lindquist et al. 2021, 304).

One major road of departure from such understandings focuses on the politics at play during the design of policies. Scholars have pointed out how policy design is inherently political and subjected to contestation between different actors that might come up with very different responses when, seemingly, dealing with the same problem (Eriksson 2020; Braun 2015; Barbehön, Münch, and Lamping 2015). There is ample evidence in institutional research that these actors select their responses not independently of their historically-grown institutional context (Trondal 2021; Egeberg and Trondal 2018; Allison and Zelikow 1999; 1999). Therefore, governments develop policies through contestation within an institutionally confined range of options. Accordingly, governments are confronted with “a dilemma between institutionalization and competition”, particularly when they are confronted with the need for policies

that address fundamental, urgent and complicated matters – such as security-relevant impacts of climate change (Peters and Fontaine 2022, 6; see also Ney 2022).

This cumulative dissertation's results provide insights into these politics of policy design and point to some dilemmatic aspects that governing entails. Chapter 2 observed how national-level security strategies display a substantial variety in problem framings, indicating substantial contestation over the problem that climate security policy is supposed to address. Chapter 3 made the case that these politics of policy design play out in the field of climate security policy between defense and civil institutions, resulting in, for example, different foci and urgencies.

Tracking these politics towards the implementation of high-level strategies, chapter 4 observed how this seemingly technocratic realization of strategies is a highly political matter. The prioritization of disaster response implementation is called into question by defense practitioners occupied with Russia's invasion of Ukraine and the designers of defense mitigation efforts seek for shortcuts – such as focusing on energy efficiency instead of emission reduction targets. In a wider sense, the politics of defense's climate security policy implementation also entail tensions between what chapter 5 categorizes as ecologically relevant military activities of a new or, respectively, old purpose: Chapters 4 and 5 documented how militaries' disaster response and emission reduction efforts are paralleled by the pursuit of border protection and Anthropocene geopolitics.

The national-level politics of climate security policy planning and implementation could be further studied at two additional sites. It would make for an instructive comparison to analyze the politics at play within civil ministries, or alliances thereof, when they prepare and conduct the actual measures implied by their high-level strategy documents. In similar fashion, it would be very instructive to further trace the politics at play within defense administrations when these plan for, or undertake, second-order adaptation by responding to, for example, violent conflicts that can be, discursively or empirically, linked to impacts from climate change (see also Maertens 2019).

Another ubiquitous feature of policy studies is their implicit or explicit grappling with the complexity of policies and the matters that they address (Cairney et al. 2015; Cairney 2012; see also Beaumont and Coning 2022). Such complexity entails a variety of features such as emergent behavior, nonlinear causation, phase transitions and feedback processes. For these concepts, the vocabulary of complexity found great purchase in research that seeks to diagnose the symptoms and consequences of climate change (Wellstead and Howlett 2015) which are indeed bearing many features of complexity (Spaiser et al. 2023; Franzke et al. 2022; Ide et al. 2020; Challinor

et al. 2018; see also IPCC 2023). In contrast, and not without irony as Paul Cairney and Robert Geyer note, complexity thinking is insufficiently applied to climate policy's "complex policy-making system itself" (Cairney et al. 2015, 13). To overcome the approaches that commonly conceptualize climate policy as a "black box' [...] in which policy simply reflects what is required of it", scholars called for studies of meso-level processes within and between governmental institutions (ibid.; see also Wellstead and Howlett 2015).

This dissertation's chapters have suggested several concepts that help with tracing complexity within the politics of (inter-)institutional climate policy. The framework developed and applied in chapter 3 suggests a way to capture the subnational contestation over policy approaches between different meso-level institutions through the comparison of climate change framings. The framework in chapter 4 embeds this study of framing into a wider assessment of meso-level climate policies within governmental systems, differentiating them according to intervention points and involved policy modes. Even more general is the typology developed in chapter 5 that differentiates institutions' ecologically relevant activities according to their directedness and the novelty of intended purpose and employed means.

Further studies on how political institutions explicitly reflect on and navigate complexity seem a timely endeavor. Globalization made contemporary crises, such as financial meltdowns, more global than in historical times. Additionally, some, such as pandemics and climate change, expand beyond societal aspects. They involve the biophysical realms more immediately than most other crises and therefore matches and, arguably, even surpass their complexity. The extent to which national-level institutions are capable of navigating this complexity becomes an urgent question in this context. The frameworks of this cumulative dissertation could be adapted to study how institutions prioritize between preventing a crisis and responding to its direct or indirect consequences. More urgently, future research should move beyond diagnostics and towards systematizing institutional best practices such as modularity, adaptability, redundancies, flexibility and other virtues in navigating such complexity (Johnson 2012).

7.3.2 Security studies

As it focused on climate *security* policies, this cumulative dissertation inevitably revolved around security. The chapters hold therefore implications for the wider, critical, study of security, particularly if defined loosely as a (sub-)discipline that studies the construction and contestation of ideas and practices related to governmental efforts aimed at the "alleviation of threats to cherished values" and their different implications (Williams and McDonald 2018, 1).

These phenomena underwent fundamental changes since the end of the Cold War with a plethora of new actors and orders, resulting in the emergence of new – and very old – risks and dangers (Porter 2023; Gheciu and Wohlforth 2018; Kaldor and Rangelov 2014). Some of these risks are so fundamental that the contemporary faces a range of planetary-scale insecurities and has even been referred to as the “age of existential threats” (Sears 2021, 1). Among these processes, the arrival of the Anthropocene, characterized as human’s ability to change natural processes at a planetary scale with devastating impacts, has generated serious concerns among societies and scientists alike (Chandler, Müller, and Rothe 2021; Dalby 2018a).

The ways in which actors of climate security policy navigate this exceptional challenge bear notable insights for the wider study. As outlined, the manifold harms that climate change does to human security are already well-documented and they are expected to increase (Adger et al. 2022). These challenges are unusually severe, the scientific community urges, in rare unanimity, for mitigation and adaptation as the right courses of action (IPCC 2023; see however Chakraborty et al. 2021; Work et al. 2019; Nightingale 2017), and climate change has made it onto national and international security agenda (Brzoska 2012b; Dellmuth and Gustafsson 2021). This means, that there is a severe danger, an empirically grounded, scientific recommendation on how to move forward, and clear consideration among conventional security actors. However, scholars have noted (Warner and Boas 2019; Rothe 2017; Methmann and Rothe 2012; Trombetta 2008) how this constellation failed to result in the “emergency measures and justifying actions outside the normal bounds of political procedure” that the early securitization literature expected (Buzan, Wæver, and Wilde 1998, 23).

This makes climate security policy a textbook example for the study of the politics involved in the conduct of security policy. As discussed, chapter 2 observed notions of climate security firmly embedded on official national-level security agenda but in very heterogeneous ways. Chapter 3 suggests that this heterogeneity might be the result of substantial differences at the subnational level between defense departments and civil ministries. This is instructive to the wider realm of critical security studies as it highlights the formation of security policies as “unavoidably political” (Williams and McDonald 2018, 1; see also Diez, Lucke, and Wellmann 2016) and contoured by elite coalitions according to their preferences through techniques such as framing (Krebs 2018).

Furthermore, the findings of this dissertation illustrate how politics are not confined to a detached early-stage phase of deliberation but permeate throughout the process of initiating, planning, realizing and revising policies. This responds to earlier calls for characterizing even the

seemingly more technical aspects of security policy implementation as a political process (Peters 2022). Chapters 4 and 5 have focused on defense organizations' activities to outline the considerable variety of problems between which their climate security policies prioritize. These range from emission cuts to the reactive, fossil-driven militarization of geostrategically transforming areas such as the Arctic. Moreover, chapter 4 observed that defense departments even differ in the ways in which they implement the same policy goals.

This political contestation has profound implications. Scholars argue that the Anthropocene as an embedding condition challenges the clear-cut division between those processes that generate insecurity and those actors that seek to prevent or ameliorate them. Through the anthropogenic character of global environmental change, political responses can, at the same time, contribute to the problem (Chandler, Müller, and Rothe 2021). Chapters of this dissertation identified various instances of such blurring activities. Chapter 5 categorized them as ecologically relevant military activities that are undertaken by conventional means. In a wider sense, chapters 5 and 6 noted how both the conduct of climate security policies and the manifestation of climate-related insecurities remain embedded into deeper, structural contexts that reproduce insecurity.

Consequently, there is a case to be made that these problems require equally fundamental policy changes. This links the study of climate security policy to the debate around whether fundamental change in international security is actually possible (Gheciu and Wohlforth 2018). If fundamental changes in security policy are required to keep local, regional and planetary entities within safe boundaries but, at the same time, the course of security policy remains inherently politicized, then the initiation of required responses is by no means an automatism, regardless of the urgency. Rather, as chapter 5 suggests, the course of climate security policies often reflect a dilemma, where security policy actors navigate between prevailing external and emerging existential threats (Dalby Forthcoming; 2021).

Further research should pay attention to how this unfolds. The civil ministries' turn to climate security is more than just an occasional fashion of individual ministries (see already Brodén Gyberg and Mobjörk 2021; Abrahams 2019). Accordingly, continuing this research offers insights whether the often called-for transformation of security practices (Depledge 2023; Ege-land 2022; Aykut and Maertens 2021; Oels 2012; Trombetta 2008) is indeed taking place and whether it is redirecting the focus to environmental change's direct impacts and the political factors that lead up to the manifestation of indirect impacts (Ide 2023d; Busby 2022). Such

research would benefit from studies into climate security policy implementation by civil ministries and further case studies on development agencies and foreign ministries (von Lucke 2023; Kaya and Schofield 2020).

While this dissertation dedicated several chapters specifically to defense sector national level climate security policy approaches, this area also leaves considerable scope for further research. The research into armed forces' ecologically relevant activities is rapidly growing (Söder 2023; Depledge 2023; Rajaeifar et al. 2022; Jayaram 2021; Estève 2021) but, as chapter 5 has shown, remains not well-integrated and undertheorized. There is yet little research into the entanglement of military forces into the onset and dynamic of environment-related violence (Spring 2021; Tesfamariam and Hurlbert 2017; Egeru 2016). Few studies have focused on militaries beyond western, powerful, industrial countries (Jayaram 2021; Oluyemi 2020; Smit 2018) and on cases where armed forces play a major role in domestic politics (Forsyth and Springate-Baginski 2021; Dwyer, Ingalls, and Baird 2016). Additionally, there are some western militaries which are understudied given their size and/or their governments' role in international climate politics such as the armed forces of Poland and Germany. Case studies on these cases could readily draw on the frameworks developed in chapters 3, 4 and 5 of this cumulative dissertation.

More generally, a long-term monitoring of climate security policy trajectories – not only in the global North but also elsewhere – remains a vital task for research. Some questions will only be answered in a few decades: How do climate security policy actors continue to develop their programs and positions? How do these reactions correspond to the course of manifesting climate change and the unfolding emission trajectories? Could it be that conventional security actors distance themselves from climate security over new security developments in Russia, the Middle East, China, Sahel or the many other places of contemporary or future violent conflicts? And how would civil climate security policy actors respond to such a development? Would they maintain their linking of climate and security or would they also alter their framings?

Beyond the immediate relevance to how national-level institutions manage one of the most severe planetary challenges, these dynamics of tying together and untying climate and security will provide a more general indication on whether civil actors perceive incantating security (Aykut, Morena, and Foyer 2020) as preferable regardless of what conventional security policy actors do simultaneously.

7.3.3 Foreign Policy and International Relations research

This cumulative dissertation has focused on the climate security policies of national-level institutions. It explored the administrative procedures by which national-level institutions translate a transnational process into a security policy issue and with which consequences. The observed elements of this climate security policy – high-level statements on the international security situation, pledges to the UNFCCC and defense activities – are inherently relevant to a nation’s foreign policy course. Drawing on interstate comparisons, the cumulative dissertation offers three implications to the (sub-)disciplines of Foreign Policy Analysis and International Relations. First, it assesses how states position themselves as actors on climate security policy within the international policy landscape. Second, the chapters add ambiguous findings to the discussion about the extent to which nation states can be considered coherent actors. Third, and more generally, they open up general inroads to future studies in comparative foreign policy analysis.

Nation states are a core player within the governance of climate change as transnational challenge. Yet, they are often characterized as incapable or reluctant to initiate the required actions. Their individual means are considered insufficient as global climate governance requires them to engage in negotiations over “authoritative international rules” (Reus-Smit 2020, 27) and their reluctance to succeed in the required cooperation is interpreted as a coordination problem of “staggering proportions” aggravated by different nations’ different responsibilities and their different scope and timing of exposure (Newell 2017, 507; see also Behera 2020). It was this predicament that eventually replaced the attempt at top-down “*internationally* agreed conventions and protocols setting out allowable GHG emissions” (Harris 2021, 33), with bottom-up approaches that reflect “anachronistic affirmations of the national interests that have consistently held back more effective governance of climate change” (Harris 2021, 57).

The cumulative dissertation provides some generalizable observations on the interests that national governments pursue on climate security in international politics. Arguably, the framing of climate change as security issue in all-governmental NSSD gives an indication on the priorities that nation states commonly associated with climate change. Chapter 2 identified it as an item firmly established in the highest national-level security documents, suggesting that many nation states consider it in their interest to position themselves on climate change.

However, the findings also call into question the extent to which these climate-related national interests align with those aspects that the UNFCCC emphasizes. The Paris Agreement firmly calls on its member parties to pursue climate mitigation and adaptation. In contrast, most NSSD do little to frame climate change itself as a security concern and they widely avoid embedding

it into the context of other crossed planetary boundaries. Instead they often focus on indirect impacts and are, at times, caught up with stigmatizing characterizations of climate displaced people not as victims or actors but as perpetrators.

Thereby, these findings add another nuance to earlier, skeptical takes on the feasibility of agreeing on ambitious bottom-up climate action: It is not that most nations fail to consider the issue – but the ways in which they consider it is not conducive to ambitious climate policy efforts aimed at preventing harm. Rather, chapters 2, 4 and 5 suggest that national-level security policies focus mostly on how global environmental change impacts their own nations' security through highly visible short-term events. National conventional security apparatuses often add these to their long list of security agenda items and face dilemmas when accommodating this existential threat among the other external threats that they tend to in practice (Dalby Forthcoming; 2021).

The subsequent chapters moved beyond capturing climate security frames in NSSD as the static interest of national governments and explore the internal politics of climate security policy. As a second implication to the wider research on International Relations and Foreign Policy Analysis, these observations offer ambiguous findings to the discussion about the extent to which nation states can be considered coherent actors. How states could be adequately conceptualized as international politics actors has long been a subject of scholarly debate and even motivated the emergence of Foreign Policy Analysis as distinct subfield (Snyder, Bruck, and Burton 1954; Hudson and Vore 1995; Hudson 2017).

More recently, scholars noted a changing role of nation states. They documented how a growing share of nation states' challenges now resides at the inter- or transnational scale. These include newly emerging challenges at the transnational level, such as cyber, and the transnationalization of long-standing issues, such as terrorism (Krebs 2018; Kaldor and Rangelov 2014). Even more abstract are planetary-scale challenges, like nuclear war or climate change, for which Nathan Alexander Sears described how they entail “forces of destruction” that are fundamentally mismatched by nation states' conventional “modes of protection” (Sears 2021, 2).

This mismatch of states' conventional means is paralleled by a declining coherence with which individual nation states are able to position themselves within the international system. Scholars have pointed out how this state transformation affects, for example, the foreign policy course even of rising powers such as China (Jones 2019) and carries the politics of global governance into national level politics (Hameiri and Jones 2015).

National-level climate security policy is related to both processes. It responds to a planetary-scale challenge mismatched by nations' conventional protective tools and it represents a policy body which is formulated, and contested, by a multitude of domestic institutions. This cumulative dissertation has repeatedly observed such dynamics, documenting how internal actors compete over nations' foreign policy course on climate security according to their organizational interests (chapter 3), how defense ministries struggle to fulfill their assigned contributions to these foreign-policy relevant activities (chapter 4) and how they are, at times, rather complicit in contributing to the problem than to the solution which their own governments committed to (chapters 5, 6).

Further research could expand on these findings by studying the societal and international processes preceding national-level climate security policy formulation and government-internal contestation. How individual governmental apparatuses arrive at the decision to approach climate change through a security lens is well studied (McCormack 2020; Bremberg, Sonnsjö, and Mobjörk 2019; Rothe 2017; Thomas 2017; Diez, Lucke, and Wellmann 2016; Hayes and Knox-Hayes 2014; McDonald 2012) and this dissertation found climate change firmly established in NSSD around the globe.

This capture of the status quo is not well-matched by analyses of external parties' dynamics that precede such an adoption. Previous studies drew on case studies or small samples to identify various influential actors such as think tanks (Daoust and Selby 2022; Brzoska 2009), energy system stakeholders (Fischhendler, Boymel, and Boykoff 2016), or the media (Schäfer, Scheffran, and Penniket 2016). Yet, theory development is severely limited. Which external parties usually drive the integration of climate change into NSSD? How commonly does it result from epistemic communities or governance networks that have been suggested as drivers of climate security agenda adoption at international organizations (Odeyemi 2020; Paglia 2018)? To what extent is the broad uptake a result of intergovernmental policy and/or norm diffusion (de Oliveira 2021)? Can, perhaps, application efforts for membership in international organizations such as EU and NATO explain why some nations adopted the issue (see also Noreen and Sjöstedt 2004)? Such studies would provide an understanding of how a security issue could enter national security agenda so globally and, possibly, help to identify those parties capable of driving policy change.

As a third, and final, implication, the dissertation offers inroads to general Foreign Policy Analysis research. As rising powers challenge the Western liberal international order albeit being incapable of tackling the planetary-scale challenges themselves (Simangan 2022; Mearsheimer

2019; Ikenberry 2018), there is a need for further research into how different countries navigate between external and existential threats. Accordingly, calls for comparative approaches to the study of foreign policy have reemerged over the last two decades (Feng et al. 2023; Lantis, Beasley, and Thompson 2017; Kaarbo et al. 2012; Breuning 2004).

To pursue this endeavor, this cumulative dissertation introduced a dataset of 310 NSSD, high-level national security strategy documents, published by 93 countries over the course of about two decades. These documents are not focused on environmental change but present the general security policy course of a country. Hence, this dataset of governmental statements – particularly if continuously updated with newer NSSD – offers considerable potential to study the changing international order. Additionally, chapter 3 has suggested a design to undertake such studies in a way that is cognizant of domestic politics.

7.4 Once more: Debating climate security in Düsseldorf

A few months after returning from my conference trip to Montreal, Canada, I was invited by a large German political foundation to join a podium discussion on the role of climate security in Europe. A diverse audience had gathered, consisting of engaged citizenry, activists and, given the host's high political profile, presumably also decision makers. I was quite happy to see that the topic could attract about a hundred people on a sunny and warm Friday evening in September. Here, I found myself in kind company between the moderator, a young politician and climate activist, and a professor who had specialized on climate policy.

The moderator opened the debate with a general question: “Why”, she asked, “does security policy need to consider climate change?” Prompted by this question, the professor spoke first. He expressed his deep concern that climate change would cause resource scarcities and result in “water wars”. The young politician seconded him, sharing his concerns that climate change would certainly result in large-scale migration “from Africa”.

With the chapters of this cumulative dissertation still very present, I could not agree. I remembered how I had wondered in Montreal how states navigated between providing security from external and from existential threats and to which extent security policy could succeed in pursuing both at once. In kind yet firm tone I briefly outlined how research has identified the crucial role that policies, and politics along with them, play in causing or preventing these specters popularly allocated to climate security. I argued that approaching climate change as a security issue would benefit from expanding the circle of domestic institutions involved in the provision of security and shared my diverse observations on the difficulties that conventional actors of security policy faced in responding to climate change.

With these contributions, the podium joined the debate over whether climate change should catch political attention because it causes external or, instead, existential threats. It is to be hoped that the latter conception gains traction. This would help nation states to center their climate security policies on the mitigation and adaptation efforts that remain central to humanity's chances of passing the Anthropocene's multiple interlinking inter- and transnational crises.

8. List of Annexes

Chapter 2: Barking up the tree wrongly? How national security strategies frame climate and other environmental change as security issues

Annex	File Type	Description
Annex 2.1	Word	Methodical remarks on NSSD research
Annex 2.2-2.13	Excel	Calculations on the coverage of frames with different focuses in NSSD

Chapter 3: Tracking Climate Securitization: Framings of Climate Security by Civil and Defense Ministries

Annex	File Type	Description
Annex 3.1-3.11	Excel	Calculations on the coverage rates for focus, origins, temporality and certainty of climate security frames in NDC and NSSD

Chapter 4: Hardly exceptional? How NATO militaries respond to environmental change

Annex	File Type	Description
Annex 4.1-4.3	Excel	Calculations on the coverage rates for awareness, assessment, planning stages
Annex 4.4	Word	Case studies on CAN, FRA, SVN, EST, LVA

Chapter 5: Not so Green Defense? A Literature Review on Ecologically Relevant Military Activities

Annex	File Type	Description
Annex 5.1	Word	Search strategy used to identify literature
Annex 5.2	Excel	List of identified studies

Chapter 6: Contextualizing Climate Security: Global Environmental Change affects Human Security differently on Vanuatu and Guam

Annex	File Type	Description
Annex 6.1	Word	References on the observed sources of climate-related human insecurity

9. References

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Selbstdeklaration bei kumulativen Promotionen (Fachbereich Sozialwissenschaften)

Konzeption / Planung: Formulierung des grundlegenden wissenschaftlichen Problems, basierend auf bisher unbeantworteten theoretischen Fragestellungen inklusive der Zusammenfassung der generellen Fragen, die anhand von Analysen oder Experimenten/Untersuchungen beantwortbar sind. Planung der Experimente/ Analysen und Formulierung der methodischen Vorgehensweise, inklusive Wahl der Methode und unabhängige methodologische Entwicklung.

Durchführung: Grad der Einbindung in die konkreten Untersuchungen bzw. Analysen.

Manuskripterstellung: Präsentation, Interpretation und Diskussion der erzielten Ergebnisse in Form eines wissenschaftlichen Artikels.

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