



The Overlooked Contributors to Climate and Biodiversity Crises: Military Operations and Wars

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Abstract

The military-industrial complex, military operations, and wars are major contributors to exacerbating both climate change and biodiversity crises. However, their environmental impacts are often shadowed due to national security reasons. The current paper aims to go through the devastating impacts of military operations and wars on climate change and biodiversity loss and challenges that hinder the inclusion of military-related activities into environmental crisis mitigation efforts. The information blind spot induced by concerns about national security reasons jeopardizes the efforts to involve the military-industrial complex and military operations in the global climate and biodiversity agendas. Besides that, many military-related challenges, such as specificity of operational requirements and lifecycles, dependence on fossil fuels, complex supply change, inadequate civilian technologies and innovations, and requirements of structural changes, can hinder emission reduction. Meanwhile, wars and conflicts not only threaten to drain all human and material resources available to tackle environmental problems but also inflict long-lasting destructions, pains, and trauma that can lead to hatred and distrust among nations and parties. With the rising hatred and distrust, global agreement and commitment to address climate change and biodiversity will hardly be achieved. Thus, promoting peace is the humanistic and planetary conscience.

Keywords Military-industrial complex · Conflicts · Humanistic conscience · Environmental conscience · Peace-making · Peace-building

“You once contributed to this *karma* [...]. Now, these vengeful spirits have come to seek justice”.

—From “Ghosts”; *The Kingfisher Story Collection* (2022)

The (Largely Unknown) Scale of Military Emissions

In the global discourse on climate change, a significant contributor often remains in the shadows: the military-industrial complex. While many efforts are being made to reduce emissions in civilian sectors, the military-industrial complex continues to have substantial environmental

repercussions. Furthermore, the destructive nature of warfare poses a critical threat to the environment and ecosystem diversity, often overlooked in the face of climate and biodiversity challenges. As “the problem of a problem solver is his inability to define the problem” (Vuong 2023), this paper aims to examine the impacts of military operations and wars on the environment and the challenges of incorporating them into the global climate and biodiversity agendas.

The military is a substantial source of greenhouse gas (GHG) emissions, largely due to its reliance on fossil fuels to power tanks, aircraft, aircraft carriers, and other vehicles. Besides direct emissions, military emissions also encompass emissions from logistics and transportation, operations at bases and facilities, and the weapons and equipment supply chain. In 2019, the top 25 largest weapons manufacturers alone sold products estimated at \$361 billion, each with its own carbon footprint (Lancaster University 2021).

Preliminary estimates indicate that militaries worldwide contribute approximately 5.5% of the total GHG emissions, a figure equivalent to the emissions of many countries (Parkinson 2022). Particularly noteworthy in this regard is the United States (U.S.) military, accounting for 31.2% of

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historical emissions (Transnational Institute et al. 2023). The U.S. military's fuel usage alone is equivalent to the emissions of a major nation ranked 47th in the world, nestled between Peru and Portugal (McFarlane and Volcovici 2023), and even surpasses that of Denmark, Portugal, and Switzerland (Kehrt 2022). In 2017, the U.S. military purchased approximately 269,230 barrels of oil/day, which could emit over 25,000 kilotons of CO₂ when burning (Neimark et al. 2019).

However, the true extent of military emissions remains somewhat elusive. Some countries lump them into civilian data or do not provide comprehensive information, while others keep this data classified for national security reasons.

Greenhouse Gas Emissions in Wars and Military Operations

In a conflict, sources of emissions are diverse. Fuel consumption is one of the primary sources of emissions in warfare. Military vehicles, aircraft, and machinery consume large amounts of fossil fuels, thereby emitting significant CO₂ into the atmosphere (Choudhury 2013). Additionally, military bases consume large amounts of energy for heating, cooling, and power supply, often relying on fossil fuels, further contributing to increased emissions (Samaras et al. 2019). Moreover, airstrikes and artillery strikes can damage or destroy vehicles and critical infrastructure, such as power plants and oil refineries, thereby contributing to greenhouse gas emissions in the atmosphere.

Military activities not only consume fuel but also affect GHG emissions through ecosystem destruction. Forests, wetlands, and other natural carbon sinks are often damaged during conflicts, leading to the release of carbon reserves into the atmosphere. Moreover, using explosives and various weapons causes environmental degradation, releases pollutants, and disrupts natural carbon absorption processes.

Information about military operations is often kept classified. Assessing their environmental impacts often relies on indirect and uncertain information, such as casualty figures and fuel consumption data. According to the Initiative on GHG Accounting of War, the total CO₂ emissions after 18 months of the Ukraine war were estimated to be around 150 million tons. Of these emissions, frequent wildfires along the frontlines accounted for approximately 15% (Agence France Presse 2023).

Impact of Wars and Military Operations on Biodiversity

The impact of war and military operations extends beyond emissions. They deeply affect biodiversity and inflict severe damage on crucial ecosystems. Over the past six decades,

armed conflicts have occurred in over 2/3 of the world's important biodiversity regions, posing serious threats to environmental conservation efforts (UN Environment Programme 2018).

The Vietnam War is a frequently cited example of military operations' impacts on biodiversity. From 1961 to 1971, millions of liters of herbicides and defoliants, including Agent Orange, were sprayed over South Vietnam to clear forests and destroy hiding places for Viet Cong insurgents, resulting in widespread ecological damage (UN Environment Programme 2018). The U.S. frequently conducted airstrikes on Asian elephants, believing they were used to transport supplies for the opposition forces (Earth.com 2019).

In the Democratic Republic of Congo, a series of armed conflicts since the mid-1990s has devastated wildlife populations (Bonessi 2016). They led to the widespread hunting of forest animals by combatants, civilians, and traders, seriously impacting species from small rodents to larger animals like gorillas and forest elephants. The conflicts also fueled illegal logging and harmful extraction processes.

Another clear example is the draining of the Mesopotamian Marshes in the early 1990s. This action, undertaken by Saddam Hussein's military, reduced the largest wetland ecosystem in the Middle East to less than 10% of its original size, turning it into a desert with a salt crust. Additionally, in 2017, ISIS militants set fire to oil wells in Mosul, releasing a tremendous amount of hazardous chemicals into the environment. Afghanistan's forests have also been affected by prolonged conflict, with over half of the country's forest area destroyed. Deforestation reached up to 95% in some areas due to people's coping strategies and lax environmental management during decades of war (UN Environment Programme 2018).

These examples illustrate the highly negative impact of war and military operations on the structure and functioning of ecosystems, which cause significant biodiversity loss and ecosystem damage (Lawrence et al. 2015).

Residuals that remain after conflicts, such as unexploded cluster bombs, can have long-lasting effects on the environment (Fares and Fares 2018). Radioactive weapons, including depleted uranium left over from the Gulf War, continue to pose environmental concerns. Although their radioactivity is only 60% that of natural uranium, depleted uranium still possesses chemical and radioactive toxicity (Pizzino et al. 2023; Young 2021). Scientists also found that the high radiation levels in wild boars in Ukraine are not directly due to the Chernobyl disaster but rather the result of nuclear weapons testing before the disaster occurred, resulting in residual radiation in the surrounding areas for decades (Limb 2023; Stäger et al. 2023).

The Information Blind Spot and the Gap in Global Climate Agreements

The lack of transparency, often referred to as the “military emissions gap,” arises from the voluntary reporting of military emissions within the United Nations Framework Convention on Climate Change (UNFCCC). The 1997 Kyoto Protocol and the 2015 Paris Agreement exempted military emissions reporting, citing national security concerns. Consequently, many governments choose not to report them.

In 2020, 40 industrialized nations spent approximately \$1.27 trillion on their armed forces, but only five countries reported their military emissions in line with United Nations guidelines. Furthermore, 15 other countries, including China, India, and Saudi Arabia, spent a combined total of about \$510 billion on their military yet failed to provide any disaggregated data on military emissions (Lancaster University 2021). Emissions from U.S. military activities abroad, including operations such as jet flights, naval sailings, and military exercises, have been exempt from reporting requirements.

Efforts are underway to address this blind spot. Environmental groups and scholars are employing research papers, letter-writing campaigns, and conferences to promote the incorporation of military emissions into global carbon accounting. In just the first five months of 2023, 17 peer-reviewed articles on this topic were published, indicating a growing awareness and concern (McFarlane and Volcovici 2023).

Complexities and Challenges in Containing Military Emissions

Even if the emission reporting within the military industry becomes transparent, reducing emissions presents several complex challenges, primarily due to the unique operational requirements and the nature of military technology and infrastructure.

Specificity of Operational Requirements and Lifecycles

One primary challenge is balancing the need to reduce emissions and maintain critical defense capabilities. Military equipment, such as tanks and jet-powered aircraft, often has long lifecycles, meaning that the fossil fuel-powered machinery currently in use may remain operational for many decades. This inherent characteristic of defense-related systems complicates the transition to cleaner technologies without compromising safety, reliability, and

performance. The use of indispensable heavy-duty systems for defense, such as missiles and weapons, also poses difficulties in achieving carbon reductions due to the chemical reactions essential for their functionality (Serhal 2023).

Dependency on Fossil Fuels

The reliance on fossil fuels further complicates the shift to clean energy. The significant fuel consumption by military units and the need to transport fuel to various global locations make reducing emissions without compromising defense capabilities challenging.

Complex Supply Chain

Addressing emissions in the military supply chain is a challenge due to the intricate nature of suppliers and the unique characteristics of defense products. This complexity hinders the creation of a mutually beneficial ecosystem between defense forces and their suppliers. One potential solution is to establish carbon reduction requirements for suppliers in line with national goals rather than attempting direct quantification and emissions reductions (Bowcott et al. 2021).

Inadequate Civilian Technologies and Innovation

Military forces can adopt low-carbon civilian technologies, such as sustainable aviation fuels, fuel cells, and electric vehicles (E.V.s). However, this approach still faces limitations and must be complemented with the development of specific military capabilities that impose high mobility and operational time demands.

Infeasible Monitoring of Emissions from Vital Military Operations

Military emissions can be categorized into two types: those directly under their responsibility and those from the supply chain. While emissions from the suppliers can be measured, emissions from security-related activities are often subject to careful evaluation to ensure minimal impact on military efficiency. Some emissions from vital military operations are difficult to classify, measure, and reduce.

Requirements of Structural Changes

Achieving net-zero emissions in the defense sector is a complex task that demands strategic planning, innovation, and potentially significant changes in military operations, procurement, and underlying military doctrines.

Humanistic and Environmental Conscience: Peace

Human conscience, which today encompasses the environment, needs peace (Vuong and Nguyen 2023, 2024). The far-reaching impact of war, military operations, and the military-industrial complex on biodiversity and climate change underscores the urgent need for global peace and environmental management. War and conflict, as illustrated by examples from Ukraine, Vietnam, the Democratic Republic of the Congo, Iraq, Afghanistan, and currently occurring ones, have led to increasing emissions, significant loss of biodiversity, ecosystem degradation, and disruption of natural habitats, affecting land and water life.

In the absence of peace, no matter how much we progress in climate change mitigation and biodiversity protection, they will be obliterated when the violence escalates and the economy becomes devastated. Wars and conflicts risk depleting all the human and material resources to tackle environmental crises (Vuong 2021b). Moreover, the more severe the destruction, pains, and trauma the wars and conflicts cause, the greater the hatred and distrust that remains among nations and parties (Vuong et al. 2021). Such hatred and distrust will be great obstacles in achieving the agreement and commitment to address the global environmental crises, of which success requires local actions and cooperation.

Therefore, the call for peace is synonymous with the call for the preservation of our planet. We need to acknowledge that war and military operations not only bring tragedy to humans but also cause environmental disasters. People claim to be righteous in wars, but the destruction of the environment and the devastating consequences left behind are sinfulness to Mother Nature. The need for global cooperation in conflict resolution, reduction of military activities, and focusing on sustainable and peaceful activities becomes more crucial than ever. As we face the daunting challenges of environmental crises, pursuing peace is not just a moral imperative; it is a critical component of the eco-surplus culture that helps maintain the survival and well-being of our planet (Nguyen and Jones 2022; Vuong 2021a).

Nick Buxton, a researcher at the Transnational Institute, has noted, “Money is being spent on militarization rather than on climate action, though the climate crisis is the biggest [common] security threat that we face today.” The transition of military spending into climate aid is a call being made at COP28 by activists. Perry O’Brien, the head of the Common Defense organization, has argued that reallocating a portion of military finances toward climate efforts would make the world safer (Noor 2023).

As a significant contributor to global emissions, the role of the military in climate change cannot be overlooked.

Increasing pressure from environmental and scientific organizations fosters progress in transparency and accountability of military emissions. Organizations like Tipping Point North South, The Conflict and Environment Observatory, and universities such as Lancaster, Oxford, and Queen Mary are actively advocating for more transparent and comprehensive reporting.

There are indications that the military sector is starting to acknowledge and address its environmental impact. Some military forces are preparing for changes in their reporting requirements. For example, NATO has developed a method for its member states to report military emissions, signaling a shift toward greater transparency. Furthermore, countries like New Zealand, the U.K., and Germany have been seeking ways to include previously excluded areas, such as emissions from overseas operations, in their national reporting (McFarlane and Volcovici 2023). The U.S. military has also shown progress in reducing its use of oil and associated emissions in recent years (Crawford 2019).

Nations and individuals are compelled to work towards peaceful solutions for conflicts and reconsider the priorities of national and global security. Investing in peace is investing in the health and resilience of our planet’s ecosystems. It is a commitment to future generations, ensuring a world where biodiversity thrives and the impacts of climate change are minimized. Let us, therefore, embrace peace not just as a political ideal but as an ecological necessity vital for preserving our planet and the intricate web of life it sustains.

Data Availability

No datasets were generated or analysed during the current study.

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Compliance with Ethical Standards

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