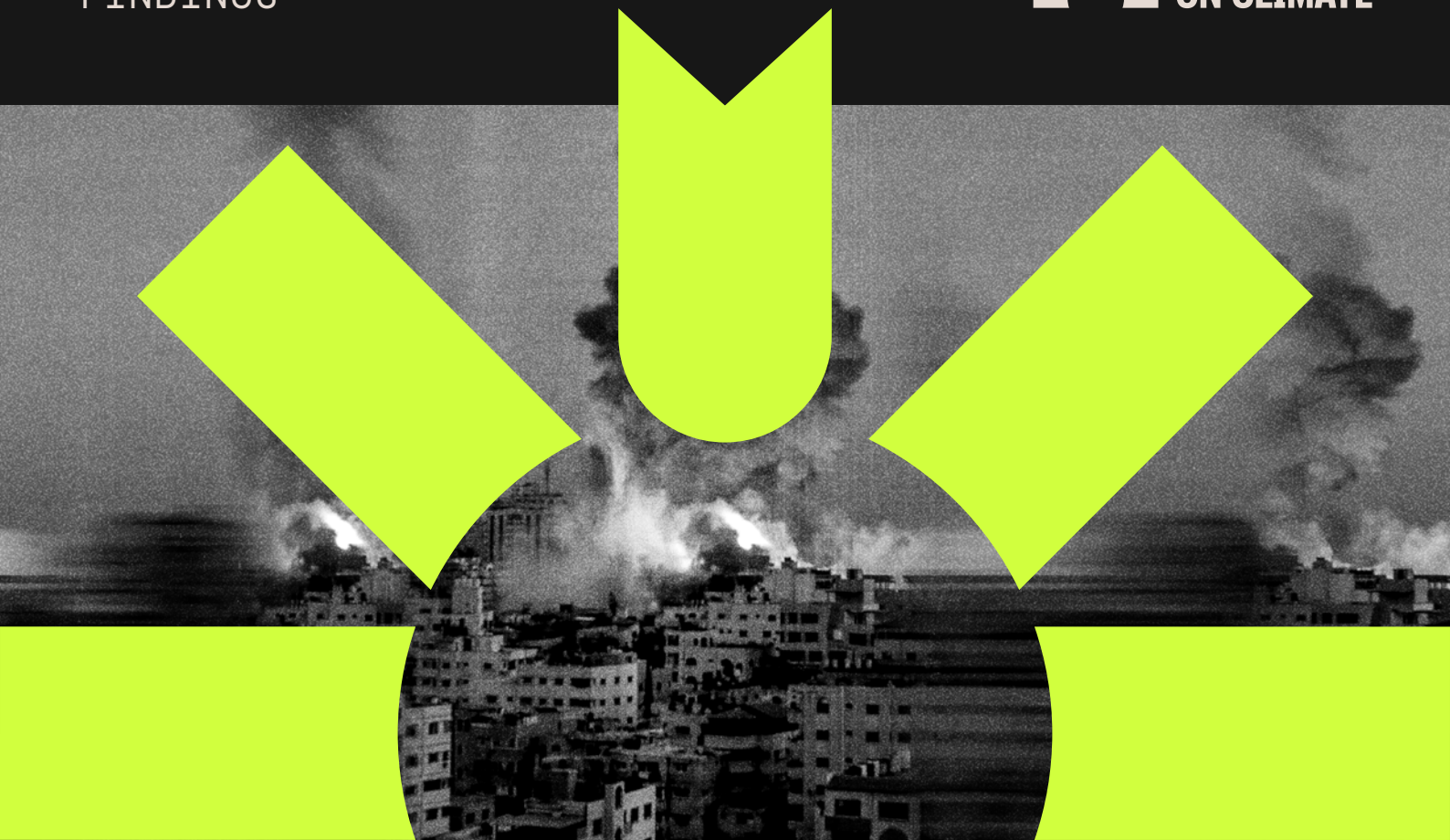


THE CLIMATE IMPACTS OF CONFLICT

SUMMARY OF PRELIMINARY
FINDINGS

 THE WAR
ON CLIMATE



The War On Climate: Unveiling the Uncounted Costs of Conflict

"1. We, the Heads of State and Government, representing the peoples of the world, have gathered at United Nations Headquarters to protect the needs and interests of present and future generations through the actions in this Pact for the Future.

...

11. Climate change is one of the greatest challenges of our time, with adverse impacts that are disproportionately felt by developing countries, especially those that are particularly vulnerable to the adverse effects of climate change. We commit to accelerate meeting our obligations under the United Nations Framework Convention on Climate Change and the Paris Agreement.

12. To live up to our foundational promise to protect succeeding generations from the scourge of war, we must abide by international law, including the Charter, and make full use of all the instruments and mechanisms set out in the Charter, intensifying our use of diplomacy, committing to resolve our disputes peacefully, refraining from the threat or use of force, or acts of aggression...

34. ... We are concerned about the potential impact that the global increase in military spending could have on investments in sustainable development and sustaining peace. We decide to:

...

(c) Ensure that military spending does not compromise investment in sustainable development and building sustainable peace..."

(Summit of the Future Outcome Documents, United Nations, September, 2024)

The World hoped for more, deserved more, needs more;
as this research seeks to demonstrate.

Summary of Preliminary Findings

edited, with thanks to the authors, for:
The Small islands Protection and Development Trust

"The Climate Impacts of Conflict"

S. Abolfathi, et al. 2025

The preliminary findings of this research suggest that promoting the achieving of peace is not merely a moral imperative; but rather more so, a necessary activity:

To further prevent the destruction of the planet / all upon it through human action.

Because:

Without mitigating military activities, global climate goals may be out of reach.

And:

**Differentiating factor between nuclear and non-nuclear warfighting,
in terms of damage to the planet and all upon it,
is a distraction:**

The main difference is only the time to destruction.

A. Background to Research

1.1.1 In 2024, out of 190 countries world-wide, 92 were currently involved in active military engagements¹ (IEP, 2024); and according to the Global Peace Index developed by the Institute of Economics and Peace, 2024 was an all-time high since World War II with 56 actual conflicts².

1.1.2 While a significant portion of military related emissions can be attributed to a few nations, global military trends reveal a pattern of increased expenditures (SIPRI, 2023).

1.1.3 In 2022, four out of five geographical regions saw their military budgets rise, with Europe alone increasing its spending by 13%. Middle East was second, with an increase in 3.2%, Asia and Oceania with +2.7%, Americas +0.3%. The only decrease was in Africa with -5.3% (IISS, 2024).

1.2.1 Military activities contribute significantly to global greenhouse gas (GHG) emissions, accounting for more than 5% of the total (Weir, 2024). However, these emissions are often hidden due to inconsistent or incomplete reporting and are only a part of the pollution story.

1.2.2 Most countries do not disclose military emissions comprehensively to the United Nations Framework Convention on Climate Change (UNFCCC); and estimates suggest that the true scale of military emissions could be over ten times higher than officially reported (COEBS, 2024).

1.2.3 In 2023, only 4 annex 1 countries³ reported their military emissions, meanwhile no non-annex 1⁴ countries reported any data on their military emissions (Neimark, B. et al. 2024).

1.3.1 This underreporting highlights a critical gap in global climate agreements, which exempt military activities from stringent emission regulations, as seen with the U.S.A. securing military exemptions during the Kyoto Protocol negotiations (NSA, 2022).

1.4.1 Despite the increase in the rise of military budgets and subsequent carbon footprint of military activities, they remain excluded from the Paris Accord's mandatory emissions monitoring (TNI, 2022).

1.4.2 This exclusion raised important questions: if military operations are so destructive to the environment, why are they not included in international climate accords?

1.4.3 Bringing transparency to GHG emissions and other environmental impacts on water, agriculture and biodiversity from military activity seemed crucial for a comprehensive climate action strategy and to work effectively on peace policies.

1.5.1 The military sector is a significant contributor to global carbon emissions, yet its impact is largely overlooked in international climate agreements. According to estimates, military activities account for at least 5.5% of GHG emissions, surpassing those of entire countries like Russia (Parkinson & Cottrell, 2022).

1.5.2 The exclusion of military emissions from national inventories not only undermines efforts to combat environmental impact but also conceals the full scale of global carbon output (Michaelowa et al., 2022).

1.6.1 Rich nations continue to allocate 30 times more resources to military spending than to environmental impacts (TNI, 2022), undermining efforts to mitigate environmental impact, especially in regions already vulnerable due to both conflict and environmental degradation.

1.7.1 The number of global conflicts nearly doubled between 2010 and 2022 (Lin & Burton, 2024), and military operations are among the largest institutional contributors to carbon emissions, comparable to those from global aviation and shipping industries combined (Lakhani, 2024).

¹ Currently ongoing conflict, transportation of military equipment and movement of troops

² Including interstate conflicts and civil wars

³ Economically developed countries that have been requested to follow voluntary reporting guidelines based on their historical emissions (Neimark, B. et al. 2024).

⁴ Less developed Countries with no requirements regarding military emission reporting (Neimark, B. et al. 2024).

1.7.2 Military strategies tend to prioritise operational efficiency over environmental sustainability, leading to a significant carbon footprint (Belcher et al., 2019). For instance, the U.S. military's global presence, with ongoing operations in numerous conflict-zones, as well as military readiness activities elsewhere, contributes to environmental destruction through fuel consumption, logistics, and weapons usage (Belcher et al., 2019).

1.7.3 This "everywhere war" emphasises the heavy environmental costs of constant military readiness.

1.7.4 This could be seen in Toussaint's (2024) findings that underscore the substantial environmental costs associated with the U.S. military's constant state of readiness. The disposal of decommissioned equipment, such as sinking old ships, poses significant environmental risks due to potential pollutants entering marine ecosystems (Toussaint, 2024).

1.7.5 In 2019, Belcher et al published the breakdown of CO2 emissions by U.S.A. military branch, which found that the total CO2 emissions (kt) in 2017 was 23,367.1 solely based on the fuel purchasing.

1.7.6 Additionally, the accumulation of obsolete military assets in storage facilities contributes to environmental degradation, highlighting the need for more sustainable practices in military operations.

1.8.1 Military conflicts not only cause direct and immediate destruction, as all can see, all too frequently, but also lead to long-term environmental degradation, including deforestation, pollution, and the depletion of vital resources, which severely impact both ecosystems and human livelihoods (UNEP, 2019).

1.8.2 Vulnerable and marginalised communities are disproportionately affected by the environmental fallout of military activities, exacerbating social and environmental inequities (Ahmad, 2024).

1.8.3 The environmental impacts of war, combined with the military-industrial complex's dependence on fossil fuels and complex supply chains, further complicate the sector's ability to reduce emissions (Parkinson & Cottrell, 2022).

1.8.4.1 Ultimately, the intersection of environmental impact and conflict creates a vicious cycle. Worsening environmental conditions, such as resource shortages and both conflict and climate-induced displacement, lead to heightened tensions and violent conflicts, which in turn further degrade the environment (UNSC, 2023).

1.8.4.2 This cycle is difficult to break without significant international intervention and cooperation. Mera and Suarez (2018) find that countries post-conflict focus on socioeconomic conditions over environmental sustainability, even if there is a heavier reliance on natural resources post-conflict.

1.9.1.1 To safeguard the planet, it is imperative to address both conflict and its environmental impact simultaneously.

1.9.1.2 As Vuong et al. (2024) argue, global peace is essential for environmental sustainability. Without peace, the resources needed to combat environmental impact are depleted, trust between nations is eroded, and coordinated efforts to preserve biodiversity are thwarted.

1.10.1 Nature has no defence against the devastation of war, and recovery is often a slow and painful process (Westing, 2013).

1.11.1 Governments often frame climate policies around individual actions, diverting attention from the systemic issue of conflict as a major environmental threat (De Jong et al., 2020).

1.11.2 While protecting citizens from aggression and terrorism is undeniably a government's responsibility (Lin & Burton, 2024), the prioritisation of national security over environmental concerns requires urgent re-evaluation.

1.11.3 Climate change itself is a national security threat, with global ramifications that endanger ecosystems and human societies alike (Barnett, 2023).

1.12.1 All this revealed the urgent need for more transparency and accurate reporting, as current data remain incomplete or imprecise; and unconnected.

1.12.2 Thus, the urgent need for a systematic research report which would bring all reported information together.

1.12.3 By exploring the environmental toll of military activities, the research would facilitate future initiatives by highlighting the importance of climate resilience strategies in peace discussions, to avoid conflict as well as influence post-conflict recovery efforts.

1.12.4 The objective was to uncover the environmental impacts of wars in pre- during- and post-conflict stages, ultimately leading to a call for peace and utilising major considerations regarding the climate to deter any further conflicts.

1.13.1 While the limitations in the data available are acknowledged, they highlight the critical need for greater transparency and comprehensive analysis of the impact of pre-, during- and post-conflict activities on the environment (UNEP, 2019).

1.13.2 Understanding the environmental impact of conflict is not only vital for meeting current climate goals but also for fostering global peace and preventing irreversible damage to the planet.

1.14.1 The research report seeks to create an academic and social platform that encourages governments and multinational bodies to reconsider their engagement in conflicts and recognise the environmental costs involved.

1.14.2 It investigates the environmental and climate impacts of conflicts across four distinct phases including: (1) pre-conflict, (2) during-conflict, (3) post-conflict relief, and (4) long-term recovery and reconstruction.

1.14.3 It focuses on the impacts of conflicts on ecosystems, resource extraction, transportation, pollution, forced migration, and land degradation.

1.14.4 The thematic areas examined include (1) greenhouse gas emissions, (2) natural ecosystems, (3) water pollution, and (4) agricultural land and food security.

1.14.5 This systematic review thus provides an insight into quantifying the environmental consequences of conflicts, highlights the need for sustainable, long-term recovery plans and encourages climate to be included in peace talks.

B. Introduction/Key Points

2.1.1 Despite the carbon footprint of military activities, they remain excluded from the Paris Accord's mandatory emissions monitoring (TNI, 2022).

2.1.2 Strengthening international regulations and ensuring military emissions are included in climate treaties like the Paris Accord are essential steps toward achieving comprehensive climate action (CEOBS, 2023).

2.1.3 Bringing transparency to military emissions is crucial for a comprehensive climate action strategy to be soundly based and accepted as valid.

2.2.1 Out of 190+ countries world-wide, only a small majority have no active military engagements; and only 36 have no militaries (World Population Survey, 2024). In 2024, there were active 56 conflicts (Global Peace Index, 2024), the most since the Second World War.

2.2.2 A significant portion of the global emissions which can be attributed to military activity arise mostly from the fewer nations actively involved in conflicts or in regular preparatory activity.

2.3.1 Governments often frame climate policies around individual actions, diverting attention from the systemic issue of military activity as a major environmental threat (De Jong et al., 2020).

2.3.2 While protecting citizens from aggression and terrorism is undeniably a government's responsibility (Lin & Burton, 2024), given that it has long been recognised that climate change itself is a national security threat, at the nation-state level, with global ramifications that endanger ecosystems and human societies alike (Barnett, 2023), the prioritisation of militaristic-focused national security over environmental concerns deserves re-evaluation.

2.3.3 Rich nations continue to allocate 30 times more resources to military spending than to climate finance (TNI, 2022); this undermines efforts to mitigate climate change, especially in poorer regions already vulnerable due to both conflict and environmental degradation.

2.3.4 The number of global conflicts nearly doubled between 2010 and 2022 (Lin & Burton, 2024), and military operations, taken together, are among the largest institutional contributors to carbon emissions; greater than many countries and greater than global commercial aviation and shipping combined (Lakhani, 2024).

2.3.5 Military framing, activities and strategies prioritise operational outcomes over environmental sustainability, leading to a significant carbon footprint (Belcher et al., 2019). This is not inevitable; merely an historical approach to war-fighting.

2.3.6 Military conflicts not only cause direct and immediate destruction where fought, but also lead to long-term environmental degradation, including deforestation, pollution, and the depletion of vital resources, which severely impact both ecosystems and human livelihoods (UNEP, 2019).

2.3.7 Vulnerable and marginalised communities are disproportionately affected by the environmental fallout from military activities, exacerbating social and environmental inequities (Ahmad, 2024).

2.3.8 The environmental impacts of conflicts and the military sector's equipment needs, combined with the dependence on fossil fuels and complex supply chains, further complicate the sector's ability to reduce emissions (Parkinson & Cottrell, 2022).

2.4.1 The intersection of climate change and conflict creates a spiral of damage. Worsening environmental conditions, such as resource shortages and climate-induced displacement, lead to heightened tensions and violent conflicts, which in turn further degrade the environment (UNSC, 2023).

2.4.2 To safeguard the planet, it is imperative to address both conflict and climate change simultaneously.

2.4.3 Without peace as the default option, the resources needed to combat climate change are constantly over-depleted, trust between nations is eroded, and coordinated efforts to preserve biodiversity are thwarted. (Vuong et al., 2024)

Nature has no defence against the impact of war, and recovery is often slow.
(Westing, 2013).

C. Research Structure

3.1.1 By exploring the environmental toll of military activities, the research provides a rationale for at least integrating climate resilience strategies into military planning and post-conflict recovery efforts.

3.2.1 The objective is to promote arguments for more sustainable approaches, whilst addressing the pressing environmental challenges posed by modern warfare (UNEP, 2019); this despite the fact that transitioning military operations towards environmental sustainability poses logistical and financial challenges, whilst competing priorities, such as military readiness, make it difficult to integrate climate-friendly practices into defence strategies (Barry, 2022).

3.3.1 The research adopts a four-phase approach to carbon emission and environmental footprint accounting: (1) pre-conflict, (2) during conflict, (3) post-conflict relief, and (4) long-term recovery and reconstruction. It focuses on the direct and indirect impacts of conflicts on ecosystems, resource extraction, transportation, pollution, forced migration, and land degradation.

3.3.2.1 The thematic areas identified for detailed examination in further research, and discussed briefly below, are: (1) greenhouse gas emissions, (2) natural ecosystems, (3) water pollution, and (4) agricultural land and food security.

3.3.2.2 Further research should also distinguish between global and local impacts of chosen themes.

Research Limitations

3.4.1 The preliminary results have several limitations, primarily due to data accessibility/gaps and incomplete reporting of military emissions, rather than methodology. Data gaps have informed further research decisions.

3.4.2 The level of non-reporting by most countries, although permitted, creates inconsistencies and underestimation of the true environmental impact of military activities (Parkinson & Cottrell, 2022; Schlanger, 2024).

3.4.3 Establishing a direct causal link between climate change and conflict is a challenge, not the least because the complex interplay of socio-political, economic, and environmental factors influencing climate change makes it difficult to isolate conflict as a sole driver. As a result, findings may not be fully generalisable across different regions and types of conflicts (Burke et al., 2014; Ide, 2023).

3.4.4 Data collection in active conflict zones is difficult and unreliable. Consequently, many studies rely on proxy data or assumptions, contributing to uncertainties in emissions estimates (De Klerk et al., 2023).

3.4.5 Long-term environmental impacts, such as biodiversity loss and ecosystem degradation, often remain unaccounted for in emissions estimates, complicating efforts to assess the full scope of military-related damage (Darbyshire, 2021; UNEP, 2019).

3.4.6 Political and legal obstacles persist.

3.4.7 Despite existing international legal frameworks (e.g. IUCN “Amman Clause”, ITLOS 2024 opinion) to mitigate environmental harm, on land and at sea, including during conflicts, enforcement remains weak or impossible; and political will is often lacking when it comes to addressing the environmental consequences of warfare (UNFCCC, 2022; United Nations Security Council, 2023).

D. Environmental and Climate Issues

4.1.1 Armed conflicts have profound and far-reaching effects on the environment, causing both immediate destruction and long-term ecological damage, locally; and globally, over time. The environmental damage during warfare includes the destruction of infrastructure, contamination of water supplies, and depletion of natural resources, which not only affects ecosystems but also endangers human health. To mitigate these impacts, it is crucial to incorporate environmental considerations into all stages of conflict prevention, resolution, and post-conflict reconstruction (ICRC, 2008).

4.1.2 The environmental consequences of military activities persist long after the conflict has ended. Bombings, deforestation, and contamination of land and water bodies disrupt natural habitats, harm biodiversity and impede ecosystem services. These effects go beyond local ecosystems, including through impacting global climate regulation and carbon sequestration capabilities (COEBS, 2021).

4.1.3 The long-term disruption of ecosystems exacerbates climate change, as it hinders natural processes like carbon absorption, making it vital to prioritise environmental protection in military planning and post-conflict recovery (Ahmad, 2024).

4.2.1 The current conflict in Ukraine provides a recent example of conflict-induced environmental damage (De Klerk et al., 2023).

4.2.2 The recently-ended conflict in Syria led to significant environmental degradation, including deforestation, water contamination, and soil erosion, which intensifies the humanitarian crisis by diminishing the availability of vital resources; whilst poor air quality, compounded by particulate matter from environmental damage, has had serious public health consequences, contributing to thousands of deaths and disabilities (Gaafar, 2020).

E. Military Emission Reporting

5.1.1 The military sector is a significant contributor to global carbon emissions, yet its impact is largely overlooked in international climate agreements and reports (Barry, 2022; Parkinson & Cottrell, 2022; Ahmad, 2024; UNEP 2021).

5.1.2 Under the Paris Accord and other international frameworks, reporting military emissions remains voluntary; whilst the exclusion of military emissions from national inventories not only undermines efforts to combat climate change but also conceals the full scale of global carbon output (Michaelowa et al., 2022).

5.1.3 This lack of comprehensive data makes it challenging to develop effective strategies to reduce the environmental toll of military operations (Parkinson & Cottrell, 2022).

5.1.4 Despite the large carbon footprint of the military sector, several nations successfully lobbied during the Kyoto Protocol negotiations for exemptions from emissions restrictions, citing concerns over national security and military readiness (NSA, 2022). Under the Paris Accord, such reporting was included, but made voluntary – and few volunteered.

5.1.6 Without mandatory reporting, the true extent of military emissions will remain hidden, making it difficult to develop targeted solutions for mitigating these impacts (Ahmad, 2024; COEBS, 2023).

F. Other findings

6.1.1.1 The research reveals that military spending and conflict continue to divert vital resources away from climate finance (TNI, 2022).

6.1.1.2 For example, in 2022, the UK redirected funds from its climate budget to provide military aid to Ukraine, while Norway paused development aid, including climate finance, in response to the same event (TNI, 2022).

6.1.1.3 Such actions reflect a global trend, where military spending takes precedence over climate action, further exacerbating the climate crisis.

6.2.1 Military activities contribute significantly to global greenhouse gas emissions, accounting for more than 5% of the total (Weir, 2024). However, these emissions are often hidden due to inconsistent or incomplete reporting.

6.2.2 Most countries fail to disclose military emissions comprehensively to the UNFCCC; and estimates suggest that the true scale of military emissions could be over ten times higher than officially reported (COEBS, 2024, NSA, 2022).

6.3.1 The convergence of climate change and conflict particularly affects vulnerable populations, intensifying existing challenges such as resource scarcity and displacement. The United Nations Security Council (2023) report emphasises how climate change exacerbates vulnerabilities in conflict zones, leading to instability.

6.4.1 Global military expenditure continues to rise, reaching a record \$2.24 trillion in 2022 (SIPRI, 2023). This growing financial commitment to defence stands in contrast to the underfunding of climate initiatives (COEBS, 2023).

6.5.1 Additionally, the intersection of conflict and climate change has significant health implications, particularly in fragile states. These regions experience heightened risks of food insecurity, disease outbreaks, and displacement, underscoring the need for integrated strategies that address both environmental and conflict-related challenges (Hickman et al., 2021).

6.6.1.1 Peacekeeping missions, seen as vital for maintaining stability, also have a substantial carbon footprint.

6.6.1.2 The UN's peacekeeping operations generate an estimated 1.5 million tons of CO₂ annually due to the reliance on vehicles, generators, and aircraft (UNEP, 2012). This underscores the importance of adopting more sustainable practices in conflict zones to mitigate their environmental impact; something which the UN has an overriding obligation to follow, but does not.

6.6.2 Military operations contribute to extensive environmental degradation, including deforestation, pollution, and resource extraction. These activities not only harm local ecosystems but also have global consequences by increasing greenhouse gas emissions (Whyte et al., 2024).

6.7.1 In some cases, environmental destruction appears to be a deliberate strategy, rather than a byproduct, of conflict (Whyte et al., 2024). Yet, these activities are often overlooked in international climate discussions, further complicating efforts to understand how to combat climate change (Michaelowa et al., 2022).

G. Military Activities

Pre-Conflict

7.1.1.1 Building and setting up military infrastructure pre-conflict, significantly contributes to greenhouse gas (GHG) emissions (Out-Larbi et al., 2024).

7.1.1.2 For example, the "Gaza Metro", an underground tunnel system used for moving supplies and military personnel, is estimated to have generated 478,800 tons of CO₂ equivalent—more than the total emissions in 2022 of Saint Lucia, a climate-vulnerable Caribbean island nation (Otu-Larbi et al., 2024; Lakhani, 2024).

7.1.3 This highlights the pressing need to integrate environmental considerations into conflict management.

7.2.1 Fuel consumption in military operations, especially in sending troops and arms, plays a significant role in environmental degradation. For example, transport fuels account for more than half of the energy used by armed forces (EDA, 2024), (Lakhani, 2024), (Michaelowa et al., 2022).

7.3.1 Global military spending has increased since 2014, intensifying the climate crisis through fuel-heavy exercises and the production of arms (TNI, 2022). Despite the carbon-intensive nature of these activities, the true carbon cost of arms production and the transportation of military supplies remains under-reported (Hussein, 2024), (Ni Bhriain & Akkerman, 2024).

During Conflict

8.1.1 The environmental toll of military operations during conflict is profound (Out-Larbi et al., 2024).

8.2.1 Military operations are heavily reliant on fossil fuels, from fighter jets and naval vessels to supply chains and logistics, making them major contributors to global carbon emissions. Identifying and reporting these hidden carbon costs is critical for understanding the true environmental impact of military operations (Belcher et al., 2019).

8.3.1.1 In the current Gaza conflict, emissions are also generated by humanitarian aid efforts.

8.3.1.2 The 1,400 trucks that transported supplies from Egypt to Gaza between October and February 2024 produced nearly 9,000 tonnes of CO₂e (Lakhani, 2024).

8.4.1.1 Historical conflicts also highlight the environmental devastation caused by warfare.

8.4.1.2 In the Vietnam War, the U.S. military's use of toxic chemicals like Agent Orange deliberately destroyed agricultural capacity, forcing populations off their land. Forests, used by Vietcong forces for cover, were also decimated, leading to what international lawyer Richard Falk termed "ecocide" (Whyte & Saunders, 2024).

8.4.1.3 The impact persists, 50 years on.

FIGURE: TOP 10 LARGEST MILITARIES BASED ON ACTIVE PERSONNEL (2024)⁵⁵

Country	Active-Duty Military Personnel	Budget
China	2,185,000	\$291,960,000,000
India	1,455,550	\$81,360,000,000
United States	1,328,000	\$876,940,000,000
North Korea	1,280,000	\$1,600,000,000
Russia	1,154,000	\$86,370,000,000
Pakistan	654,000	\$10,340,000,000
Iran	610,000	\$6,850,000,000
South Korea	599,000	\$46,370,000,000
Vietnam	482,000	\$5,500,000,000
Egypt	450,000	\$4,650,000,000

(Ahmad, 2024)

8.5.1.1 The ongoing Gaza conflict continues to produce immense carbon emissions. In the 120 days after October 2023, Israeli military operations alone generated around 60 million tonnes of CO2e—comparable to Sweden's annual emissions (Peacock, 2024).

8.5.1.2 That figure, which is likely underestimated due to missing military data, also equates to the combined energy use of over 77,000 average U.S.A. households, annually (Peacock, 2024; Lakhani, 2024).

8.6.1.1 Beyond direct emissions, conflict-driven environmental degradation also has long-lasting consequences.

8.6.1.2 In Syria, from 2012 to 2019, the country lost 20.4% of its total tree cover, primarily due to illegal logging, forest fires, and agricultural expansion. These activities, driven by conflict-related socio-economic factors, were particularly severe in Lattakia and Idlib governorates, where up to 27% of tree cover was lost during the war (Gaafar, 2020).

8.6.2 Such widespread deforestation not only disrupts ecosystems but also contributes to increased carbon emissions.

Post Conflict

9.1.1 The carbon footprint of post-conflict reconstruction is substantial.

9.1.2 For example, rebuilding Gaza is projected to generate between 46.8 and 60 million tonnes of CO2e—higher than the annual emissions of over 135 nations, putting that rebuilding, a wholly-avoidable activity, on par with countries like Sweden and Portugal (Otu-Larbi et al., 2024; Peacock, 2024). This highlights the massive environmental costs of post-conflict recovery efforts.

9.1.3 Materials essential for reconstruction, such as cement and steel, are among the most carbon-intensive industrial products (McCarthy, 2022). Cement alone contributes around 8% of global CO₂ emissions (Rodgers, 2018).

9.1.4 In Syria, where nearly 900,000 housing units have been destroyed, the cement needed for reconstruction is expected to release approximately 22 million tonnes of CO₂ (Lin & Burton, 2024).

9.1.5 Clearing debris before rebuilding also generates significant additional emissions, further escalating the carbon footprint of post-war recovery (Jensen & Lonergan, 2013), as well as releasing other toxins, such as asbestos used in historical construction methods.

9.2.1 Despite these large-scale impacts, the emissions associated with post-conflict reconstruction are rarely accounted for in conflict-related climate studies, leading to an incomplete understanding of the long-term environmental costs of war (Lakhani, 2024).

9.2.2 The reconstruction of Ukraine, which involves rebuilding homes, factories, and energy infrastructure, is predicted to significantly contribute to long-term environmental damage, adding further pressure on global climate goals (De Klerk et al., 2024).

9.3.1 The environmental damage caused by unexploded ordnance, chemical and radioactive weapons poses serious risks to ecosystems and life; long after conflicts end (Vuong et al., 2024).

9.3.2 These post-conflict challenges require urgent attention to mitigate their long-lasting effects on the environment and people; locally and globally.

9.4.1 Integrating sustainable practices into post-conflict reconstruction is essential to minimise further environmental damage and support ecosystem recovery. By adopting eco-friendly strategies, we can reduce the long-term carbon footprint of conflicts while promoting resilience in affected communities (Ahmad, 2024).

9.5.1 To address the intertwined threats of climate change and conflict, an integrated approach that combines climate action with peacebuilding initiatives is critical. This holistic approach not only reduces the environmental impacts of reconstruction but also fosters long-term sustainability and stability in war-affected regions (Hickman et al., 2021).

Greenhouse Gas Emissions

10.1 Military operations are significant contributors to global greenhouse gas (GHG) emissions, a fact often overlooked in discussions about climate change.

10.2.1 The military sector produces approximately 500 MtCO₂e annually, which represents around 1% of global GHG emissions (Parkinson & Cottrell, 2022).

10.2.2 When factoring in the known global military carbon footprint, which includes indirect emissions, this figure rises to 2,750 MtCO₂e, at least 5.5% of total global emissions (Parkinson & Cottrell, 2022).

10.2.3 Accordingly, if the military sector were a nation, it would have the fourth largest carbon footprint in the world.

10.3.1 Notably, these estimates are conservative as they exclude emissions from the direct impacts of warfighting, underscoring the vast scale of the military sector's contribution to global emissions (Parkinson & Cottrell, 2022).

10.4.1 In 2017, the global military and arms industries accounted for about 5% of total GHG emissions; whilst 2% was produced by global civil aviation (TNI, 2022).

10.5.1 During armed conflicts, military activities such as the deployment of vehicles, aircraft, and weaponry release significant amounts of CO₂ and other pollutants.

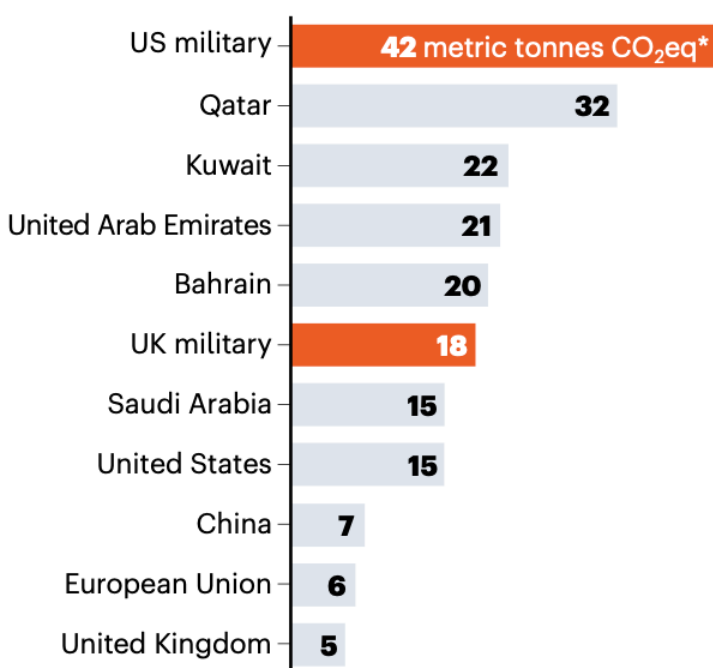
10.5.2 These operations not only contribute to immediate emissions, but also destroy carbon-storing ecosystems, such as forests and wetlands, further exacerbating climate change (COEBS, 2021).

10.6.1 The environmental footprint of military activities goes beyond direct combat emissions. The extensive logistical operations required to sustain a global military presence, such as troop movements, equipment transport, and maintaining military bases, consume vast quantities of fossil fuels, with inevitable consequences.

10.6.2 This hidden carbon cost, often overlooked in climate assessments, adds to the already substantial GHG output from military operations (Belcher et al., 2019), (Rajaeifar et al., 2022).

MILITARY EMISSIONS

Fuel-use data show that US and UK armed forces emit as much CO₂ per capita as many carbon-intensive countries.



(Rajaeifar et al, 2022)

*Per capita or per military personnel.
Country-level data are from the World Bank and are from 2018.
See the Supplementary spreadsheet for further calculations.

10.7.1 Conflicts also contribute to long-term environmental degradation, as the destruction of infrastructure and ecosystems releases stored carbon into the atmosphere.

10.8.1 In Ukraine, over the course of 12 months in 2022&23, conflict resulted in 120 million tonnes of CO₂e; comparable to the annual emissions of Belgium (De Klerk et al., 2023).

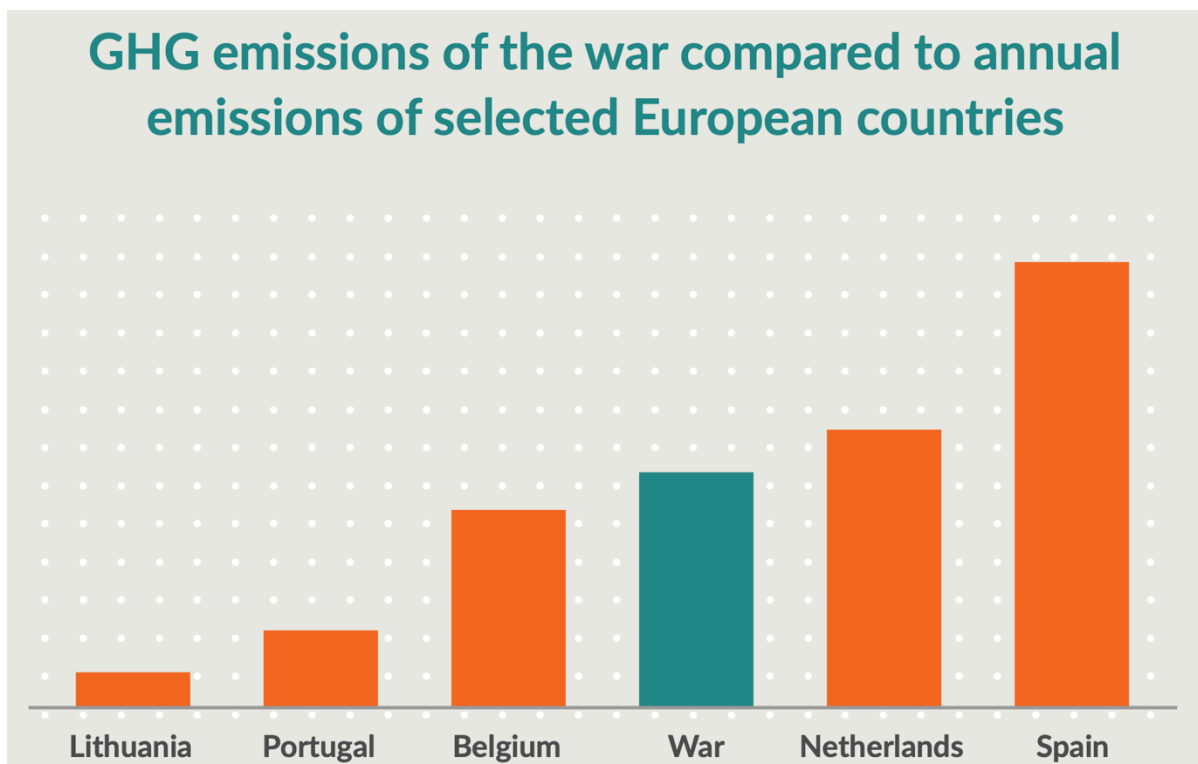
10.8.2 This figure rose to 150 million tonnes of CO₂e after 18 months of conflict, with climate damage estimated at USD9.6 billion (De Klerk et al., 2023).

10.9.1.1 Moreover, conflicts drive the release of greenhouse gases through the burning of fossil fuels and flaring during military operations.

10.9.1.2 In 2020, flaring in conflict zones like Libya, Syria, Iraq, and Yemen accounted for 22.1 billion cubic meters (bcm) of gas, translating into 50.7 million tonnes of CO₂e emissions (UNFCCC, 2022).

10.10.1 Military institutions are also major historical contributors to GHG emissions.

10.10.2 Seven of the top ten historical emitters, including the United States of America, China, Russia, and the United Kingdom, are also among the top global military spenders. Their military expenditures further amplify their climate footprint (TNI, 2022).



(De Klerk et al, 2023)

H. Natural Ecosystems

11.1.1 Conflicts often lead to extensive environmental degradation, where natural resources become both a cause and a casualty of war.

11.1.2 The destruction of ecosystems and biodiversity during conflict exacerbates the effects of climate change, creating a vicious cycle of environmental harm and instability. As wars persist, the long-term environmental consequences become more apparent, with damaged ecosystems struggling to recover (UNEP, 2019).

11.1.3 This degradation not only destabilises local environments but also has broader implications for global climate regulation.

11.1.4 Addressing these impacts requires a comprehensive approach that integrates environmental protection into conflict resolution, peacebuilding, and post-conflict reconstruction (UNEP, 2019).

11.2.1 The environmental toll of warfare extends far beyond the direct emissions from military operations. Conflicts contribute to deforestation, the burning of oil fields, and habitat destruction, all of which release significant amounts of carbon into the atmosphere (TNI, 2022).

11.2.2 These indirect emissions, compounded by military interventions, disrupt global efforts to transition to renewable energy and further destabilise ecosystems.

11.3.1.1 An often-overlooked consequence of conflict is the indirect environmental damage, which is harder to quantify but equally significant.

11.3.1.2 Forced migration, resource depletion, and the breakdown of ecosystems often persist for decades after the conflict ends.

11.3.1.3 Deforestation, soil erosion, and pollution, triggered by warfare, have long-term impacts on both local ecosystems and global environmental stability. These effects are difficult to reverse and highlight the need for comprehensive strategies that address not only immediate environmental concerns, but also long-term recovery efforts (UNEP, 2019).

11.4.1.1 The presence of military bases and operations across different ecological zones further intensifies environmental degradation (Belcher et al. 2019).

11.4.1.2 Military installations can disrupt local ecosystems through land use changes, deforestation, and pollution (Belcher et al., 2019).

11.4.1.3 These bases, coupled with the emissions generated by military logistics and operational activities, contribute to the broader ecological impacts of sustained military presence. The environmental costs of maintaining such installations illustrate the need for military operations to adopt more environmentally conscious practices (Belcher et al., 2019).

11.5.1 Conflicts also create governance vacuums in war-torn regions, which indirectly exacerbate environmental degradation (Braun, 2021).

11.5.2 In post-conflict Colombia, weakened control over natural areas resulted in widespread deforestation, turning former carbon sinks into significant sources of emissions and biodiversity loss (Braun, 2021).

11.5.3 The long-term impacts of such environmental degradation highlight the urgency of integrating environmental considerations into military and conflict recovery strategies (Braun, 2021).

11.6.1.1 The destruction of biodiversity and ecosystems is another consequence of warfare.

11.6.1.2 Historical examples, such as the use of herbicides like Agent Orange during the Vietnam War, illustrate how military actions can result in long-term ecological damage (Vuong et al., 2024).

11.6.1.3 More recent conflicts in the Democratic Republic of Congo and Iraq have seen the destruction of habitats, leading to the loss of species and biodiversity (Vuong et al., 2024).

11.6.1.4 These conflicts highlight the severe and lasting environmental consequences of military actions, with ecosystems suffering long after the immediate conflict ends (Vuong et al., 2024).

11.7.1 The destruction of natural habitats not only harms biodiversity but also disrupts ecosystem services that are critical for climate resilience (McCarthy, 2022).

11.7.2 For example, during the 2006 conflict in Lebanon, military operations led to significant deforestation, particularly in southern Lebanon and the Bekaa Valley, where up to 25% of forest cover was lost. The destruction of these forested areas displaced numerous species and significantly reduced biodiversity, which has long-term implications for the resilience of Lebanon's ecosystems, especially as they face the growing pressures of climate change (Saba & Al-Masri, 2007).

I. Water Pollution

12.1.1 The shrinking of vital water bodies, such as Lake Chad, has severely impacted the resilience of local populations (UNSC, 2023).

12.1.2 As water availability diminishes, so too do the opportunities for survival, leading to increased illicit activities and the rise of organised crime (UNSC, 2023).

12.1.3 The shrinking of Lake Chad has fuelled local conflicts, as communities struggle to adapt to the changing environment and compete for dwindling resources (UNSC, 2023).

12.1.4 This highlights the deep connection between water scarcity and regional instability, a trend that is likely to worsen as climate change accelerates.

12.2.1 In the context of direct conflict, water bodies and coastal ecosystems also suffer tremendous damage.

12.2.2 One of the most severe environmental impacts from the 2006 Lebanon war was the oil spill caused by airstrikes on the Jiyeh power station. This released an estimated 10,000 to 15,000 tons of heavy fuel oil into the Mediterranean Sea, marking one of the region's largest oil spills (UNEP, 2007). The spill not only contaminated over 150 kilometres of Lebanon's coastline but also disrupted the fragile marine ecosystem, coinciding with the breeding season of endangered Green and Loggerhead Sea turtles. Numerous marine species were killed as a result, destabilising an already vulnerable coastal ecosystem (Khalaf & Saad, 2008).

12.2.3 The impact of the 2006 Lebanon war on water systems extended beyond the coastline.

12.3.1 The destruction of infrastructure generated an estimated 3.5 million cubic meters of rubble and debris, including hazardous materials such as asbestos and concrete (UNDP, 2007).

12.3.2 Waste management systems in Lebanon were overwhelmed, leading to the establishment of emergency landfills and dumping sites that lacked proper environmental safeguards, resulting in further contamination of soil and water sources (UNDP, 2007).

12.3.3 Damage to water supply and sewage infrastructure also led to the discharge of untreated sewage into rivers and coastal waters, contaminating water sources and contributing to the spread of waterborne diseases (Bou Jaoude, 2007).

12.4.1 These examples underscore the often-overlooked impact of warfare on water resources, with contamination and destruction of critical infrastructure leading to long-term environmental and public health crises.

12.5.1 As conflicts intensify, the protection of water resources must be prioritised not only as a strategic asset but also as a fundamental component of human and environmental health.

12.5.2 The looming threat of sea-level rise, as highlighted by Lin and Burton (2024), only amplifies the need for urgent action.

12.6.1 In the past 10 years, 61% of the World saw an increase in extreme rainfall (compared with 1961-1990 average); whilst 48% had at least one month of extreme drought in 2023, up from 15% during the 1980's (Romanello et al., 2024).

12.6.2 Drought exposed 151 million more people to food insecurity in 2023, compared with the 1990's (Romanello et al., 2024).

H. Agricultural Land and Food Security

13.1.1 Conflicts have a profound and lasting impact on global food security, as evidenced by the conflict in Ukraine, which, with Russia, was one of the world's leading exporters of wheat and maize (FAO, 2022).

13.1.2 The disruption to global food supply chains caused by this conflict has been particularly detrimental to low-income, food-deficit nations that rely heavily on these imports and has led to higher food and fertilizer prices globally, exacerbating food insecurity in vulnerable regions (FAO, 2022).

13.2.1 Ukraine's inability to fully harvest crops, combined with international sanctions on Russia, has further strained the global agricultural market.

13.2.2 The closure of Ukrainian ports and damage to inland infrastructure disrupted the export of essential foodstuffs like wheat, maize, and sunflower oil, while the conflict's ripple effects have driven up fertilizer and energy prices worldwide, compounding production costs (FAO, 2022).

13.3.1 Whilst the conflict persists, it could significantly reduce the global supply of wheat and maize, pushing food prices even higher and increasing the risk of malnutrition (FAO, 2022).

13.4.1 This situation underscores the need for coordinated global efforts to manage food insecurity and the importance of addressing the interplay between conflict and agricultural vulnerability.

13.5.1 The relationship between climate change and conflict is complex and mutually reinforcing, particularly in the context of food security.

13.5.2.1 War often exacerbates environmental degradation, placing additional pressure on already scarce land and water resources (UNFCCC, 2022).

13.5.2.2 Conflict-driven displacement forces populations into areas with limited access to food and water, intensifying competition for these essential resources.

13.5.2.3 As displaced communities settle in neighbouring regions, the strain on agricultural systems grows, making it difficult to manage resources sustainably and exacerbating food insecurity (UNFCCC, 2022).

13.6.1 In Syria, the conflict had devastating consequences for agriculture.

13.6.2 More than 85% of Syria's agricultural land has been exposed to soil erosion, and the use of arable land decreased by 21% between 2010 and 2014. The pollution and fallout from oil fires have further destroyed large areas of cultivated and grazing land, killing livestock and disrupting local food production. Syria's cultivated land has decreased by 30% on average, with irrigated land shrinking by 50% (Gaafar, 2020).

13.6.3 The conflict has led to soil contamination, particularly in areas where industrial facilities and fuel depots were destroyed, leaving high levels of heavy metals in the soil and groundwater. This contamination not only poses long-term risks to agriculture but also threatens public health (Mhawej et al., 2017).

13.7.1 Lebanon's 2006 conflict presents another example of the lasting impact of war on agriculture and the environment. The destruction of industrial facilities and the deforestation that followed significantly increased soil erosion, particularly in hilly regions. Without vegetation cover, the land became vulnerable to landslides and runoff, further degrading its productivity and increasing the likelihood of natural disasters (Saba & Al-Masri, 2007).

13.7.2 The contamination of soil and groundwater in these areas has made it even harder for local populations to recover and restore agricultural output (Saba & Al-Masri, 2007).

13.8.1 The global implications of conflict-driven environmental damage are clear, particularly when it comes to food security.

13.9.1 Disruptions in global supply chains, rising food prices, and the degradation of agricultural land are all consequences of war that require urgent attention.

13.10.1 In addition to addressing the immediate humanitarian needs in conflict zones, there is a pressing need for international cooperation to integrate climate resilience strategies into conflict resolution and recovery efforts.

13.10.2 Ensuring sustainable agricultural practices in post-conflict regions is critical to preventing long-term food insecurity and mitigating the environmental damage that war leaves behind (UNEP, 2019).

J. Global Impacts

14.1.1 As conflicts intensify and military capabilities expand globally, the environmental and climate impacts of these developments are becoming increasingly severe.

14.1.2 According to the International Institute for Strategic Studies' *Military Balance* report (2024), this decade is marked by growing military power demonstrations, increased isolationism, and bolstered defence capacities worldwide.

14.1.3 This surge in military activities contributes heavily to global greenhouse gas emissions and accelerates environmental degradation (IISS, 2024).

14.2.1 Military energy consumption is enormous, as highlighted by the European Defence Agency's report, which notes that the armed forces of EU Member States alone consume energy on par with a smaller EU nation (EDA, 2024).

14.3.1 This pattern of high energy use is replicated globally, with military operations depending on fossil fuels, further compounding the climate crisis.

14.4.1 A critical dimension of the climate impact of conflict lies in the missed opportunities for addressing climate change.

14.4.2 Global military spending trends reveal a pattern of increased expenditures. In 2022, four out of five geographical regions saw their military budgets rise, with Europe alone increasing its spending by 13%; Africa the only region of decrease (-5.3%) (SIPRI, 2023).

14.4.2 The global spending on militaries represents resources that could otherwise be directed toward combating climate change and supporting vulnerable nations in their efforts to cope with environmental changes (Lin & Burton, 2024) (SIPRI, 2023).

14.5.1 The economic consequences of conflict-induced climate change are also profound.

14.5.2 Conflicts exacerbate environmental degradation, leading to heightened economic vulnerabilities in affected regions.

14.5.3 The destruction of infrastructure and disruption of economic activities due to warfare contribute directly to greenhouse gas emissions. These emissions not only drive climate change but also impose substantial economic burdens on regions already struggling to recover from the effects of conflict.

14.5.4 Addressing this issue requires integrating conflict-related emissions into global climate policies, ensuring that both direct and indirect impacts of conflict on the climate are adequately mitigated (Burke et al., 2014).

14.6.1 The high carbon emissions associated with military activities, particularly those involving extensive use of fossil fuels and destructive weaponry like phosphorous bombs, contribute to long-lasting environmental and social harm.

14.6.2 The excessive use of such weaponry not only causes immediate destruction but also undermines food security for generations, as contaminated soil and water make agriculture and sustainable food production nearly impossible.

K. Selected Conclusions

15.1.1 The global impacts of conflict on climate cannot be overstated; but need better quantification for demonstration.

15.2.1 The carbon footprint of military operations, combined with the environmental destruction caused by wars, makes it clear that addressing climate change and conflict together is an urgent priority.

15.3.1 Without global cooperation to redirect military spending toward climate solutions and to hold actors accountable for the environmental damage of war, the World risks perpetuating cycles of conflict-driven environmental degradation and escalating climate crises.

15.4.1` Effective climate policy must also integrate mitigation and adaptation strategies to address the complex relationship between conflict and environmental degradation.

15.5.1 The widespread damage caused by conflicts complicates efforts to mitigate climate change, making it essential for policymakers to develop adaptive measures that enhance societal resilience to both climate and conflict-induced disruptions.

15.6.1 Early investment in sustainable infrastructure, including renewable energy and efficient waste management, can reduce the long-term economic and environmental costs associated with conflict (Burke et al., 2014).

15.7.1 Reconstruction efforts present a unique opportunity to rebuild with sustainability at the forefront. In the aftermath of conflicts, societies can prioritise environmentally friendly practices, promoting sustainable development, protecting biodiversity, and addressing pollution.

15.7.2 Incorporating sustainability into recovery processes, can mitigate the long-term environmental harm caused by war, ensuring that future generations inherit a stable and healthy environment (UNEP, 2019).

15.8.1 International Humanitarian Law (IHL) can play a pivotal role in safeguarding the environment during armed conflicts (ICRC, 2008).

15.8.2 Under IHL, and climate treaties, parties to a conflict are obligated to avoid unnecessary harm to the natural environment, including the prohibition of warfare methods that cause widespread, long-term, and severe environmental damage.

15.8.3 Strengthening adherence to these legal frameworks is crucial in reducing the long-term environmental impacts of military activities (ICRC, 2008).

15.8.4 International legal protections remain inadequate in many areas. Strengthening frameworks like the Environmental Modification Convention and ensuring their enforcement is essential to safeguarding ecosystems during war (UNEP, 2019).

15.9.1 Integrating environmental protection into conflict resolution and post-conflict reconstruction is vital for achieving long-term sustainable development.

15.9.2 The environmental consequences of armed conflicts can hinder recovery efforts and exacerbate vulnerabilities, particularly in regions already affected by climate change.

15.9.3 By prioritising environmental sustainability in peacebuilding initiatives, we not only protect biodiversity and natural resources but also foster more resilient communities. These efforts contribute to global climate goals while creating a more stable and peaceful future (ICRC, 2008; COEBS, 2021).

“Despite the initial hope inspired by the 2015 Paris Agreement, the world is now dangerously close to breaching its target of limiting global multiyear mean heating to 1.5°C. Annual mean surface temperature reached a record 1.45°C above pre-industrial baseline in 2023.”

(Lancet Countdown on Health and Climate Change, Romanello et al., 2024)

**This research suggests why that became so; and what must be done;
Because we know it has already got worse.**

