

## From Battlefield to Ecological Disaster: The Environmental Cost of War

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### Introduction

The most visible and immediate consequences are not the only impacts that war bestows upon the planet earth. Lives lost, cities destroyed, people displaced and economies weakened - these may be the obvious effects, but war brings with it something beyond these- the destruction of natural environment. This form of destruction is often less visible and remains hidden beneath the immediate costs making the natural environment a “silent victim”, but it is potentially much precarious and longer lasting. Armed conflicts frequently result in contaminated land, polluted water, destroyed forests, disrupted wildlife habitats and damaged industrial facilities. In this sense, the battlefield does not remain confined to the area where fighting takes place. Its consequences spread through ecological systems and can continue long after the formal end of direct hostilities. However, environmental cost of war is not always the by-product of the process of armed conflict; sometimes, it operates as the very mean through which parties fight and sabotage one another. Natural resources and ecosystems often become part of the strategic landscape in violent conflicts, and conflicting parties either utilize these as their own strength or the weakness of their rival parties. Control over oil, timber, minerals, fertile land and water can influence the political economy of conflict, while the destruction or manipulation of environmental resources can weaken an adversary’s ability to sustain itself<sup>2</sup>. Unfortunately, ecological wreckage- be it the mean or

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<sup>2</sup> Le Billon, Philippe. “The Political Ecology of War: Natural Resources and Armed Conflicts.” ScienceDirect. June 2001.

[https://doi.org/10.1016/S0962-6298\(01\)00015-4](https://doi.org/10.1016/S0962-6298(01)00015-4).

outcome- does not harm only the hostile parties, it impacts the whole population of a state or community. A polluted river can become a public health problem; damaged farmland can become a food-security issue; destroyed forests can undermine rural livelihoods; and ecological degradation can make the return of displaced populations more difficult. Subsequently, environmental degradation, in the long run, creates obstacles in the way of security and development even after the formal termination of armed conflict, complicating recovery and conflict transformation.

## **War as an Environmental Disaster**

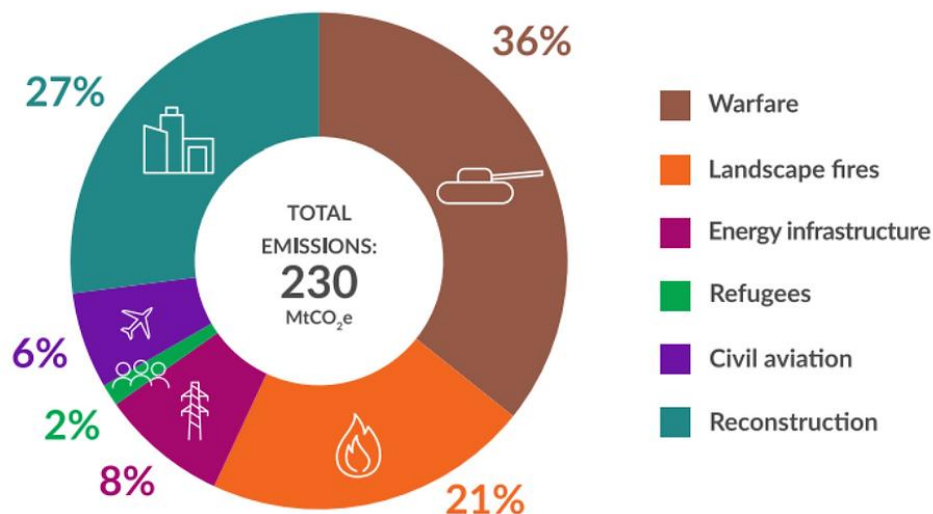
War not only brings on human catastrophe, political instability and economic loss, it poses a serious threat to the natural environment. The relation between war and ecological destruction can be easily noticed through numerous pragmatic instances. However, the scale and complexity of modern warfare have expanded the environmental footprint of armed conflict. Military operations can harm ecosystems through explosions, fires, chemical and biological contamination, contamination from fuels and munitions, creation of hazardous rubbles, and disruption of agricultural and industrial systems.

Armed conflict ruins the environment throughout three phases: pre-conflict phase, during active combat and post-conflict phase. In the pre-conflict phase, sustaining military readiness consumes vast volumes of hydrocarbons and critical minerals, with global military forces estimated to be responsible for 5.5% of all global greenhouse gas emissions and occupying between 1% and 6% of the global land surface<sup>3</sup>. It is illustrated by the updated 2026 report on the war in Ukraine that 48 months of full-scale conflict generated an estimated 311 million tons of CO<sub>2</sub>e; and the destruction of Ukraine's Kakhovka dam exposed bottom sediments containing over 83,000 tons of heavy metals, which now pose long-term risks as they are transported by wind, rain and water erosion. In the Gaza Strip, active combat has generated an estimated 39 to 40 million tons of toxic rubble- exceeding 107 kg of waste per square meter of the territory. The extreme destruction disabled all five of Gaza's wastewater treatment plants, allowing raw sewage to contaminate soil,

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<sup>3</sup> "How Does War Damage the Environment?". Conflict and Environment Observatory. May 5, 2025. <https://ceobs.org/how-does-war-damage-the-environment/>.

groundwater and beaches creating immediate public health crises<sup>4</sup>. Thus, armed conflict, even before it starts and after it formally ends, instinctively turns into an ecological disaster.



Source: Human Rights Research Center

One of the most proximate outcomes of war is land degradation. Armed conflict, in most of the cases, affects arable land and forestry that negatively impact the people whose livelihood heavily depend on these natural resources. Military activities can harm ecosystems directly by physically disturbing them and, indirectly by generating outcomes that hinder their potential utilization. This matters particularly in rural societies where destruction of productive land and natural resources continue to affect communities even after active fighting declines. Moreover, environmental damage becomes an economic problem because communities lose productive assets that cannot be replaced easily.

Water sources are equally vulnerable. Rivers, wetlands, groundwater and reservoirs can be affected when infrastructure, industrial facilities or sanitation systems are damaged. Water pollution and toxic contamination can also be seen as outcomes of military activities. The consequences imposed by war often exceed beyond the primary conflict zone because rivers and aquifers do not respect

<sup>4</sup> “Armed Conflicts and the Environment - the Invisible Cost of War.” IGTS Foundation. June 28, 2026. <https://igtsf.com/en/armed-conflicts-and-the-environment/>.

political boundaries. The Kakhovka Dam disaster in Ukraine in June 2023 illustrates how the destruction of a critical infrastructure can simultaneously become an ecological and humanitarian crisis. The collapse contributed to extensive flooding downstream while rapidly reducing water availability upstream. A subsequent assessment done by UNEP identified hydrological and geomorphological changes, chemical contamination, harm to ecosystems and protected areas due to the destruction of the dam. The assessment concluded that some of the effects were irreversible and had the potential to continue impacting the environment for decades. Additionally, some contemporary newspaper documented the proximate environmental and agricultural implications of the disaster, illustrating the transformation of ecological crisis into security and livelihood concerns<sup>5</sup>.

Air pollution and toxic contamination can also be propagated by armed conflicts and combative actions. Almost every type of combat weapon- small arms and light weapons, sophisticated machineries, and explosives- directly contribute to the degradation of air quality. Damage of energy infrastructure, industrial facilities and storage sites can release pollutants into the atmosphere. At the same time, military waste and damaged infrastructure can introduce toxic and hazardous ingredients to the land and water system. The environmental footprint of war can be noticed across several connected domains, including greenhouse gas emissions, water systems, agricultural land, food security and natural ecosystems<sup>6</sup>.

Another casualty is the loss of biodiversity. War ruins natural environment and ecosystems that, subsequently, results into the destruction of natural habitats. Weapons like- landmines and booby traps not only kill combatants, these also flail and maim animals, especially when used in forest areas. Over 90% of major armed conflicts between 1950 and 2000 took place in countries containing global biodiversity hotspots<sup>7</sup>; warfare directly dismantles conservation efforts and

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<sup>5</sup> Sabbagh, Dan., and Borger, Julian. "Thousands Flee Homes as Collapse of Dam Is Blamed on Russian Forces." The Guardian. June 6, 2023.  
<https://www.theguardian.com/world/2023/jun/06/ukraine-accuses-russia-of-blowing-up-nova-kakhovka-dam-near-kherson?>

<sup>6</sup> Desalegn Wirtu, Yohannes., and Abdela, Umer. "Impact of War on the Environment: Ecocide." Frontiers. February 5, 2025.  
<https://doi.org/10.3389/fenvs.2025.1539520>.

<sup>7</sup> "Armed Conflicts and the Environment - the Invisible Cost of War." IGTS Foundation. June 28, 2026.  
<https://igtsf.com/en/armed-conflicts-and-the-environment/>.

fragments critical ecological habitats<sup>8</sup>. However, the relationship between war and biodiversity is not limited to physical destruction during combat. Patterns of extraction and utilization of natural resources can also be changed because of war which indirectly affects biodiversity. However, these crises become more intense in the absence of well-conditioned authority and governance. Research on Colombia found a significant increase in fires and deforestation in protected areas after guerrilla demobilization, demonstrating that even the transition from conflict to peace can create new environmental pressures when state authority and land governance change<sup>9</sup>.

Moreover, the consequences that war imposes on the natural environment are cumulative. Therefore, the environmental cost of armed conflict cannot be easily fathomed through isolated incidents. War affects the nature by destroying its ecological, economic and social congruence.

## **Weaponization of Nature: Deliberate Destruction of Environment in Armed Conflicts**

Weaponization of nature refers to a strategy where the environment and environmental destruction are deliberately used as military tactics to weaken an opponent or population in armed conflict. The intentional manipulation and destruction of the environment is frequently employed as an active yet underhand weapon of war. This dimension of environmental cost of war is extremely troubling because when nature itself becomes a strategic mean of destruction in armed conflicts, the conflicting parties rarely consider the impacts of their activities on nature; rather it lures them to further weaponize the environment that may propagate irreversible and improbable consequences.

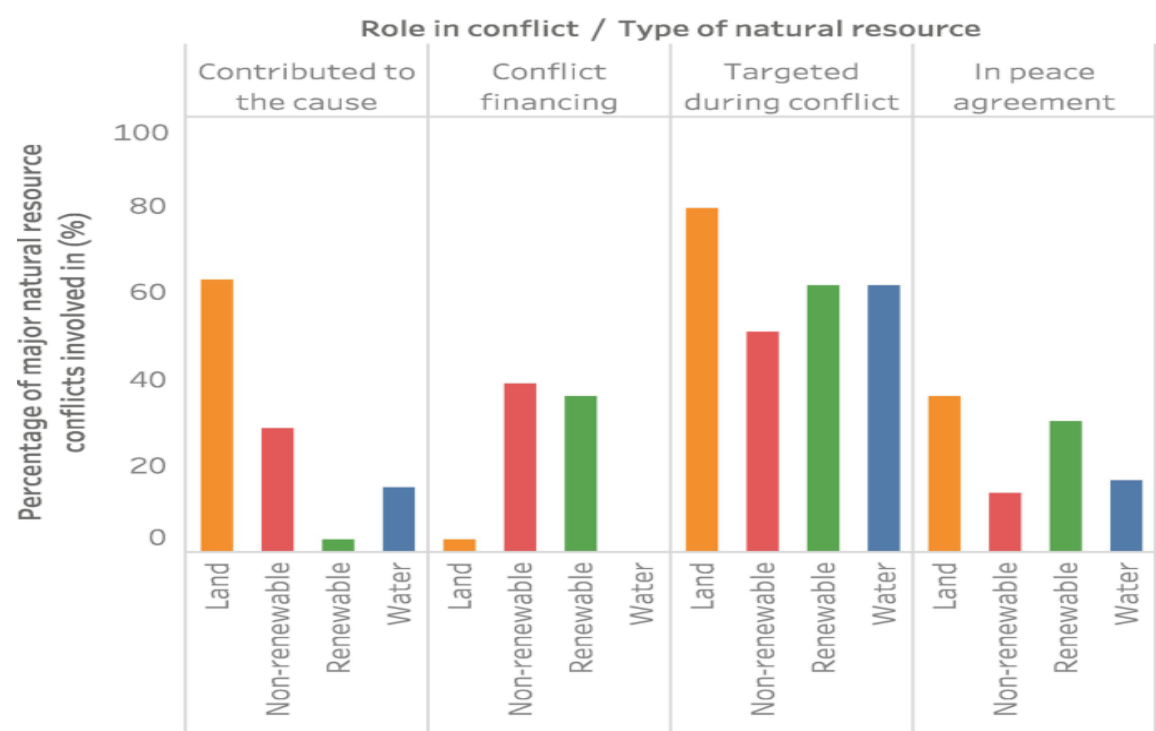
Strategic value of natural resources in warfare is nothing new. Oil, timber, minerals and other natural resources have long been used to finance armed groups, sustain military operations and become objects of territorial competition. The practice of weaponizing the environment possesses an ancient lineage. During the Peloponnesian War, toxic sulfur fumes were generated and used by the Spartans to breach the walls of Plataia, while Greco-Roman forces regularly dropped victims

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<sup>8</sup> “How Does War Damage the Environment?”. Conflict and Environment Observatory. May 5, 2025. <https://ceobs.org/how-does-war-damage-the-environment/>.

<sup>9</sup> Armenteras, Dolors., Schneider, Laura., and María Dávalos, Liliana. “Fires in Protected Areas Reveal Unforeseen Costs of Colombian Peace.” *Nature Ecology & Evolution*. November 26, 2018. <https://doi.org/10.1038/s41559-018-0727-8>.

of plague and cholera over the city walls to contaminate local resources<sup>10</sup>. The utilization of resources during armed conflicts illustrates that natural resources are not merely passive background conditions; rather their economic value, strategic importance and geographical concentration can actively shape and change the strategies and interests of the conflicting parties.



Source: Springer Nature

In contemporary, industrialized warfare, this intentional manipulation has been scaled to devastating proportions<sup>11</sup>. The Vietnam War provides one of the most evident historical instances of deliberate environmental transformation during conflict. The usage of the chemical defoliant Agent Orange for combative purposes led to extensive loss of crops and vegetation. During this war, the destruction of vegetation was not a mere accidental consequence of military activities; contrarily, vegetation itself was targeted for military purposes. This chemical warfare degraded

<sup>10</sup> Travis, Charles. “Environment as a Weapon: History, and the Hazards of War.” Springer Press. 2023.

<sup>11</sup> Travis, Charles. “Environment as a Weapon: History, and the Hazards of War.” Springer Press. 2023.

3.1 million hectares of biologically diverse forests and 124,000 hectares of coastal mangroves<sup>12</sup>. Hence, the country had to bear the ecological and public health consequences for decades. The 1990-91 Gulf War demonstrates another example of how environmental consequences can be generated by warfare through the wreckage of an energy infrastructure. The burning of more than 600 Kuwaiti oil wells, an act of “ecoterrorism” committed by the Iraqi forces, created extensive air pollution, while oil contamination affected terrestrial and marine environments in the Persian Gulf<sup>13</sup>. The Gulf War was so crucial in environmental terms that it instigated to generate renewed consideration of the international community for the protection of the environment during armed conflict. The ICRC’s account of the development of environmental protection rules notes that the international community revisited the issue after the Gulf War, eventually strengthening guidance on environmental protection in warfare.

Natural resources and critical infrastructures are more extensively exploited in hybrid and asymmetric warfare. Asymmetric and non-state actors frequently target environmental infrastructure to assert geographic hegemony; while operating outside the conventional rules of engagement makes it more effortless and advantageous for them<sup>14</sup>. The destruction of Mosul Dam in Iraq by the Islamic State to deliberately flood territory and thwart government troop movements is a mentionable example of this concept. The intentional poisoning of water wells in Kosovo by Yugoslav troops to cast down the ethnic Albanian refugees from returning to their homes also demonstrates how deliberate wreckage of environment is utilized in armed conflict in order to exert geopolitical power and control.

These cases demonstrate that weaponization of nature does not necessarily mean that an entire ecosystem is consciously selected as a military target. Environmental destruction can also result

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<sup>12</sup> “Armed Conflicts and the Environment - the Invisible Cost of War.” IGTS Foundation. June 28, 2026.  
<https://igtsf.com/en/armed-conflicts-and-the-environment/>.

<sup>13</sup> “Armed Conflicts and the Environment - the Invisible Cost of War.” IGTS Foundation. June 28, 2026.  
<https://igtsf.com/en/armed-conflicts-and-the-environment/>.

<sup>14</sup> Bizzotto, Marina, and Altomare, Antimo. “Weaponization of Natural Resources.” CoESPU - Center of Excellence for Stability Police Units. 2024.  
<https://doi.org/10.32048/Coespumagazine2.24.1>.

from attacks on infrastructure that performs both economic and ecological functions. This is why environmental protection during war cannot be separated from civilian protection.

## **The Security and Development Consequences**

War cannot be seen only as a humanitarian exigency; it ultimately becomes a security and development problem because societies cannot recover sustainably when their ecological foundations are destroyed. As much as it generates short-term consequences, its long-term impacts contribute to sustain sufferings for decades by hampering the security and development of a society. Environmental degradation expands the meaning of insecurity; because its security implications surpass the concept of traditional military security and reaches to a broader aspect of security- non-traditional security.

Environmental degradation is a prominent factor of displacement. Although war itself produces mass amount of internally displaced people (IDP) and refugees, destruction of nature further pushes people to abandon their houses and localities. People may leave areas where farmlands are no longer fertile, water is contaminated and ecological conditions have become unsuitable for livelihoods. Displacement then results into the creation of additional pressure on host communities. This ultimately indicates that environmental consequences of war can cross borders through migration and pollution, which halt the security and development, simultaneously for the displaced and the host communities, by creating developmental impediments and social restlessness.

The impacts on the security of basic rights cannot be neglected as well. War makes upholding the protection of basic rights difficult for both the authority and the people of a society. Food security is particularly at risk because agriculture depends on productive soil, water functionality and predictable ecological conditions. When farmland is contaminated, flooded or made inaccessible, food production falls; and subsequently, communities dependent on agriculture face loss of income as well as food. Water insecurity can be equally destabilizing. Damage to water infrastructure or contamination of water sources creates immediate public-health concerns and can also intensify competition over remaining supplies. UNEP has repeatedly stressed that environmental resources

are closely connected to conflict prevention and peacebuilding because natural resources sustain livelihoods and social stability<sup>15</sup>.

The security implications are particularly grave in countries that are already tangled with weak governance, poverty or existing traditional and non-traditional concerns. In these scenarios, environmental damage caused by war may work as a threat multiplier, contributing to existent problems. Environmental degradation does not always automatically lead to armed conflict; the evidence on direct environment-to-conflict causation is complex and should not be exaggerated<sup>16</sup>. However, it interacts with existing political, economic and social vulnerabilities; therefore, deepens instability where authority and institutions are already struggling to manage existing resource scarcity or provide necessary services.

The development conformities are equally serious. Post-conflict authorities instinctively experience enormous challenges: rebuilding infrastructure, restoring social stability and reclaiming political equilibrium. Environmental restoration can receive less political attention because its benefits are less immediate and its costs are difficult to calculate. Nevertheless, disregarding ecological impacts can make reconstruction tenacious and unsustainable. Environmental balance serves as foundation for a prosperous society, and a society cannot recover from the blains of armed conflict when that based has disappeared.

Moreover, the security and development consequences caused by the environmental impacts of armed conflict are particularly urgent to solve because contemporary conflicts are already occurring alongside climate change and biodiversity loss. Further ecological destruction imposed by war makes the existent threats worse. The ICRC notes that environmental degradation and climate risks can compound the difficulties faced by populations living through conflict and social

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<sup>15</sup> “Protecting the Environment during Armed Conflict: An Inventory and Analysis of International Law.” UN Environment Programme. October 30, 2009. <https://www.unep.org/resources/report/protecting-environment-during-armed-conflict-inventory-and-analysis-international?>

<sup>16</sup> Gleditsch, Nils Petter. 2015. “Armed Conflict and the Environment.” *Springer Briefs on Pioneers in Science and Practice*, 81–103. [https://doi.org/10.1007/978-3-319-03820-9\\_6](https://doi.org/10.1007/978-3-319-03820-9_6).

complexity. The outcome is a cycle in which conflict deranges environmental resilience and environmental wreckage creates impediments in the way of recovery from conflicts.

## **Conclusion**

Even when the battlefield becomes quiet, it does not always indicate the end of war. War remains alive through its ecological consequences- polluted water, barren farmland, destroyed forests and disrupted ecosystems. Therefore, the environmental cost of war is- at the same time- immediate and cumulative. It affects nature directly; but its outcomes ultimately return to human societies through food insecurity, displacement, livelihood loss, health risks and hindrances to reconstruction. The Gulf War illustrated how attacks on energy infrastructure can generate outcomes far beyond the proximate battlefield, while Gaza demonstrates the way wreckage of infrastructure, waste systems and natural environment compound an existent humanitarian crisis. The history of Vietnam shows that military strategy can intentionally incorporate environmental destruction to gain an upper-hand in armed conflict. The cases mentioned above may differ substantially; however, together they portray one common reality: nature cannot be distinguished completely outside the battlefield; rather, it is part of the terrain, infrastructure and life-support system on which societies and communities rely deeply. So, the environment is not an isolated and secondary aspect of warfare, its preservation and restoration are absolute security and developmental imperatives. Without ensuring the safety of environment, natural resources and ecosystems, reconstructed human settlements remain toxic and uninhabitable, prolonging the suffering of populations long after the formal military phase has ended<sup>17</sup>. In that sense, the battlefield can become an ecological disaster whose final costs are paid not only by the present generation, but also by generations that never experienced the war itself.

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<sup>17</sup> “Armed Conflicts and the Environment - the Invisible Cost of War.” IGTS Foundation. June 28, 2026.  
<https://igtsf.com/en/armed-conflicts-and-the-environment/>.