

War and the Environment

The abolition of war is not only desirable but absolutely necessary if the planet is to be saved. It is an idea whose time has come.

—Howard Zinn

Mark Walsh

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On the southern coast of Ukraine, between the cities of Odessa and Kherson, lies the Black Sea Biosphere Nature Reserve. First established as a preserve in 1927, it is a unique ecological complex of sandy forests, wetlands, dunes, islands and shallow-water bays. It is home to a plethora of flora and fauna such as the bottlenose dolphin, the white-tailed eagle, a multitude of species of fish and many rare flowers. It is also a haven for hundreds of thousands of migrating birds which visit the region every winter. On the 24th of February, 2022, a less welcome visitor arrived—the Russian military. The nearby town of Kherson was, after a week of fierce fighting, the first Ukrainian city to fall to the Russian invaders, who came north from Crimea. Conservative estimates suggest that many hundreds of civilians perished while tens of thousands fled.¹ Along with the terrible human toll, another awful price was paid. Fighting for control of the Dnieper Bridge sparked wildfires in the Black Sea Nature Reserve which were large enough to be visible from space.²

Environmental destruction is a feature of all wars. Usually, it is a predictable consequence of military action. Sometimes, it is a deliberate tactic. Accounts of armies scorching the earth (that is, burning to the ground everything the enemy might use and sowing salt or weeds into the soil to induce food shortages or employing primitive forms of biological warfare such as the use of dead animals to poison water supplies) stretch back into antiquity. Modern warfare takes this to an industrial scale. During its invasion of Vietnam, the United States used chemical defoliants to destroy forests, denying cover to the Vietnamese resistance. The most well known of these was the notorious ‘Agent Orange,’ the toxic effects of which are still endured by the Vietnamese people today.³ The scale of the destruction led to the coining of the term ‘ecocide.’⁴ It is a term that could rightly be deployed

in the context of many modern conflicts. The torching of hundreds of oil wells by Saddam Hussein’s retreating army during the 1991 Gulf War comes to mind. As does the destruction by Israeli settlers of Palestinian olive groves.⁵ Today, many environmentalists are now using this term to describe Russia’s actions in Ukraine.⁶

There is a good reason for this. Alongside its varied landscape, transitioning between wetlands, forests and virgin steppe (grassland), Ukraine is home to a multitude of factories, mines, gas pipelines, chemical plants, nuclear plants and nuclear waste storage facilities. Many have been in the vicinity of intense fighting; some have been hit. An attack on the Sumykhimprom chemical plant in Northern Ukraine led to an ammonia leak over an area of 12 square kilometres, contaminating groundwater supplies, soil and local wildlife.⁷ The shelling of oil and gas refineries in Kharkiv released a host of contaminants into the atmosphere, while forest fires caused by missile strikes near the Chernobyl nuclear facility have made airborne a considerable quantity of radioactive material.⁸ Indeed, the Russian assault at the Zaporizhzhia Nuclear Power Plant came terrifyingly close to causing a meltdown of the type that hit Japan’s Fukushima Daiichi Nuclear Plant in 2011.⁹ A long, drawn-out conflict increases the probability that such a calamity will occur.

With its outdated infrastructure, massive chemical industry, over-reliance on fossil fuels and poor waste management, Ukraine has long struggled to improve its environmental record. The heavily industrialised Donbas region in Eastern Ukraine, accounting for about half of Ukraine’s greenhouse gas emissions, has for years been a source of environmental woe. Since 2014, this region has seen conflict with Russian forces leading to massive increases in pollution and what Ukrainian conservationist Evgenia Zasiadko describes as an ‘ecological catastrophe.’¹⁰

The Russian invasion of February 2022 has extended this catastrophe, making cities like Mariupol unliveable due both to the destruction of infrastructure and the extreme toxicity of the environment. Each day of the conflict, Zasiadko and her colleagues have set out to record incidents of environmental destruction. Her conclusions make for grim reading:

All of these missiles, tanks and bombs contain waste. Now and in the future, heavy metals will be in our groundwater and soil. We’re an agricultural country, and when it’s not an active war, I don’t know how we’re

going to rebuild anything because it's going to be polluted.¹¹

During war, our primary concern is naturally the immediate human cost, something which in the case of Russia's aggression in Ukraine has been harrowing. As a result, environmental impacts, which often seem medium to long term, are difficult to prioritise. This is especially true if one is fighting for one's life. However, these impacts are no less serious for being overlooked, and are inseparable from the human cost of war. After all, humanity is a part of nature, and our survival depends on maintaining a harmonious relationship with our environment. Environmental destruction can and will lead to human destruction, as well as that of our fellow creatures. (While we typically focus on human suffering, non-human animals suffer terribly in wars also.) In discussing the environmental impacts of conflict, therefore, we do not in any way diminish the suffering of those humans directly affected by the crime of war. Rather, we seek to fully understand the extent of the crime and the variety of levels on which it impacts.

War affects the natural world in profound and myriad ways. Some of these are blunt and obvious, especially when one considers the destructive capability of modern weaponry and the prospect of nuclear conflict. Much of the impact, though, is hidden and follows indirectly, sometimes unexpectedly. The preparation for war already has a profound environmental impact before the fighting even begins. This includes the construction and testing of weapons (in particular those of a nuclear capacity), the costly maintenance of armed forces and the distortion of scientific research priorities. In turn, the acute effects of battle often give way to a cascade of after-effects: the displacement of large populations or the destruction of food sources, for example, may place certain species at risk, leading to unforeseen ecological disruption. In the following pages, we hope to shed at least some light on this vast and complicated subject.

The Carbon Cost of Military Preparation

In 2021, the world's nations spent over \$2,113 billion on maintaining and expanding their armed forces, the largest amount ever spent.¹² Almost half of this (over \$800 billion) was spent by the United States alone, more than the combined totals of the next eleven highest-spending countries. These include China (\$293 billion), India (\$77.6 billion), the UK (\$45 billion), France (\$58 billion) and Russia (\$65.9 billion). These figures are almost certainly

underestimates. In the case of the United States, for example, the total rises to well over \$1 trillion when veterans' benefits, interest on military debts and military grants to foreign governments are included.¹³ While the US budget has yet to return to the historic high of 2013, when analysts at the Trans-National Institute calculated it to reach about \$1,700 billion,¹⁴ it has grown steadily over the last five years.¹⁵ In the case of China, military spending has increased year on year for the last 21 years.¹⁶

The implications of such numbers are terrifying, disheartening and enraging in equal measure. Whatever these figures say about the likelihood of future wars between major powers, something too horrific to contemplate, they represent an extraordinary set of priorities. Aside from the squandering of material resources, one wonders what scientific and cultural achievements humanity has been denied by this staggering abuse of the human intellect. Such priorities speak to the hollowness of claims by our rulers to be taking seriously the climactic catastrophe facing us all. This becomes shockingly clear when, ignoring for now the destructive power of modern instruments of war, one considers the sheer magnitude of the energy consumed and carbon emitted by military activity.

It is a fact not well enough understood that no institution in the world consumes more fossil fuels or pollutes more than the United States Military.¹⁷ With over 700 bases in 80 countries, it produces more dangerous waste than the five largest US chemical companies combined, and it is the world's greatest producer of greenhouse gases. Indeed, its greenhouse gas emissions exceed those of many industrialised nations, including Sweden, Finland, Norway and New Zealand. The Canadian-Czech economist Vaclav Smil calculated that during the 1990s (excluding the fuel used in the 1991 Gulf War and the NATO bombardment of Serbia and Kosovo in 1999) the US military used 'more than the total commercial energy consumption of two thirds of the world's countries.'¹⁸

Science journalist Sonia Shah points out:

The sixty-eight tonne Abrams tank burns through a gallon of fuel every half mile... twelve gallons of fuel just idling. So much time and money is spent fueling the American fighting machines that each gallon of fuel delivered to the US military in action can cost up to \$400. Indeed, 70% of the weight of all soldiers, vehicles and weapons is pure fuel!¹⁹

What is more, the ships of the US Navy (like all cargo ships), use low-quality ‘bunker fuel,’ which is especially polluting. Shah observes that continuing efforts to support the US Military’s demand for fuel require either more oil-efficient weapons or greater support systems, commenting that many generals seem keen on a third option: increasing access to oil.²⁰

Barry Sanders, in his book *The Green Zone: The Environmental Costs of Militarism*, estimates that the US Military consumes well over one million barrels of oil a day. This comprises about 5 percent of total US greenhouse gas emissions. These figures are likely conservative, Sanders explains, as much of the information is shrouded in secrecy. More generally, it is difficult to determine the full impact of global military emissions on the climate crisis. When states declare their carbon output, military activity is frequently given a free pass. For example, military emissions were entirely excluded from the 1997 Kyoto climate accord, and due to a ‘large loophole,’ were largely omitted from the 2015 Paris Agreement. Effectively, states are not required to include military pollution when discussing carbon-reduction targets. Indeed, this issue was not even included on the agenda at the recent COP26 (Conference of the Parties) climate talks in Glasgow.²¹

Oil is not the only resource which is gobbled up by humanity’s armed forces. Somewhere between 1 percent and 6 percent of the world’s land surface is reserved for military exercises and war games.²² While some might argue that denying the public access to this land provides a net environmental benefit, it is hard to accept that such land might not be better maintained by not subjecting it to military exercises, explosive ordnance, heavy metals from spent rounds, armoured vehicles and all the emissions and noise pollution that follow. And then there is the demand for water. In the case of the US Military and their tendency in recent decades to fight in especially arid regions of the world (and with global temperatures rising), hydration of soldiers has become a major concern. At the US base in Kirkuk, Iraq, during the recent occupation, soldiers consumed about a million litres of water per month. This was shipped in plastic bottles as the local water supply was considered unsafe.²³ Maintaining such supplies in the future is considered by the US Army to be a very serious problem.

Weapons Inflict Harm before They Are Used

The term ‘wealth’ is used to describe both natural resources and the fruits of human labour. While this term carries positive connotations, not everything that arises from human labour is on balance useful or deserves to be valued. From cheap plastic toys in fast-food restaurants, to advertising, to mobile phone gambling apps, there are many human creations which arguably cause more social harm than good. The English philosopher and art critic John Ruskin coined the term ‘illth,’ in contrast to wealth, to describe such things. Surely there is no greater example of illth than the instruments created by the masters of war.

The global arms trade is booming, bolstered in no small part by the Russian assault on Ukraine.²⁴ Even before guns are fired, their creation carries a considerable ecological price tag. In 2018, the carbon emissions of arms manufacturers in the United Kingdom were estimated to be equivalent to the total of all domestic UK flights.²⁵ Weapons production involves the mining and processing of both common metals and rare earth elements. Mining has always been a dirty practice. In the case of rare earth minerals (on which so much of modern technology relies) the rarity comes from the enormous labour required to separate them from the surrounding rock. This involves cocktails of chemicals and creates enormous quantities of waste. While there are cleaner ways to do this, such is the insatiable demand to obtain cheap rare earths that environmental (and labour) concerns are a low priority. In the past, most mining for rare earths took place in Brazil, India and South Africa. Today, China is the main player, providing about 80 percent of US rare earth imports, a cause of great concern at the Pentagon.²⁶

Most weapons are never used in conflict. This is in a sense a mercy. However, all weapons require both maintenance and eventual disposal. We will shortly discuss the issue of nuclear weapons, but even when it comes to so-called conventional weapons, stockpiles of which can be vast, the environmental impact is atrocious. Open burning of large quantities of artillery propellants, for example, is often performed by the US Military.²⁷ In recent years this has led to confrontation with the Environmental Protection Agency, as those residing near disposal zones have fought to resist such plans. Stockpiles of explosives and highly volatile substances like rocket fuel create enormous environmental headaches. Decommissioning such entities is difficult and

expensive. The cost of not doing so can be catastrophic. In Beirut, in August of 2021, over 200 people lost their lives when 2700 tonnes of ammonia nitrate (a component of fertiliser and a high explosive) ignited, having been left in a storage shed at the city port for over six years.²⁸

The abandonment of military equipment is an enormous source of pollution. Afghanistan, for example was littered with 'tank graveyards' and degrading ordnance abandoned by the Soviet Union in 1988. The US occupation and subsequent withdrawal in 2021 has left behind a whole swathe of 'toxic detritus' which may never be properly cleaned up.²⁹ The problem of dumped military ordnance and equipment, especially in the oceans of the world, is a very serious one. In the North Sea alone, there is an estimated 1.6 million tonnes of relic munitions, which, as they degrade, release all manner of toxins.³⁰ The Solomon Islanders in the Pacific, for example, continue to struggle with the legacy of chemical agents and explosives abandoned in ships scuttled during World War II.³¹ Future plans to build aquatic farms or to tap into wave and wind energy are made all the more hazardous and complicated by this presence.

The Cost of Building and Maintaining a Nuclear Arsenal

There are estimated to be approximately 13,000 nuclear weapons in the world today. Almost 12,000 of these are held by the United States and Russia, the rest by China, India, Pakistan, the United Kingdom, France, Israel and North Korea.³² The estimated cost of maintaining this arsenal is about \$70 billion per year. Should even a minute fraction (about 0.03 percent) of these devices ever be deployed, in a regional conflict between India and Pakistan say, humanity would be faced with an ecological catastrophe of nightmarish proportions.³³ The enormous quantities of soot alone, sent hurtling into the stratosphere, would be enough to cause global crop failures and cataclysmic famine. A larger exchange would likely end organised human life. Assuming humanity manages to avoid Nuclear armageddon (which is by no means a certainty), it is worth considering the human and environmental costs we have paid and continue to pay in maintaining these dreadful devices.

The first atomic bomb, nicknamed the 'gadget,' was exploded in the deserts of New Mexico on the 16th of July, 1945. This was the so-called 'Trinity test.' The nuclear fuel used to make it, Uranium-238 (U-238),

from which the necessary plutonium was extracted, was mined at Shinkolobwe in the Belgian-controlled Congo. The miners were effectively slaves, and no concern was shown for their safety or the lands they inhabited as they dug toxic materials from the earth. Over the coming decades, the race to accumulate uranium and the labour practices involved would leave a trail of death and ecological devastation. Between 1944 and 1986, for example, 30 million tonnes of uranium were extracted from Navajo territories in the American West. The miners, poorly paid and badly equipped, had no idea of the dangers inherent in inhaling particles of uranium dust. In the 1990s, compensation was paid out by the US government. Today, the still-contaminated Navajo territories are littered with abandoned uranium mines.³⁴

The first atomic explosion caused a shockwave felt more than 160km away. Hundreds of tonnes of sand and soil were lifted into the sky in the form of a 12km high mushroom cloud. The intense heat turned some of this into glass, which rained down in green shards, a substance later named trinitite. Over the coming days, ash and dust fell from the sky, often hundreds of kilometres from the explosion site. To unsuspecting locals (the entire project was kept secret), this would have looked like snow, though it would have felt warm on contact. Today, we call this radioactive fallout and we know a great deal about its lethal effects. Over the coming weeks, this dust was inhaled by humans and animals, entered soil and water and became embedded in the local food supply. Poor records and the lack of any serious epidemiological research at the time mean that it is very difficult to calculate to what extent the explosion affected the health of the many thousands of (mostly Native American) people who lived in the locality of the blast. A recent study by the National Institute of Health suggests at least several hundred extra cancers occurred as a result.³⁵

The Trinity test was only a prelude. On the 6th and 9th of August, 1945, the United States Air Force dropped atomic bombs on the Japanese cities of Hiroshima and Nagasaki, the only time in history that nuclear weapons have been specifically targeted at civilian populations. It is thought that well over 200,000 people perished as a result, many incinerated in the initial blasts and many more succumbing over the subsequent weeks to an agonising death from radiation sickness. Many survivors of the event, the Hibakusha (literally 'bomb exposed'), lived with the consequences of agonising burn injuries, badly damaged immune systems and a variety of radiation-induced cancers. Worse, the Hibakusha often faced

employment discrimination and social isolation as a result of physical deformity or fear that their exposure to radiation posed a risk to others.

Between the years 1945 and 1996, at least 2000 nuclear test explosions were carried out. The destructive power unleashed in many cases, as our understanding of nuclear phenomena developed, made the bombs dropped at Hiroshima and Nagasaki seem puny by comparison. About a thousand of these tests were conducted by the United States. The Soviet Union was responsible for about 700, including, in 1961, the largest ever human-made nuclear explosion on the remote island of Novaya Zemlya.³⁶ It was the about 3000 times more powerful than the bomb dropped on Hiroshima.

In the early years, most of these tests happened above ground, creating an immensity of radioactive fallout. Explosions carried out by the United States at Bikini Atoll in the Pacific included, in 1954, the first (deployable) hydrogen bomb, creating an explosion many hundreds of times more powerful than the original Trinity test. The blast spread radioactive material (mostly irradiated ash from coral) over nearby inhabited atolls and the Marshall Islands, as well as over the unfortunate occupants of a Japanese fishing vessel. Today, radiation levels on the Marshall Islands are still many times higher than what is considered safe. The formerly inhabited Bikini Atoll, whose surroundings experienced the equivalent of about 7000 Hiroshima bombs, is today uninhabitable.³⁷ The Soviet Union performed hundreds of nuclear detonations at Semipalatinsk in Kazakhstan. The residents of the local city of Semey, about 150km away, still endure deleterious health effects in the form of elevated levels of cancer and congenital birth defects.³⁸

After the signing of the Limited Test Ban Treaty in 1963, most nuclear testing was moved underground. Underground testing at sufficient depth usually prevents radioactive emissions into the atmosphere. However, contamination of soil and groundwater is still a serious problem, as is structural damage in the form of ground slumps and water-table movement.

Notably, neither China nor France signed the 1963 treaty. Between 1964 and 1996, China performed about 40 nuclear tests (many above ground) at the Lop Nur site in Xinjiang, a western province mostly inhabited by some twenty million Uygur's, one of China's ethnic minorities. Witnesses recall days when 'soil fell from the sky like rain.'³⁹ The extent of the ecological carnage is difficult to quantify, and the Chinese state refuses to acknowledge it.

The Uygur physician Enver Tohti has dedicated much of his life to exposing the truth about China's nuclear testing. His work with the Japanese physicist Jun Takada makes a compelling case that the death toll is in the hundreds of thousands.⁴⁰

Over the same period, France carried out about 200 nuclear tests in both Algeria and territories in the South Pacific. The last one, at the Mururoa atoll, was in 1996. Like France, China and the United States, the United Kingdom's nuclear programme was also developed on the lands of formerly subjugated peoples, in Maralinga, Australia, on ancestral Aboriginal lands. For most nations, nuclear testing (at least for now) is a relic of the recent past. The effects, however, will be with us for a long time. There is no place on earth where the signature of the cumulative effects of nuclear testing cannot be detected: either in soil, water or polar ice. Whole swathes of landscape were made uninhabitable, and while calculating the radiological effects on human health is extremely difficult, there is no doubt that populations who lived near testing sites saw increased cancers.⁴¹ Indeed, the Centers for Disease Control in the US provides a guide for people who resided near such sites in states like Nevada to evaluate their cancer risks.⁴²

It is worth pointing out that the 1996 Comprehensive Test Ban Treaty, which forbids nuclear testing, has been signed by 185 nations, though only ratified by 172. Until certain nations, including the United States, China, India, Pakistan and Israel, actually ratify this treaty, it cannot formally come into effect. Despite this, and with the exception of North Korea, no nation has performed a nuclear test since 1996. Much credit for this must surely go to the organised resistance and campaigning of the native peoples of Polynesia, America and Australia, as well as to years of tireless campaigning by anti-nuclear groups. On jointly receiving the Nobel Peace Prize in 2017, Setsuko Thurlow, a survivor of the Hiroshima attack and anti-nuclear campaigner, described how she stood in solidarity with the

peoples from places with long-forgotten names like Bikini, Maralinga, Moruroa, Ekker and Semipalatinsk. We refused to sit idly in terror as the so-called great powers took us past nuclear dusk and brought us recklessly close to nuclear midnight. We rose up. We shared our stories of survival. We said: humanity and nuclear weapons cannot coexist.⁴³

The decommissioning of all nuclear weapons is something that anyone concerned with the fate of the

human species or the world we inhabit should call for. Unfortunately, even if we achieve this, part of the legacy of humanity's nuclear project involves cleaning up the mess. On its closure at the end of the Cold War, the Hanford Site in Washington State, which was used to produce plutonium for US nuclear weapons, held hundreds of thousands of cubic metres of high-level radioactive waste in storage tanks and created an enormous lake of contaminated groundwater. This is one of dozens of such facilities and the clean-up will last well into the twenty-second century.⁴⁴

The Environmental Consequences of Battle

It is as bluntly obvious as the explosion itself that the detonation of a bomb, even in an empty field, is an ecological crime. A habitat is turned upside down, wildlife killed and all manner of heavy metals and poisonous chemicals are released into the earth. When this happens en masse in cities and industrial sites, setting off fires and showering the landscape with ash and dust, it is nothing short of an environmental disaster. And while cities may be rebuilt, the damage done to natural habitats is far more difficult to rectify.

During World War I, for example, trenches on the Western Front ran from the North Sea all the way to the Swiss border. All along this strip, millions of shells were fired, turning the landscape into a wasteland. While the explosive power of an artillery shell is damaging enough, the embedding of heavy metals in the landscape has far-reaching consequences. Today, the soil around World War I battle sites like Ypres still contains elevated levels of lead.⁴⁵

In the 1991 Gulf War, the United States blasted Iraq with hundreds of tonnes of missiles encased in depleted uranium (DU), a radioactive substance.⁴⁶ On impact, these showered the landscape with particles of DU, allowing it to enter the food and water supplies. While the alpha radiation it emits has little penetrating power external to the human body, once ingested or inhaled, it is extremely dangerous. Many scientists argue that DU contamination helps explain a massive rise in Iraqi mortality (especially infant mortality) throughout the 1990s.⁴⁷

One of the difficulties in determining the causal role of a substance like DU in a rise in cancer rates, say, is that it is just one of many competing environmental factors. Iraq's infrastructure was utterly destroyed by

the first Gulf War. This included not just its roads and bridges but its electricity grid, its healthcare system, its waste management systems and so on. Worse, years of sanctions prevented rebuilding. The environmental and human consequences of this were catastrophic. More generally, the destruction of infrastructure during war is a double blow. Not only is it ecologically damaging in its own right, but the ability to clean up polluted habitats may be severely hampered for years to come.

Ecological After-Effects of War

The effect of two world wars has completely changed the European landscape, wiping out forests, reducing animal populations and leading to considerable reduction in species diversity. While artillery bombardment was certainly a factor, there was also an intense need for wood to aid military construction projects such as the supporting of trenches. Another much less obvious source of damage to European forests (and one that persists to this day) was the unintended importation of a fungus, *ceratocystis platani*, on American pinewood ammunition crates during the Second World War.⁴⁸

In Afghanistan, 30 years of war has effectively stripped the country of most of its trees, including its Pistachio woodlands. Much of this was due to illegal logging by various warlords. The result was desertification, drought and species loss. In turn, the number of migratory birds passing through the country has fallen by over 80 percent.⁴⁹ Wars in Angola and Mozambique in the 1970s meant both the simultaneous suspension of anti-poaching patrols and an influx of guns. This had a devastating effect on several large mammal populations, including elephants, zebras, hippopotamuses and buffaloes. During the civil war in Rwanda, hundreds of thousands of refugees living near Virunga National Park removed about a thousand tonnes of wood a day. This was used to build shelters, as cooking fuel or was sold as charcoal. The removal of forest meant the removal of habitats for critically endangered species like the mountain gorilla.⁵⁰

Peace at All Costs

The old aphorism that no battle plan survives first contact with the enemy is an acknowledgement of both the chaotic nature and the destructive power of war. Once that destruction is initiated, it begets further destruction. As the examples above indicate, the cascade of effects is often impossible to predict and very difficult to undo. More than this, when it

comes to ecological crisis, war is both a cause and an accelerant.

The current conflict in Ukraine bears this out. Aside from the acute ecological damage arising from the Russian assault, the conflict has had the effect of emboldening militarists around the world. Rather than seeking a diplomatic solution, the great powers seem content to let the conflict carry on, despite the human and environmental cost. At the same time, these powers continue to export war around the world. Arms companies have never had it so good. Perversely, some weapons merchants even boast of their green credentials.⁵¹ And political leaders in supposedly neutral countries like Ireland eagerly seek to join military alliances while proclaiming their green credentials.

To say that the human species cannot afford to be waging wars is an understatement of mammoth proportions. Humanity currently stands on an environmental precipice. As the clock ticks towards climactic catastrophe, every step that can possibly be taken towards reconfiguring our economy and society in a more ecologically harmonious way becomes more and more vital. Given what is at stake, every war that is waged is therefore a crime against humanity, not only locally and to the immediate victims, but in a truly global sense.

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