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The Environmental Implications of War: Analysis of the Spectacular and Slow Environmental Violence Inflicted through Russia's Deliberate Targeting and Weaponization of Ukrainian Environments

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Introduction

Human wars have taken place over millennia, and their catastrophic impacts have led to the degradation and decline of Earth and its natural spaces. Warfare has evolved over time with the goal of becoming better adapted to the environment. The presence of war and armed conflict can cause extreme effects in the long and short term, but war as a concept holds an inherently anthropocentric bias. Among human activities causing severe changes to the environment, war's consequences are both intensive and far reaching, and while war is incited, perpetrated, and fought specifically by humans, these conflicts come at the expense of all, including a silent victim: the greater environment in which wars take place.

Today, the conflict between Russia and Ukraine is the most significant confrontation in Europe in decades. It has had far-reaching effects on geopolitics, the economy, infrastructure, and the environment on a local and international scale. There is a severe water shortage, and the sanitation systems and air quality are negatively impacted by the frequent movement of troops and incessant bombardments. Large-scale deforestation and wildfires, fueled partly by nuclear radiation and military activities, are significant contributors to global warming and other immediately pressing environmental crises within the borders of Ukraine.[1]

Public attention and outrage tend to focus on the spectacular, sudden, or catastrophic violence unfolding in Ukraine. Often forgotten are the longer-term, frequently invisible, and slowly unfolding effects of war. This thesis therefore asks: How does Russia's deliberate weaponization of environments against Ukraine produce not just immediate, but slow violence as well? By reading across disciplines, reading daily updates on the fighting, bringing news reports and scholarship on the current conflict into conversation with broader ideas of warfare and the

[1] Sasmoko, Muhammad Imran, Shiraz Khan, Haroon ur Khan, Hanifah Jambari, Mohammed Borhandden Musah, and Khalid Zaman. "War Psychology: The Global Carbon Emissions Impact of the Ukraine-Russia Conflict." *Frontiers in Environmental Science* 11 (pp. 2)

environment, I argue that slow environmental violence forms a calculated part of Russian military strategy and conquest. The newfound consideration and understanding of these environmental impacts that take root over the long term in tandem with those immediate ones, will influence future analysis and deliberations on armed conflicts such as the war currently taking place in Ukraine.

This thesis is divided into three main chapters. Chapter 1 will give insight into the intertwined histories of Russia and Ukraine as well as how their respective identities have diverged to be in conflict with one another since the fall of the Soviet Union. In Chapter 2 I will introduce and review the sources gathered on the frameworks of the Just War Tradition, environmental weaponization, and slow violence. Then, in chapter 3, I will analyze the source material accumulated throughout the war of Russian attacks on Ukraine through the theory and frameworks of environmental weaponization and slow violence.

Chapter 1: Background

Russia's February 24th, 2022 launch of a full-scale invasion into Ukraine marked the largest mobilization of armed forces in Europe since World War II. In the early morning of the historic day, Vladimir Putin announced the commencement of a special military operation, with the goals: "to protect people who, for eight years now, have been facing humiliation and genocide perpetrated by the Kiev regime. To this end, we will seek to demilitarize and denazify Ukraine".[2] Approximately 190,000 Russian troops were deployed[3], with some of that number composed of separatist combatants from the Donetsk and Luhansk regions known as The Donetsk People's Republic and the Luhansk People's Republic (DPR and LPR respectively). The Russian Army is divided into Battalion Tactical Groups (BTGs) described as autonomous military units consisting of infantry, artillery, vehicles (both armored and otherwise).[4] In the months and days leading up to the February 24th invasion, Russia accumulated approximately 120 BTGs on the border with Ukraine. BTGs have around 600-1000 infantrymen, in tandem with 10 tanks, and further reinforced with 40 to 70 other armored vehicles. Combining these figures leads to a minimum estimate of 1200 tanks, and 5,000 armored vehicles deployed by the Russian expeditionary forces in the first days of the invasion.[5] This was an extensively planned and coordinated attack, but cannot be fully realized and understood without tracking the long, intertwined, and overarchingly tumultuous recent dispositions between contemporary Russia and Ukraine.[6] This close and complex relationship has been heavily contested ever since the collapse

[2] Fisher, Max. "Putin's Case for War, Annotated." The New York Times. The New York Times, February 24, 2022.
[3] Cancian, Mark F. "Russian Casualties in Ukraine: Reaching the Tipping Point." CSIS, March 31, 2022.
[4] Grau, Lester W, and Charles K Bartles. "Getting to Know the Russian Battalion Tactical Group." Royal United Services Institute, April 14, 2022.
[5] Ibid
[6] Elsherbiny, Asmaa. "Europe on Fire: The Russo-Ukrainian War, Its Causes and Consequences." SSRN, March 21, 2022.

of the Soviet Union in 1991. The invasion of February 24th, 2022 was not the first time these contentions have led to violent conflict since the collapse of the USSR, as the previous instance took place in 2014 with Russia's annexation of Crimea, leading to extensive social, economic, and physical damage that has not only remained unrepaired, but was a direct driver of today's conflict.[7] The background section of this thesis will strive to introduce the actors involved in the conflict, and to further reveal the nuanced differences in Russian and Ukrainian identities dating back to the Soviet Union and through Russia's invasion of Crimea in 2014, to inform the motivations of Russia's ongoing invasion of Ukraine.

The questions that Russia raises about the legitimacy of Ukrainian sovereignty are ones that are rooted in the history of the region, spanning back a thousand years. For much of this history Ukraine, as we know it today, did not exist or at least did not exist as an independent sovereign state. The name Ukraine, nonetheless, will be used in this background to describe the region around Kyiv. Today, Kyiv is the capital city of Ukraine, but the establishment of this capital city predates the contemporary territories of Russia and Ukraine.[8] Russians and Ukrainians share the same ancestry whose origins date back a millennium, at a time when Kyiv was at the heart of the Kyivan Rus State.[9] Russians, Ukrainians, and Belarusians all track their heritage back to the Kyivan Rus. Founded by the Vikings in the ninth century, Kyivan Rus grew to encapsulate Ukraine as defined by its contemporary borders. The ways in which the different peoples interpret this knowledge differs as it has withstood as a subject of contention of whether or not Ukrainians were originally a part of Russia, or if Russians were once a part of Ukraine, or

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[7] Ibid

[8] B, Subhash. "National Identity Complexities: Genesis of Russian-Ukraine Conflict." *IUP Journal of International Relations* 16, no. 4 (pp. 4)

[9] Conant, Eve. "Russia and Ukraine: The Tangled History That Connects and Divides Them." *History. National Geographic*, February 24, 2023.

something in between. On July 12, 2021, in an address to the nation, Putin commented on the intertwined beginnings of Russians and Ukrainians, going as far as to say from the Kyivan Rus era, "Russians and Ukrainians are one people, a single whole."[10]

Since the establishment of the Kyivan Rus State to the present day, Ukraine has repeatedly been fought over, and had its territory claimed by various competing powers. Mongol warriors took over the region in the 13th century, and Polish and Lithuanian armies invaded from the west in the 16th century. The continuation of war into the 17th century between the Polish-Lithuanian Commonwealth and the Tsardom of Russia further split Ukrainian lands. Territory east of the Dnieper River (the "left bank") fell under Tsarist Russian Imperial Control and those lands to the west of the river ("right bank") were under Polish control.[11] Over 100 years later in 1793, the "right bank" western Ukraine was annexed by Russia, and enacted a Russification policy that sought to rid the region of Ukrainian culture by banning the use and study of the Ukrainian language. This came in the midst of a nationalist movement sweeping across Europe which had infected as far as its easternmost regions, birthing a spirit of Ukrainian nationalism.[12] Pro-independence Ukrainians promoted Ukrainian language and stressed the distinct history of their nation and peoples, and for the first time referred to themselves as Ukrainians with the objective of sovereign rule. Russia implemented a repressive response to silence dissenters, and instill Russian imperial control over Ukraine by attempting to erase their history. Ukrainian books and newspapers were banned, and religious pressure to convert to the Russian Orthodox

[10] Putin, Valdimir. "Putin's Address: 'On the Historical Unity of Russians and Ukrainians.'" Президент России, July 12, 2021.
[11] Conant, Eve. "Russia and Ukraine: The Tangled History That Connects and Divides Them." History. National Geographic, February 24, 2023.
[12] Kuzio, Taras, Paul J. D'Anieri, and Steven Shulman. "The Internal-External Nexus in the Formation of Ukrainian National Identity: The Case for Slavic Integration." Essay. In *Dilemmas of State-Led Nation Building in Ukraine*

faith was also placed on these disgruntled Ukrainian subjects of Russia.[13] It is interesting to note that these sorts of moves towards prohibiting aspects of Ukrainian culture are repeated by the Ukrainian government against Russian culture following the 2014 annexation of Crimea. Moving into the 20th century, the Soviet Revolution of 1917 led to a vicious civil war between Ukrainian peoples and other international powers that were distributed regions of Ukraine in the aftermath of World War I. The conflict resulted in the establishment of a Ukrainian Republic, which was quickly absorbed into the Soviet Union in 1922 as the UkSSR (Ukrainian Soviet Socialist Republic) remaining a communist state until the Soviet Union's fall in 1991.

Ukrainian people faced many hardships during their long history as part of the Soviet Union which began in the 1930s and partly contributes to today's violent tensions with Russia. Soviet leader Joseph Stalin forced peasants to join communist farms, then deliberately instigated a famine known as "The Holodomor" that led to the starvation of millions of Ukrainians. In the aftermath, Stalin sent large numbers of Russian and other Soviet citizens to Ukraine in order to repopulate the eastern territories.[14] These immigrants were people that could not speak Ukrainian and had tenuous ties to the region, to further suppress calls for sovereignty from the Ukrainians people that came before. From 1936-1938, a paranoid Stalin sought to rid the USSR of any perceived threats to the stability of the union, and his supreme rule. Known today as "The Great Purge" Stalin sent suspected collaborators, including many Ukrainians, to gulag labor camps or the firing squad.[15] Ukrainians and Ukrainian Jews experienced further hardship during World War II as Nazi Germany invaded the USSR in 1941, swiftly capturing and occupying almost all

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[13] Kappeler, Andreas. "Ukraine and Russia: Legacies of the Imperial Past and Competing Memories." *Journal of Eurasian Studies* 5, no. 2 (pp. 6)

[14] Legvold, Robert, and David D. Laitin. "Identity in Formation: The Russian-Speaking Populations in the near Abroad." *Foreign Affairs* 77, no. 6

[15] Conant, Eve. "Russia and Ukraine: The Tangled History That Connects and Divides Them." History. National Geographic, February 24, 2023.

of Ukraine within a year. A progressive Ukrainian nationalist leader standing against the communist party, named Taras Bulba-Borovets, initially welcomed the Nazis as liberators from their oppressive communist regime. The Ukrainians quickly realized, however, that the Nazis were not allies as they began sending thousands of Ukrainians back to German work camps to support the Nazi war effort. The Nazis cemented their position as enemies of Ukraine through their vile actions now known as the Babi Yar Massacre.[16] After taking Kyiv in September, the SS rounded up Ukrainian Jews, forced them to undress and walk into a ravine outside the city, which would soon serve as their mass grave. Over the course of two days, just under 34,000 Jews were executed by gunfire in an appalling instance of genocide. Even knowing the history of this horrific instance, Putin uses the admiration nationalist Ukrainians have for Taras Bulba-Borovets as evidence of Ukrainians as Nazi sympathizers in his speech marking the start of the 2022 invasion. When WWII came to a close in 1945, Ukraine had suffered between 5-7 million deaths, including approximately 1 million Ukrainian Jews.[17] In 1954, Soviet Leader Nikita Krushchev transferred control of Crimea to UkSSR as a gesture of friendship and to instill unity within the USSR.[18] This unity would be permanently damaged in 1986 through the fallout of a horrific nuclear disaster.

When a safety test caused the reactor of Chernobyl Nuclear Power station in Ukraine to explode, the negative effects were severe and plentiful. Thirty-one employees died directly from the explosions, whilst 28 others - both employees and firefighters - additionally died from radiation poisoning during cleanup attempts. To this day, Chernobyl is closed off from human

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[16] Masters, Jonathan. “Ukraine: Conflict at the Crossroads of Europe and Russia .” *Council on Foreign Relations*, February 5, 2020, 1–13.
[17] Conant, Eve. “Russia and Ukraine: The Tangled History That Connects and Divides Them.” History. National Geographic, February 24, 2023.
[18] Riabchuk, Mykola. “Ambivalence or Ambiguity? Why Ukraine Is Trapped between East and West.” *Ukraine, the EU and Russia*, 2007, 70–88.

inhabitation as the radiation contamination can still be lethal if improperly exposed to it.[19] This nuclear disaster sowed many seeds of mistrust and disunity among the USSR, especially among Ukrainians as it occurred and devastated territories within the bounds of the UkSSR. The fiasco in Chernobyl is thought to be a major catalyst towards the demise of the Soviet Union.[20] The legacies of these historical scars are far reaching and present themselves in the differing dispositions of people and regions of Ukraine. Since the eastern regions of Ukraine were considered extensions of Russia long before the rise of the USSR, many Ukrainian inhabitants that dwell on or around the border of Russia, hold pro-Russian sentiments. Conversely, the central and western Ukrainian populations seek to be a westernized nation, aligned with the European Union, and are vehemently opposed to Russian influence ever since the fall of the Soviet Union in 1991.

Following the collapse of the Soviet Union, many countries declared independence despite the fact that culturally and linguistically, they were linked with Russia. The Ukrainian parliament jumped at the opportunity to hold a national referendum on the future of the nation, to which voters overwhelmingly approved a motion towards the independence of the nation.[21] Ukraine had been calling to transition to a state based on liberal ideologies, but was still plagued by the two main conflicting national Ukrainian identities: a Ukrainian national identity, and an eastern Slavic national identity - reinforced by their geographical affiliations.[22] As Ukraine sought to model their newfound nation on western societies, it made it harder for Russia to

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[19] Greenspan, Jesse. “Ukraine Has Seen Centuries of Conflict - History.” History, October 5, 2022.
[20] Parrott, Bruce, Mark R Beissinger, and Karen Dawisha. “State Building in the Shadow of an Empire-State: The Soviet Legacy in Post-Soviet Politics.” Essay. In *The End of Empire?*: The Transformation of the Ussr in Comparative Perspective, 166–67.
[21] Parrott, Bruce, Mark R Beissinger, and Karen Dawisha. “State Building in the Shadow of an Empire-State: The Soviet Legacy in Post-Soviet Politics.” Essay. In *The End of Empire?*: The Transformation of the Ussr in Comparative Perspective, 166–67.
[22] Ibid

loosen its grip on Ukraine as Russia saw it as within its area of influence, and would rather maintain closer ties than to operate in close proximity with jarringly dichotomous, and continuously diverging sentiments and ideologies. Therefore, on December 8, 1993 another partnership between Ukraine, Russia, and Belarus called the Commonwealth of Independent States succeeded the USSR but ultimately failed through a lack of coordination and efforts towards success.[23] Ukraine also had intergovernmental organization offers from the west with the North Atlantic Treaty Organization (NATO) as well as an independent offer from the United States. President Bill Clinton visited Kyiv in 1995, with second President of Ukraine Leonid Kuchma afterwards stating, "NATO would be a guarantor for stability in Europe, and that Kyiv was no longer against NATO enlargement."[24] Upon hearing this, Russia became even less inclined to distance itself from Ukraine, fearing a pervasive western domino effect. Putin declared, "These are also the result of deliberate efforts by those forces that have always sought to undermine our unity. The formula they apply has been known from time immemorial – divide and rule. Hence the attempts to play on the 'national question' and sow discord among people, the overarching goal being to divide and then to pit the parts of a single people against one another."[25] Putin, charged by his notion of an eastern Slavic identity in Ukraine, blames western alliances for propagating a divide between Russia and Ukraine and claims that, in reality, Russia and Ukraine are one people.[26]

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[23] White, Stephen, and Valentina Feklyunina. Identities and Foreign Policies in Russia, Ukraine and Belarus: The Other Europes.
[24] B, Subhash. "National Identity Complexities: Genesis of Russian-Ukraine Conflict." *IUP Journal of International Relations* 16, no. 4 (9-10)
[25] Bukkvoll, Tor. "Ukraine and NATO: The Politics of Soft Cooperation." *Security Dialogue* 28, no. 3
[26] B, Subhash. "National Identity Complexities: Genesis of Russian-Ukraine Conflict." *IUP Journal of International Relations* 16, no. 4 (10-11)

Putin's statement expresses the crux of this divergence in ideologies between the eastern Slavic identity and the Ukrainian national identity. The eastern Slavic perspective is one that revolves around a belief of "Slavic unity" or "brotherly relations" between Russians and Ukrainians within Ukraine. The argument for a Slavic rather than Ukrainian nationalist identity assumes similar cultures and histories, with the strong presence of Russian language and culture to be cherished and preserved. Conversely, Ukrainians that hold an affinity towards western culture and ideologies reject the treasuring of Russian language and culture, believing that Ukrainian ethnicity, language, and culture should be the dominant force in the nation. Ethnic Ukrainian elites further feel that since they are native to the lands encompassed within the boundaries of the country, they should hold special status, and that their relationship to Russia throughout history has been nothing more than one of colonization and oppression.

These conflicting perspectives among people of Ukraine came under the spotlight during two key "revolutions": the Orange Revolution and the Revolution of Dignity. A "revolution" within this context refers to a call for a political, economic, and/or social upheaval within the newly established country of Ukraine. The Orange Revolution took place between November 2004 and January 2005 in a series of protests dissenting the results of the most recent Presidential election. Foreign and domestic election monitors called into question the legitimacy of the 2004 election runoff.[27] Claims of widespread corruption, voter intimidation, and electoral fraud caused thousands of Kyiv citizens to rally together in the capitol protesting the results daily. The two Presidential candidates at the center of this election controversy were: then Kremlin backed Prime Minister Viktor Yanukovych, and western ally Viktor Yushchenko. The initial election results named Yanukovych as the President, prompting public condemnations

[27] Wilson, Andrew. "Ukraine's 'Orange Revolution' of 2004: The Paradoxes of Negotiation." *Civil Resistance and Power Politics: The experience of non-violent action from Gandhi to the present*

from the European Union as well as the United States about the validity of the election. Russia on the other hand claimed that there was no evidence of any sort of election fraud. Due to the ongoing protests, however, the Ukrainian Supreme Court ruled that a revote was in order, in which Yushchenko won by a large margin.[28] The overturning of these election results significantly inflated Ukrainian confidence in the powers of the west, but simultaneously reopened these divisions between the conflicting identities of Ukrainians. The demographics of the Orange Revolution were extremely revealing of this as it showed western and central Ukrainians dominating the representation of protestors, with almost exclusively eastern Ukrainians opposing the protests. The result of this revolution was that Viktor Yushchenko, an ally of the western powers was elected President and marked a liberal transformation of the economic and political spheres of Ukraine. In regard to relations between Ukraine and Russia, the election fraud was considered by Ukraine to be a Russian attempt at further inhibiting the nascent democratic practices of the country.[29] From the opposite perspective, Russian leaders saw the foreign refereeing of the election to be a sign of a misplaced sense of western righteousness in promoting democracy abroad. Russian retaliation came in the form of sanctions towards Ukraine in the form of increased gas prices and pipeline flow restrictions, sending only enough gas to fulfill contracts with western Europe.

The Ukrainian Presidential elections of 2010 reassured Russia as Yanukovych was elected President, and he marked his term by an immediate reversal of all western policies instituted by Yushchenko against the wishes of the Kremlin.[30] By 2012, Kremlin supported

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[28] Ibid

[29] Wilson, Andrew. "Ukraine's 'Orange Revolution' of 2004: The Paradoxes of Negotiation." *Civil Resistance and Power Politics: The experience of non-violent action from Gandhi to the present*

[30] B, Subhash. "National Identity Complexities: Genesis of Russian-Ukraine Conflict." *IUP Journal of International Relations* 16, no. 4 (14-17)

President Yanukovych's approval ratings fell after he altered the Ukrainian Constitution terms on the removal of a president. This amendment caused fear and anxieties among Ukrainians as they saw the amendment as moving their government towards one that resembled Imperial Russia, as Yanukovych could potentially stay in power as long as he wanted. These worries were compounded by allegations of corruption as his family members greatly benefited throughout his years in office, further hurting his approval rating. In an attempt to reverse this trend, Yanukovych set out to sign Ukraine into association with the European Union which immediately received widespread support from Ukrainians with the possibilities of new economic prospects coming through this association agreement.

This excitement for new international possibilities among Ukrainian people was shattered in 2013 when the Kremlin bribed President Yanukovych to pull out from the EU Association Agreement, with a 15-billion-dollar bailout. Many Ukrainians wanted this deal to go through as not only could it aid the deeply troubled Ukrainian economy, but western and central Ukrainians saw closer ties to the EU as desirable both culturally and politically. Yanukovych's rejection of the EU agreement also caused people to associate him with corruption, and as a puppet of the Russian government. Ukrainians in response took to the streets Kyiv's independence square in November 2013, calling it the Revolution of Dignity.[31] While widespread protest rocked the country and gained international attention, Yanukovych would not so quickly backtrack on his decision to reject the EU agreement as he claimed it would have dealt a big blow to the Ukrainian economy by further limiting economic ties with Russia. However, these reasons did not quell the anger of the protests, with the ceasing of demonstrations seeming nowhere in sight, even with the authoritarian institution of civil and protest rights restrictions.[32] In January 2014,

[31] "Ukraine's Foreign Policy after the Orange Revolution." Wilson Center, March 5, 2005.
[32] Ibid

Yanukovych didn't recognize any other option than to try to stave off protests violently by deploying Ukrainian police to combat demonstrators. On January 22nd, in a bloody clash with police, two protesters were killed. This violence led anti-demonstration protests to ensue in eastern Ukraine where the majority of people held pro-Russia sentiments. Into February, the violence between police and protesters became increasingly deadly as police attempted to retake independence square killing 20 and injuring hundreds.[33] Western Ukrainian cities like Lviv seized government buildings, with EU representatives threatening Ukraine with sanctions if Yanukovych could not escalate the violence and protests. Under pressure, Yanukovych fled for Russia and on May 25, 2014 Ukraine elected Petro Poroshenko as president. Poroshenko was an organizing leader within the Revolution of Dignity and was a supporter of ties between Ukraine and the European Union.

Whilst it seemed like the ousting of Yanukovych would stop the violence, Russia demonstrated that it was not willing to loosen its grip on Ukraine. In eastern Ukraine, the ousting of Yanukovych sparked protests among pro-Russian Ukrainians that began calling for a succession from the nation. Russia expedited this motion by sending bands of unidentifiable gunmen to the Crimean Peninsula to bring it under a proxy military occupation.[34] On March 16, Crimeans voted substantially in favor of seceding from Ukraine and rejoining Russia. The Ukrainian government denied the validity of the election as there was no international monitoring, and saw the results as propagated on hostility and intimidation. While the legitimacy is contested, the result was pushed through, making Crimea officially a part of Russia. Putin

[33] B, Subhash. "National Identity Complexities: Genesis of Russian-Ukraine Conflict." *IUP Journal of International Relations* 16, no. 4 (14-17)
[34] B, Subhash. "National Identity Complexities: Genesis of Russian-Ukraine Conflict." *IUP Journal of International Relations* 16, no. 4 (18-19)

justified these moves by claiming it was his duty to protect and uphold the people and values of Russian citizens and ethnic groups in Ukraine.

The annexation of Crimea (figure 1)[35] led to heightened ethnic divides in the eastern regions of Donetsk and Luhansk and caused Ukrainians previously indifferent towards Russian conflict to subscribe to a larger Ukrainian Nationalism once violence erupted between pro-Russian separatists backed by unmarked Russian militants and the Ukrainian armed forces.[36]

[35] Kirby, Paul. "What Russian Annexation Means for Ukraine's Regions." BBC News. BBC, September 30, 2022. https://www.bbc.com/news/world-europe-63086767.
[36] Ibid

People from the eastern front of Ukraine fled to Kyiv seeking shelter from the war. Although prior to 2014, it was commonplace for eastern Ukrainian regions to speak only Russian and be connected to Russian culture, after the annexation of Crimea, Ukrainian government mandated with strict legislation the sole use of Ukrainian across the country (especially in government positions) including the remaining eastern regions of the country that were not lost in the annexation. The fighting that ensued after the annexation went back and forth and attained full international attention when on July 17, the rebels shot down a commercial Malaysian airplane killing all 298 passengers.[37] Whether this was accidental or intentional remains up for debate, but it did not stop the fighting from intensifying with the Ukrainian forces gaining the upper hand. Thus, in August, Russia overtly deployed forces to invade eastern Ukraine as a show of support to the separatist rebels. Over the course of this conflict over 2,500 Ukrainians were killed, and the citizens caught in the crossfire felt increasingly disenfranchised, leading to both sides looking to garner local support through manipulative tactics of appealing to their experience and promising change.[38]

The international attention that the conflict in the Donbas was receiving led to the creation of a fresh pact between Russia and Ukraine called the Minsk Agreements. The basis of the agreement was to end the war in the Donbas region. Minsk, the capital of Belarus, became the location for the leaders to come together and deliberate on an agreement to end the war.[39] The agreement enacted on September 5, 2014 failed due to ceasefire violations, and the Minsk II agreement meeting that took place in February 2015 was never signed due to disagreement on

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[37] B, Subhash. "National Identity Complexities: Genesis of Russian-Ukraine Conflict." *IUP Journal of International Relations* 16, no. 4 (23)

[38] Feklyunina, Valentina. "Soft Power and Identity: Russia, Ukraine and the 'Russian World(s)'." *European Journal of International Relations* 22, no. 4

[39] B, Subhash. "National Identity Complexities: Genesis of Russian-Ukraine Conflict." *IUP Journal of International Relations* 16, no. 4 (24-25)

the terms, and the continued fighting of the DPR and PLR against Ukrainian forces within the Donbas region. After several successive talks held between Russia, Ukraine, NATO, and the US there were no positive outcomes.[40] The Donbas region remained heavily stricken with civil unrest from 2014-2021 with the death count surpassing 14,000 people as a result of the relatively continuous fighting, making it the most casualty heavy conflict in Europe since the Balkan Wars in the 1990s.[41]

The flames of conflict were doused with gasoline ever since Russia's February 2022 invasion of Ukraine. With the conflict ongoing, and peace talks nowhere in sight, it's necessary to inspect the root of the deep seeded tension between present day Ukraine and Russia dating back to the establishment of their ethnic groups and creation of their empires. Whilst this background does not provide a complete picture of those origins, it does provide an overview of their developments, as well as some nuances of their diverging identities and how those identities were formed. As this historical overview suggests, much of the news coverage on the conflict details – often in gruesome detail – inter-group violence and horrendous human toll. Yet there are other victims in this war, including Ukraine's landscapes, its flora and fauna, and future generations. Thus, my thesis will now transition to look specifically at the various ways in which the war has affected the environment, with a specific focus on how natural spaces and environments are weaponized to achieve military victories, as well as on the fallout of these campaigns.

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[40] Wittke, Cindy. "The Minsk Agreements – More than 'Scraps of Paper'?" *East European Politics* 35, no. 3 (2019): (pp. 6)

[41] B, Subhash. "National Identity Complexities: Genesis of Russian-Ukraine Conflict." *IUP Journal of International Relations* 16, no. 4 (24-25)

Chapter 2: Literature Review

The Oxford English Dictionary defines war as 'hostile contention by means of armed forces, carried on between nations, states, or rulers, or between parties of the same nation or state; the employment of armed forces against a foreign power, or against an opposing party'[42]. It often involves the use of extensive violence and lethal force, and contemporary conflicts involving large-scale armies, navies, air forces, and may also include non-state actors such as rebel groups or militias. Wars are fought for various reasons such as: ethnic and territorial disputes, political or ideological differences, resources, or religious beliefs. Wars have devastating ramifications: death, injury, displacement, as well as widespread destruction of property and infrastructure. These are often accompanied by human trauma and psychological scars that can persist for generations.

When considering the detrimental and far–reaching effects of war, people often look at it from an anthropocentric perspective. This perspective has been instilled through the war theory known as the Just War tradition. The Just War theory deals with the ethical justifications of why a war is fought, the forms it may or may not take.[43] This dated yet widely accepted framework among war historians instilled a focus on the direct human impacts when analyzing the consequences of war. Figures of casualties, displaced civilians, and the economic toll are most emphasized when assessing damages from a particular conflict. Recently, however, this notion has expanded to include damages of non-human, environmental aspects in which the war takes place. This perspective emerged in the latter half of the 20th century as a result of environmentally devastating conflicts like the Vietnam War and the Persian Gulf War.

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[42] KEKES, JOHN. "War." *Philosophy* 85, no. 332 (2010): 201–18.
[43] Hartnett, Liane, and Cian O'Driscoll. "Sad and Laughable and Strange: At War with Just War." *Global Society* 35, no. 1 (28-29)

Historians, political scientists, and geographers have begun to pay closer attention and analyze the impacts of war on non-human actors and non-combatant entities like: ecosystems, wildlife, and resources that fall in the line of fire during armed conflicts. Further, war historians have changed their approach to war analysis by inspecting how the elements of an environment influence the strategies of military commanders during their war campaigns. Through the study of this relationship, historians have further highlighted not only the ways in which natural environments complicate military operations, but the ways in which modern conflicts have weaponized the utilization and/or destruction of environments against their enemies.

This section of the thesis provides an overview of the various ways that wars interact with the environment drawing scholarship across various social science disciplines. Subsections of various environmental aspects that are involved in war below will give an in-depth look at their deliberate weaponization and or destruction, as well as how these environmental damages present themselves across various methods and timelines, and the nearsighted militaristic dispositions that contribute to it.

As mentioned above, the lack of environmental considerations in armed conflicts was established through the ancient Just War Tradition. While the term "Just War" was thought to be coined by Aristotle, the idea came about through Christian Theology, and was used in conquest determinations. The theory was further developed by many other thinkers, military-focused and otherwise. The idea of the Just War framework is that it was created to subject wars to moral examinations, or put slightly differently, to conceptualize wars in their relation to justice.[44] The three modes of inquiry to assess the ethical standards in war employed in the Just War Tradition are: *Jus ad bellum, Jus in bello, Jus post bellum*. *Jus ad bellum*, translated from Latin means, the

[44] Lee, Steven P. "The Just War Tradition: a Brief History." Essay. In *Ethics and War: An Introduction*, 35–67. Cambridge, UK: Cambridge University Press, 2013. (35-37)

right to war. It is an analysis of whether or not there is ample justification for a state or political community to resort to armed conflict. *Jus in bello*, translated to English is the law that governs the way in which warfare can be conducted. This pole of inquiry deals with the conduct in which war should be waged, appealing to restraints on the persecution of enemies, as well as the treatment or immunity granted to non-combatant civilians caught in the line of fire. Lastly, *Jus post bellum*, meaning justice after war, is an assessment that takes place when nearing the termination of war.[45] This framework has been followed by state actors in countless wars, with deliberations centered around these three modes of inquiry. *Jus in bello* is the element that deals with the approach to the use of force and the externalities that are associated with warfare's destruction. In this framework, immunity is given to humans that are not directly involved in the conflict, classifying them as non-combatants. This classification has only been bestowed on human actors in these conflicts, while the destruction that comes from these wars frequently affect non-human, non-combatant entities.[46] This non-human degradation, however, is completely neglected in the Just War framework. Today, the preservation of natural environments is one of the most pressing issues facing the human race, thus the neglect of the wellbeing of natural spaces in the Just War Tradition renders this framework inadequate in assessing damages and justifications of armed conflicts.

War's impacts on the environments in which they take place ranges on a wide spectrum, with some of the worst effects degrading and contaminating spaces, rendering them uninhabitable for decades if not centuries.[47] I use the term "environment" broadly to include

[45] Hartnett, Liane, and Cian O'Driscoll. "Sad and Laughable and Strange: At War with Just War." *Global Society* 35, no. 1 (28-29)
[46] Johnson, James Turner. "Maintaining the Protection of Non-Combatants." *Journal of Peace Research* 37, no. 4 (421-22)
[47] Vrai, Meenakshi. "The Impact of War on Our Natural Environment." FAWCO Website, June 27, 2022.

land, air, water, plants, animals and all living organisms; landscape features like rivers, mountains, deserts, oceans; natural resources, used to make food or fuel; and strategic raw materials for the production of goods such as oil, coal, natural gas, metals, stone, and sand. Military conflicts often cause environmental pollution. Countries like the United States and those of the former USSR are still tallying the immense quantity of chemicals, depleted uranium, and other residues of their military equipment that litter battlefields, storage depots, and other places where the fighting took place. At many of these locations no attempt has been made to clean up or remediate these sites as the costs to do so would easily reach billions of dollars.[48] Not only can war be damaging to the social environment, but military activities such as weapons production produce extensive amounts of greenhouse gasses, causing pollution that contributes to anthropogenic climate change and resource depletion, among other negative scars on the overall environment.[49]

Conversely, a lesser-studied aspect of the relationship between environment and warfare has to do with the way in which particular aspects of an environment dictate the strategies that military commanders employ in war campaigns. An infamous instance of when terrain influenced military strategy came in the 1800s under the command of Napoleon Bonaparte. After Austrian armies captured the modern day Italian city of Genoa, Napoleon sought to take it back by employing an unexpected strategy. Since many considered the passageway through the Alps to be too difficult to traverse with a whole army, Napoleon disregarded this notion and sent the bulk of his army, approximately 40,000 men along with a large portion of their artillery through

[48] Closmann, Charles E. War and the Environment: Military Destruction in the Modern Age. College Station, TX: Texas A & M University Press, 2009. (11-13)
[49] Ibid

the Great St. Bernard Pass.[50] With diversionary factions, composed of about 20,000 men, taking alternate routes through the Alps to find a vantage point behind the Austrian armies, when the French quickly descended the Alps upon the Austrians, their men and the element of surprise overwhelmed them with force. Elsewhere and more recently, in 1962, Major General Alden K. Sibley of the U.S. Army delivered a lecture on the impact of terrain on military strategy. He stated that thorough analysis on the various aspects of terrain is required when conducting military operations.[51] The identification of rivers, lakes, and marshes, as well as the drainage risks associated with inhabiting hills or mountains. Vegetational spaces must also be given consideration from dense forests to open grasslands. Further, types of soil and the roughness of the ground must be considered as artillery and other machinery is transported much more easily on dry and firm soil and opposed to wet and slippery ones.[52] The built environment is also a major factor in planning these campaigns as roads, urban areas, and railways can be both utilized and sabotaged in any given operation. All of these elements can be organized into the static and kinetic factors of an environment. The static factors refer to the slope angles, underlying bedrock, soils, and drainage characteristics, as well as plant distribution. The kinetic factors are those that are more subject to change rapidly, and in some cases, abruptly. These include rain, fog, temperature, dust, and foliage. While none of these factors are specifically considered terrain, they do interact with each other in predictable and often unpredictable ways that produce environments that influence military planning.[53]

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[50] "PASSAGE OF THE ALPS BY NAPOLEON." 1829.*The Albion, A Journal of News, Politics and Literature* (1822-1876), Oct 24, 158.
[51] Sibley, Alden K. “THE IMPACT OF TERRAIN ON STRATEGY: A Lecture Delivered at the Naval War College 9 February 1962.” Naval War College Review 14, no. 8 (22-23)
[52] Ibid
[53] Ibid

Over the last few decades, journalists and scholars have increasingly drawn our attention to the entanglements of nature and war. For instance, Michael Herr was an American writer and war correspondent, most well-known for his fictional retelling of his experiences in Vietnam during the war as a correspondent for Esquire Magazine called *Dispatches*. The below excerpt demonstrates how easily natural landscapes become either tools of combat, barriers to be overcome, or enemies to be vanquished by military technology.

> "But mostly, I think, the Marines hated those hills; not from time to time, the way many of us hated them, but constantly, like a curse. Better to fight the war in the jungles or along the dry flats that lined the Cua Viet River than in those hills. I heard a grunt call them "angry" once, probably something he'd picked up from a movie or a television series, but from his point of view he was right, the word was a good one. So when we decimated them, broke them, burned parts of them so that nothing would ever live on them again, it must have given a lot of Marines a good feeling, an intimation of power. They had humped those hills until their legs were in an agony, they'd been ambushed in them and blown apart on their trials, trapped on their barren ridges, lain under fire clutching the foliage that grew on them, wept alone in fear and exhaustion and shame just knowing the kind of terror that night always brought to them, and now, in April, something like revenge had been achieved.
>
> We never announced a scorched-earth policy; we never announced any policy at all, apart from finding and destroying the enemy, and we proceeded in the most obvious way. We used what was at hand, dropping the greatest volume of explosives in the history of warfare over all the terrain within the thirty-mile sector which fanned out from Khe Sanh. Employing saturation-bombing techniques, we delivered more than 110,000 tons of bombs to those hills during the eleven-week containment of Khe Sanh.""[54]

Herr describes the American soldier's disposition towards the environments of Vietnam, and it shows the ways in which foreign forces feel threatened as subjects of the natural environment, bringing about a feeling of resentment towards the environments surrounding them. To dispel this fear and expend the anger, soldiers resorted to destructive acts towards conquering the land via explosives, defoliants, and machine weaponry. The American defoliation campaign in

[54] Herr, Michael. *Dispatches*. First Vintage International, 1977. (pp. 152-153)

Vietnam not only caused immediate and immense destruction of its natural environments, but also afflicted its ecosystems for decades to come.

While the immediate and instantaneous violence and environmental degradation that comes out of armed conflicts is realized as these conflicts unfold, there is another kind of violence that is a product of war, but its effect takes place over a much longer time horizon. This is known as *slow violence*.

The concept of slow violence, according to Rob Nixon differs greatly from traditional ideas of violence:

> "By slow violence I mean a violence that occurs gradually and out of sight, a violence of delayed destruction that is dispersed across time and space, an attritional violence that is typically not viewed as violence at all. Violence is customarily conceived as an event or action that is immediate in time, explosive and spectacular in space, and as erupting into instant sensational visibility. We need, I believe, to engage a different kind of violence, a violence that is neither spectacular nor instantaneous, but rather incremental and accretive, its calamitous repercussions playing out across a range of temporal scales."[55]

Slow Violence has taken place in almost all armed conflicts but is identified and commented on more sparsely than those of instantaneous violence. Since its negative effects take root and present themselves long after the initial environmental disruption, the connections to the initial impact are harder to draw. When conflicts are at their height, the instant spectacles of destruction draw the most attention. The realization of the slowly violent consequences is much more difficult to identify and requires a retrospective analysis. While a conflict rages on, it is only possible to speculate about how today's impacts will unfold weeks, years, and even centuries into the future. While there has been little attention towards the slow and long-lasting calamities that gradually and somewhat invisibly affect natural spaces, scholars have begun to consider and

[55] Park, Albert L. "The Reshaping of Landscapes: Systems of Mediation, War, and Slow Violence." *The Journal of Asian Studies* 77, no. 2 (2018). (pp. 367)

more astutely anticipate violent effects that present themselves over the long term. Attritional catastrophes which transcend the boundaries of time and space present themselves in all kinds of displacements: temporal, geographical, rhetorical, and technological manifesting themselves in both human and environmental costs, disruptions, and frequently negative transformations.[56] Frequently intermingled with issues of slow violence are the sorts of neglectful, ignorant, and myopic dispositions that military commanders tend to have in orchestrating military operations on foreign grounds.

Key to understanding war's spectacular and slow violence on the environment is to consider how nature is weaponized in conflict. By "weaponization" in this context I refer to the deliberate destruction and deprivation of aspects of the environment, as well as the long-term effect of the destruction and deprivation, known as slow violence.

Recently, more scrutiny has been placed on military commands that have deliberately targeted the environment to obtain any possible advantage in armed conflicts. There are many instances of wars from centuries ago where environments have been deliberately weaponized or targeted for military gains. During the US Civil war, General Sherman deliberately destroyed homes, infrastructure, and farmlands to break the morale of the confederacy. In WWI the British set fire to Romanian oil fields to prevent them from being captured by the central powers, while in WWII both Nazi Germany and the Soviet Union engaged in scorched earth tactics to make whatever region that would soon fall to the enemy as useless and unappealing as possible. During the Korean War of the 1950s the US bombers targeted North Korean dams to destroy water infrastructure and energy generation.[57] The Vietnam War was a turning point in the

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[56] Nixon, Rob. *Slow Violence and the Environmentalism of the Poor*. Cambridge, MA: Harvard University Press, 2013. (pp. 6-7)

[57] Austin, Jay E., and Carl Bruch. *The Environmental Consequences of War: Legal, Economic, and Scientific Perspectives*. Cambridge, UK: Cambridge University Press, 2000. (pp. 17)

conception of environmental warfare as the conflict showcased the increasingly devastating environmental effect from modern military technology. Entire ecosystems were targeted with an herbicide, known as Agent Orange, and Napalm, a highly flammable gel-like fuel used in air bombings. The US military even employed cloud seeding weather modification technology[58] in order to protectively shroud bombing runs targeting enemy troop movements, as well as artillery and other military equipment transports.[59] The Persian Gulf War of 1990-1991 was a very recent and egregious example of an invader's concerted effort to destroy their enemy's environment to as irreparable a state as possible. The targeting and destruction of oil wells posed consequences across many sectors of the environment from water to air.[60]

The rest of this section will be broken down into the vast and influential aspects of environments that have been weaponized and/or targeted in previous international armed conflicts. This organization of these various consequences will allow for insight into the ways in which Russia is currently weaponizing and targeting the environment within the context of the war in Ukraine from 2014 to present day.

Water

Water is an invaluable resource as it is required to sustain life of both flora and fauna, and plays a role in all kinds of societal functions from waste management to energy production. Armed conflicts can disrupt water systems in diverse ways, with negative consequences reaching from basic service provision to development efforts. According to the World Economic Forum (WEF), water crises, alongside weapons of mass destruction, failure of climate-change

[58] Hearing on S. Hrg. 93, Weather Modification, before the Subcommittee on Oceans and International Environment of the Comm. on Foreign Relations, 93rd Cong. 2d sess., March 20, 1974, p. 89
[59] Ibid
[60] Ibid

mitigation, and extreme weather events, are some of the most severe threats to global health security.[61]

Water resources are often targeted during armed conflicts and the destruction of water infrastructure and contamination of water sources can have severe consequences for civilians. Understanding the relationship between water and armed conflict is important for both humanitarian reasons and for strategic planning during conflicts. Water infrastructure is often indirectly damaged due to secondary reverberating effects of attacks on urban infrastructure. An example was the Alouk water station in the Al-Hasakah in Syria, which serves 460,000 people directly and another half a million indirectly via truck transport. This water station has faced numerous deliberate disruptions as a result of Turkish occupation, and their intent to tighten their grip on Syrians through deprivation tactics. In northwest Syria, substantial water infrastructure damage occurred in July, 2019, when eight facilities in the Al-Mar'a district were attacked by Syrian Government forces, leaving a quarter of a million people without water. Water is protected under International Humanitarian Law; however, there is little accountability for attacks that threaten a population's access to it. The World Health Organization's Surveillance System for Attacks on Health Care was introduced in December, 2017 to protect from these kinds of strikes that target vulnerable populations' basic necessities.

In broad terms, water weaponization is the use of water as physical arms to harm and/or gain leverage over an adversary.[62] Grech-Madin also developed a typology that represents the structure of water weaponization (figure 2)[63]. In each of these four classifications, all actions

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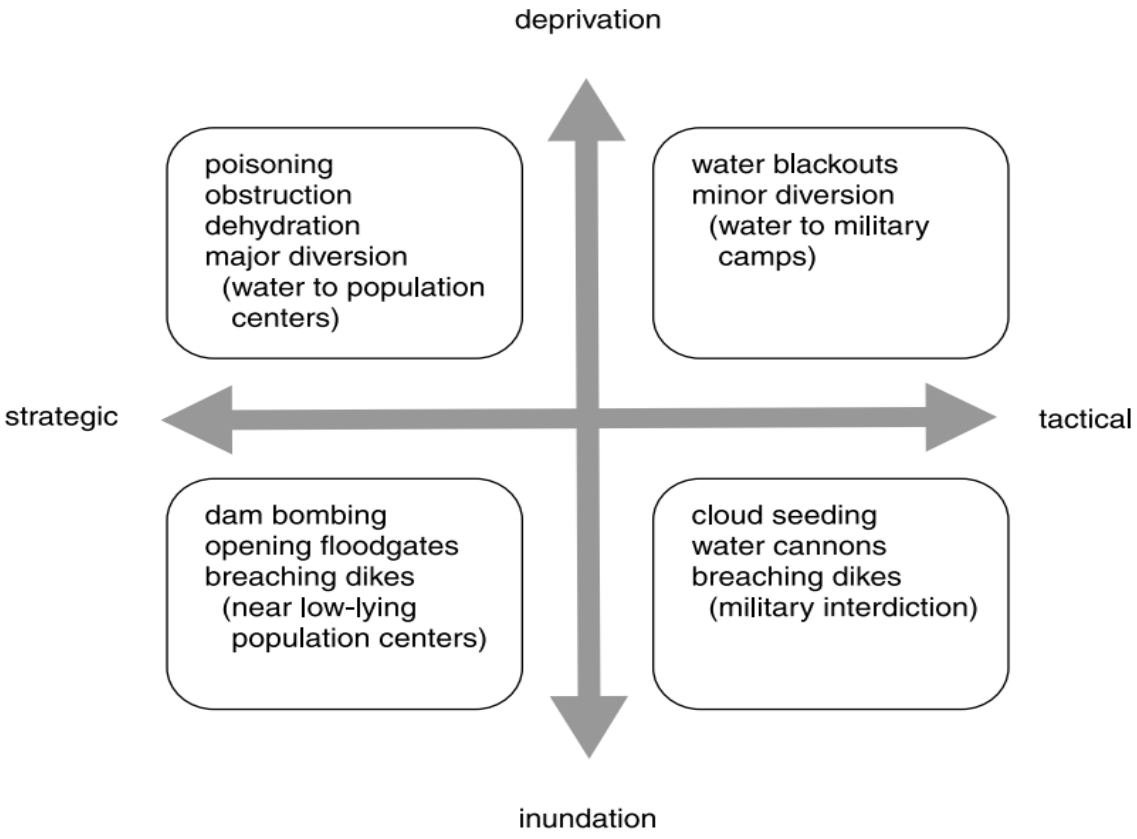
[61] Abbara, Aula et al. "Weaponizing Water as an Instrument of War in Syria: Impact on Diarrhoeal Disease in Idlib and Aleppo Governorates, 2011–2019." (pp. 202)
[62] Grech-Madin, Charlotte. "Water and Warfare: The Evolution and Operation of the Water Taboo." *International Security* 45, no. 4 (pp. 88)
[63] Grech-Madin, Charlotte. "Water and Warfare: The Evolution and Operation of the Water Taboo." *International Security* 45, no. 4 (pp. 89)

involved water as arms towards a particular military end. On the vertical axis the two ends of the spectrum are deprivation and inundation. Acts of deprivation are ones that deliberately reduce or deny access to water for basic human sustenance, as well as for the greater degradation of non-human water dependent life, such as plants and animals. Deprivation doesn't refer to direct physical violence with people, but rather the indirect destruction that inhibits access to water for all. Some examples of this have come in the form of poisoning, scorched earth destruction of water infrastructure, as well as destroying a water blockade in siege warfare.

1. The Structure of Water Weaponization



On the other side of the vertical axis, inundation has to do with the rapid and deliberate release of large amounts of water through leveling storage infrastructure or opening the floodgates. An example of this kind of inundation tactic came in the midst of World War II and was employed

by the British Royal Air Force. Known after this operation as the British "Dam Busters", as part of Operation Chastise British bombers flew over Germany, destroying dams in order to inundate landscapes and destroy important war effort infrastructure. The extensive and gritty fighting of World War II encouraged this kind of weaponization of water for both the Allied and Axis powers on various battle fronts.[64] The German occupying army in The Netherlands in 1944 routinely breached dikes to flood roads towards cities like Amsterdam and Rotterdam in order to hinder and delay the advance of the allied powers after liberating France and pushing towards Belgium and Holland.[65] As the American armies pressed further on their liberation path through Europe, General Eisenhower gave the command to chase the Nazis off the main island of Walcheren by weaponizing the ocean in order to inundate the entire island. The Walcheren landscape was much like a basin which would fill with water within a day through a concerted effort of breaching a large seawall protecting the island. The allied Air Force bombed the seawall at four locations, through which deep and broad gaps of water flooded the island. As a result, the Nazis instantly surrendered Walcheren, and fled within days. The impact of the flooding was huge, not only on the four locations, where much collateral damage to properties was caused, but over 150 people also perished during the blasts. As the flooding occurred on 3 October 1944, much additional damage was caused during the bad weather over the following weeks.[66]

A more specific kind of water damage in war efforts has to do with the targeting of wastewater plants and facilities. One of the major concerns that comes out of this attack is if the

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[64] de Kraker, A. M. "Flooding in River Mouths: Human Caused or Natural Events? Five Centuries of Flooding Events in the SW Netherlands, 1500–2000." *Hydrology and Earth System Sciences* 19, no. 6 (2015): (pp. 2678–2679).
[65] Grech-Madin, Charlotte. "Water and Warfare: The Evolution and Operation of the Water Taboo." *International Security* 45, no. 4 (pp. 90).
[66] de Kraker, A. M. "Flooding in River Mouths: Human Caused or Natural Events? Five Centuries of Flooding Events in the SW Netherlands, 1500–2000." *Hydrology and Earth System Sciences* 19, no. 6 (2015): (pp. 2679).

wastewater is released from septic tanks and begins spilling out in neighborhoods and homes, with a further concern being of the contamination of water by wastewater infrastructural damage. During World War I, the spread of the Spanish flu through the mud, feces and wastewater which lined the trenches, is considered to have killed more people than both world wars combined; and similarly, the lack of clean water, and adequate wastewater disposal in the refugee camps of the Democratic Republic of Congo is blamed for the epidemics of dysentery and cholera which claimed over 40,000 people from Rwanda in 1994.[67] Grech-Madin's water weaponization framework figure, along with the other articles on the targeting and weaponization of water in armed conflicts will be useful to apply to the various instances of Russian military water strategy in the ongoing war in Ukraine.

Ecosystems: Forests & Biodiversity

Repetitive armed conflicts have been both directly and indirectly responsible for severe biophysical modification to the environment. Direct effects are the result of military operations at the time of conflict (short-term), while indirect effects typically last for many years as their violent effects are carried out slowly.[68] These sorts of short- and long-term effects have been seen in many armed conflicts, but the most recent, widespread, and internationally condemned wartime forest defoliation campaign came from the United States in the Vietnam War. The Viet Cong militants led by Ho Chi Min sought to utilize the rainforest environment that enveloped them as a tactical protective measure from aerial threats. The dense rainforest covered much of

[67] Talhami, Michael, and Mark Zeitoun. "The Impact of Attacks on Urban Services II: Reverberating Effects of Damage to Water and Wastewater Systems on Infectious Disease." *International Review of the Red Cross* 102, no. 915 (January 2022): (pp. 1302)

[68] Zheng, F., Xiao, C., & Feng, Z. (2023). Impact of armed conflict on land use and land cover changes in global border areas. *Land Degradation & Development*, 34(3), (pp. 880)

the battleground that took place above the demilitarized zone (DMZ) at the 17th parallel. In order to get a view of what was happening on the ground, the US military sought to engage in a defoliation campaign so that US troops could be move and be tracked by Air Force reconnaissance planes, as well as so that if VC troops were relocating, they would not be shrouded in rainforest allowing for direct aerial bombing barrages no longer inhibited by the dense forest. The US saw the defoliation of the natural environment of Vietnam as a means to an advantageous military end, thus began a devastating campaign known as Operation Ranch Hand that persisted from 1962-1971, with the lingering effects still being realized today. It took nine years of spraying Agent Orange and letting the slowly violent effects take hold in various parts of the ecosystems throughout Vietnam and neighboring countries like Cambodia and Laos, before the International Criminal court coined the term ecocide, and prohibited its perpetuation in war efforts as part of the Rome Statues.[69] According to calculations, 221 kg of TCDD was sprayed in Vietnam by US forces, and this does not include herbicides used by the Vietnamese forces or herbicides sprayed other than by C-123 aircraft.[70]

While much of the blame for defoliation came from the use of Agent Orange in Vietnam, the US employed widespread methods that were just as destructive in order to rid the Viet Cong of natural cover and ecological sanctuaries. Bombing and bulldozing campaigns were also used to achieve this military end.[71] In terms of immediate effects, exploded munitions created a shock wave large enough to obliterate nearby flora and fauna, injure plants and animals further away, as well as damage soil by producing impact craters in the land. Concussion bombs were also

[69] Rome Statute of the International Criminal Court: A Commentary. Oxford University Press, n.d.
[70]Stellman, J. M., Stellman, S. D., Christian, R., Weber, T., & Tomasallo, C. (2003). The extent and patterns of usage of Agent Orange and other herbicides in Vietnam. *Nature*, 422(6933), 681–687.
[71]Brauer, Jurgen. War and Nature: The Environmental Consequences of War in a Globalized World. Lanham, MD: AltaMira Press, 2011. (pp. 46-58)

used in this war as they were designed to create an instantaneous helicopter landing zone. This produced immediate vegetation and death to all above ground animals in close vicinity to the blast. Brauer's estimations predicated on the amount of bombings, measurement and frequency of land craters, and assumptions on tree density, come to a shocking conclusion that nearly 1.5 million trees were killed immediately on impact from bombings in South Vietnam, with a further 700,000 trees killed in North Vietnam, Cambodia, and Laos.[72] Further, including a representation of the indirect killing of trees via shrapnel and other bi-products of bombing brings the total number of trees killed in the Vietnam War by the US to approximately 45 million.[73] The further effects of these bombings can be seen through: loss of vegetation leading to inadequate evapotranspiration causing the water table to rise. This rising water table also holds far reaching effects with not only the local ecosystem being affected as downstream ecosystems will also experience water flow about the optimal amount leading to soil erosion, nutrient loss, and flooding. The cratering of bomb impacts compacts the soil, lasting decades, and inhibits vegetative regrowth.[74]

In addition to the bombing, shelling, and use of defoliants like Agent Orange, the US armed forces also employed Georgian manufactured plows and bulldozers to strip the environment of as much vegetation as possible. These plows were devastatingly effective as they would literally scrape all vegetation off the earth's surface and expose subsoil for multiple thousands of kilometers, ascribing this to the military purpose of ambush prevention and area denial (a contemporary term for the centuries old - scorched earth tactics). Aside from the extensive death of trees and vegetation, the land cover degradation trifecta of: Agent Orange,

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[72] Brauer, Jurgen. War and Nature: *The Environmental Consequences of War in a Globalized World.* Lanham, MD: AltaMira Press, 2011. (pp. 47)
[73] Ibid
[74] Ibid

bombing/shelling, and bulldozing rendered many areas completely uninhabitable for animals. John Edmund Delezen, a Veteran and author recounts the juxtaposition of US outposts chiseled out of the rainforest to the rest of the forest that surrounded it.

> "Soon the lush green of the Truong Son encounters the impassable rows of razor wire that encompass the slash of red scar that is [Landing Zone] Stud. Having been scraped clear of vegetation by the onslaught of bulldozers, the dramatic contrast that separates the ugly, barren outpost and surrounding rainforest is vivid; as thin streams of bright red dust drift through the ominous perimeter, from high above, the outpost resembles a bleeding wound. Like hungry flies feeding on the open wound, helicopters swarm above the churning dust; most never land, instead they hover while red nylon cargo nets are hooked underneath their bellies. The nets are filled with rations, ammo, artillery rounds, water cans, body bags, razor wire, and sand bags."[75]

Delezen's imagery explains the way in which the United States' War in Vietnam was one of intense violence, not only towards humans across the battlefield, but also that the violence extended to non-human entities of the region's environment, and various ecosystems, damaging and scaring them irreparably.

Soils

Beneath the feet of humans is an entire ecosystem by itself. Many tiny organisms create and maintain the soil and biological cover—grasses, mosses, lichens, and fungi. They are most vulnerable due to their lack of mobility. In other words, all living organisms in the soil layer or those that protect its surface from erosion cannot leave the area where the munitions explode or defend themselves from harm.[76] One of the most dramatic ways humans can affect soil properties is through the performance of military activities. Warfare-induced disturbances to soil are basically of three types - physical, chemical, and biological - and are aimed at causing direct problems to enemies or, more often, are indirect, undesired ramifications. Physical disturbances

[75]Gregory, Derek. "The Natures of War." *Antipode* 48, no. 1 (2015): (pp. 25)
[76] "Munitions and Chemicals: How Does War Damage Soils, and What Are the Solutions?" *Ecorubric*, July 15, 2022.

to soil include sealing due to building of defensive infrastructures, excavation of trenches or tunnels, compaction by traffic of machinery and troops, or cratering by bombs. Chemical disturbances consist of the input of pollutants such as oil, heavy metals, nitroaromatic explosives, organophosphorus nerve agents, dioxins from herbicides, or radioactive elements. Biological disturbances occur as unintentional consequences of the impact on the physical and chemical properties of soil or the deliberate introduction of microorganisms lethal to higher animals and humans such as botulinum or anthrax. Soil represents a secure niche where such pathogens can perpetuate their virulence for decades.[77] The intentional infliction of these kinds of disturbances demonstrates the weaponization of soils against the people native to its ecosystem.

Weather

The weaponization and targeting of weather in armed conflicts has taken place for centuries, but in the 20th and 21st century, approaches to this have become more scientific, allowing for more agency and control in these operations. Weather warfare uses weather modification and geoengineering techniques to purposefully alter the weather so that this altered weather can be used to defeat the enemy economically, strategically, and covertly, inflicting as much damage as possible. Historical utilizations of weather in military strategy can be seen in countless wars. One of the most famous instances of when inclement weather was weaponized or used as refuge came in WWII during Nazi Germany's campaign across the Soviet Union. Hitler named this Operation Barbarossa and sought to bring the Soviet Union and its resources under Nazi control. The Blitzkrieg tactic had an overarchingly successful first 10 months breaking through the various Soviet aligned countries (including Ukraine), on October 2nd, 1941, Hitler

[77] Certini, Giacomo, Riccardo Scalenghe, and William I. Woods. "The Impact of Warfare on the Soil Environment." *Earth-Science Reviews* 127 (December 2013): (pp. 1-2)

initiated Operation Typhoon intending to push forward to Moscow believing the Russian forces too weak to defend their capital, but the weather was beginning to turn. From rainfall the dirt roads became mudslides impossible to traverse with heavy equipment, and horse drawn transport became fully stuck.[78] As the advance was drawn to a halt, temperature began dropping drastically by November and while the German troops were waiting for supplies, they suffered through terrible winter weather while equipped with improper clothing. As the Germans became increasingly debilitated battling the cold weather, with the Russian much more well suited for a war of attrition. Eventually the Russians launched a counterattack that dissipated and drove back the German forces.

While in World War II the use of weather in military strategy was more straightforward in terms of planning defenses and attacks around the changing of the seasons, scientific technology has advanced far enough to shorten or prolong weather patterns and seasons for military gains. Over the course of 5 years during the Vietnam War from 1967-1972, the US military implemented cloud seeding technology in order to alter the weather patterns to disrupt VC movement and operations. Weather modification can be used in warfare because it serves as a tactical weapon, a strategic weapon, or a covert way of weakening the well-being of an enemy state. Known as Operation Popeye, the US Air Force implemented cloud seeding technology in order to extend the monsoon season in the region.[79] By harnessing the power to alter the seasons, the US military sought to enlarge the rainfall season so that VC moving troops and equipment along the Ho Chi Minh trail would be met with mudslides and pits that were near impossible to traverse. The torrential rain that came as a result of the cloud seeding was successful in

[78]"Operation 'Barbarossa' and Germany's Failure in the Soviet Union." *Imperial War Museums*. Accessed March 22, 2023.
[79] Brauer, Jurgen. War and Nature: *The Environmental Consequences of War in a Globalized World.* Lanham, MD: AltaMira Press, 2011. (pp. 49)

hampering Viet Cong tactical logistics.[80] This was the first practical use of modern weather modification technology, but when this operation was revealed, the Environmental Manipulation Convention decreed that any future uses of weather modification in armed conflict as punishable by the International Criminal Court; though those sorts of charges have posed little obstruction for Putin and the Russian military in their unlawful attacks on Ukraine and their environment as a whole.

[80] Editorial Team of Unrevealed Files. “Weather Warfare: Weather Modification Technology in Warfare.” *Unrevealed Files*, July 23, 2021.

Chapter 3: Discussion

February 24th, 2022 was a significant day as it marked a drastic shift in Putin's and Russia's militaristic disposition towards Ukraine. The annexation of Crimea in 2014, leading to the loss of the eastern Ukrainian regions of Donetsk and Luhansk, saw Russia take a reserved position in the conflicts that ensued in the aftermath. For the 8 years that followed the annexation, Russia's moves in the conflict were for the most part, only those of aid towards separatist fighters (DPR and LPR) in eastern Ukraine. Through monetary means, as well as copious care package drops containing military equipment from weaponry to reconnaissance technology, Putin openly defended this aid by referring to the UN Charter of self-determination:

> "We are doing this (providing aid - TASS). Does this comply with the UN Charter? It does. There is Article 51 of the UN Charter which mentions self-defense. And we, as a party to this agreement, are obligated under this clause, under this UN Charter article, to provide aid to our allies. This is just what we are doing. Here is a simple sequence and logic in full compliance with international law."[81]

In terms of deploying combatants, while Russia has not admitted to this, there have been reports of unidentified militants fighting alongside the separatist groups presumably from the eastern border between Russia and Ukraine. At dawn on February 24th, Russia's level of involvement in the conflict following the 2014 annexation transformed into an extensively planned, full blown military invasion of Ukraine, marking the end of sporadic, state backed conflicts in the Eastern regions of Ukraine, and marking the start of an internationally recognized war, whose impacts would affect every last Ukrainian citizen in the country.

While Russia began its invasion with a tactical military setup that resembled Hitler's blitzkrieg campaign throughout European nations and the Soviet Union, just as it was thwarted by the Russians, Putin's aspirations for a swift victory was emphatically crushed by resilient

[81] "Russia Provides Aid to LPR, DPR Based on UN Charter - Putin." TASS. Accessed March 24, 2023.

Ukrainians, with the war raging on with no surrender in sight, over one year since Russia's initial invasion. Putin launched the invasion of Ukraine from the north, east and southern fronts, all with the goal of breaking through the outskirts and converging on the capital city of Kyiv. Russian troops quickly reach Kyiv's outskirts, but their attempts to capture the capital and other cities in the northeast meet stiff resistance. By the beginning of March, Russian forces took the shipping port city of Kherson as well as seizing the rest of the Kherson region. Further the Russians occupied a large part of the neighboring Zaporizhzhya region, including the Zaporizhzhia Nuclear Power Plant, the largest Nuclear Power Plant in Europe.[82] Putin's Russian forces made some military gains, but the international conception of the invasion was that they were overarchingly halted, disorganized, and uncoordinated in their invasion tactics. The Russians were meant to take Kyiv in a matter of weeks, to a couple months at most, but the Ukrainian resistance quickly rendered that objective impossible. As the Russian army got stuck near Kyiv by determined Ukrainian guerilla forces, the Russian army convoys became easy prey for Ukrainian artillery and drones. A bit over a month since the launch of the invasion, on March 29th, Moscow announced the withdrawal of forces from Kyiv in order to bolster its hold on the outskirt regions near the border, specifically Donbas, that had been ridden with violence since the 2014 annexation.[83] This withdrawal of forces from around the capital spoke volumes as it showed that the invasion was not going to plan, and that Russia was now stuck in a conflict that would last indefinitely.

This realization moved Putin and the Russian military generals to hold little back on Ukraine and utilize their position as the invader to begin weaponizing and deliberately targeting

[82] Associated Press. "1 Year after the Invasion Began, a Timeline of Russia's War in Ukraine." PBS. Public Broadcasting Service, February 19, 2023.
[83] Ibid

aspects of Ukrainian environments for both immediate destructions, as well as to instill lingering damage, intended to slowly break the bodies and spirit of Ukrainians, and most of all, their means to defend their country.

Besides the numerous civilian casualties and the unprecedented displacement of people, Russia's war on Ukraine will have dire consequences for the environment and public health, not just in Ukraine, but also in Russia, Belarus, Moldova and larger parts of Eastern Europe. The long-ranging effects of environmental harm from war can range from persistent pollution, the loss of ecosystems, fertile soil, and livelihoods to large-scale and regional consequences of industrial disasters highly likely in a country as industrialized as Ukraine.[84] While this war is ongoing and new scientific results on the exact damages are emerging every day, the discussion section of this thesis will discuss various already-recorded instances for Russian environmental weaponization that create obstacles and hardships for Ukrainians stuck in the fighting, and produce general military advantages to bolster their advances in the invasion towards Kyiv.

Weaponized Environments

To date in their invasion, Russia has committed targeted attacks on both ecological elements and civilian infrastructure in order to weaponize the environment against Ukraine. The broad definition of "environmental weaponization" in wartime campaigns is the use of nature and climate change by armed actors to inflict harm on the enemy.[85] The main environmental elements through which these attacks of weaponization have been carried out are: water, ecosystems (forests and biodiversity), soils, nuclear power plants, and the weather. Through

[84] Averin, Dmytro, Freek van der Vet, Iryna Nikolaieva, and Nickolai Denisov. "The Environmental Cost of the War in Ukraine." *Green European Journal*, April 6, 2022.
[85] "Weaponizing Nature." *Undisciplined Environments* - the former entitled blog, May 28, 2019.

them, Russia has inflicted not only spectacular violence with instantaneous environmental effects, but also slowly violent impacts that will present themselves over the long term and persist far after the conflict has taken place. By bringing in current sources and information on what is going on in the war on the ground, this section will outline the specific damages and their effects over the short and long term. Consideration of these slowly violent impacts in tandem with immediately violent ones will deepen our understanding of damages of armed conflicts that have been historically overlooked, and influence the decisions of politicians, generals, and international prosecutors when deliberating on these armed conflicts.

Water

Instantaneous Violence -

Outlined in the literature review section, water supplies are increasingly being targeted during armed conflicts. Russia's invasion of Ukraine shows the various deliberate and concerted efforts to use the deprivation of water in their war effort. 80% of Ukrainian drinking water supply comes from surface sources, and 99% of the urban population has access to centralized water supply systems before the war. After the invasion began, the precariousness of water security systems for citizens of Ukraine were dramatically worsened. 36% of the country's total produced drinking water was lost with 35% of the water supply and sanitation systems were classified as in a "state of emergency". This water shortage worsens as one moves from the western end of the country (which has become a place of refuge) to the eastern regions where there are no longer centralized water supplies.

A month into Russia's invasion of Ukraine, Russia cut off the water supply to the besieged city of Mariupol to drive it to surrender.[86] UNICEF provides key and jarring statistics on the various attacks on water that began as far back as the 2014 annexation of Crimea. In a protracted crisis, more children die from water-related diseases than from direct violence, over 4.2 million people are affected by the damaged water systems, and 500,00 children do not have immediate access to clean drinking water.[87]

Under the Structure of Water Weaponization, (figure 2) the militaristic methods in which the Russians have engaged these water supplies are widespread. They present themselves in every quadrant of the typology from: strategic and tactical deprivation, to strategic and tactical inundation. Direct attacks on water supplies, as well as in indirect ones of: contamination or destroying water flow infrastructure, cutting off power grids that are essential to the flow of drinking water, treatment of wastewater, and heating systems powered by water limit the essentials to combat the country's harsh winters. These water systems, to the advantage of Russian saboteurs and to the hindrance of Ukrainians, are bound tightly together and rely on each other to operate.[88] Natural water bodies have been indirectly contaminated through collateral damage as a result of the shelling of infrastructure, especially in the heavily industrialized eastern Donbas region. These reckless bombardments with no attempt to avoid critical civilian infrastructure results in damaged water and sanitation systems.[89] A large number of mines, refineries, storage tanks, oil depots, gas lines, and other industrial units reside there and have

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[86] Hussein, Hussam. "Russia Is Weaponizing Water in Its Invasion of Ukraine." *Nature* 603, no. 7903 (2022): (pp. 793)
[87] "Water under Fire." UNICEF, September 19, 2019.
[88] Averin, Dmytro, Freek van der Vet, Iryna Nikolaieva, and Nickolai Denisov. "The Environmental Cost of the War in Ukraine." *Green European Journal*, April 6, 2022.
[89] Water @ Wilson | Water and Conflict: Updates from the Russia-Ukraine War. Wilson Center, 2023. (5:49)

been hit by the Russian strikes, with the damage releasing toxic chemicals and substances into natural water bodies.

The ways in which Russian forces have directly and deliberately targeted water supplies vary based on the specific system or infrastructure that they are trying to damage. Direct Russian attacks on water come in the form of targeting pipelines to constrict its flow by pouring concrete in drinking wells, gaining control of and subsequently turning off pumping stations so pipes run dry, shutting down electrical grids in which water pumping stations rely on for pumping power, the poisoning of water wells to deny civilian communities access to drinking water, and further Russian forces in occupied areas have been preventing, attacking, and sometimes killing Ukrainian people working to repair critical civilian infrastructure.[90] These water supply and sanitary infrastructural damages have taken place in cities all around southern and eastern Ukraine and their consequences will manifest through low standards of sanitary conditions which have propagated the existence of various food and water borne diseases afflicting Ukrainian peoples.[91] This lack of access to clean water in tandem with extremely hot temperatures observed during the summer in 2022, and reduced capabilities of the medical system leaves Ukrainian people in a very precarious position with the threat of an epidemic looming larger by the day.

Shumilova et al. (2023) outline the various water disruptions accounted for since the start of the war. They are as follows: eight cases of water pipeline disruption, six cases of surface water pollution (from sunken military equipment and the release of chemicals from shelling targets), five cases of intentional dam destruction (one instance at the North Crimean Canal, and

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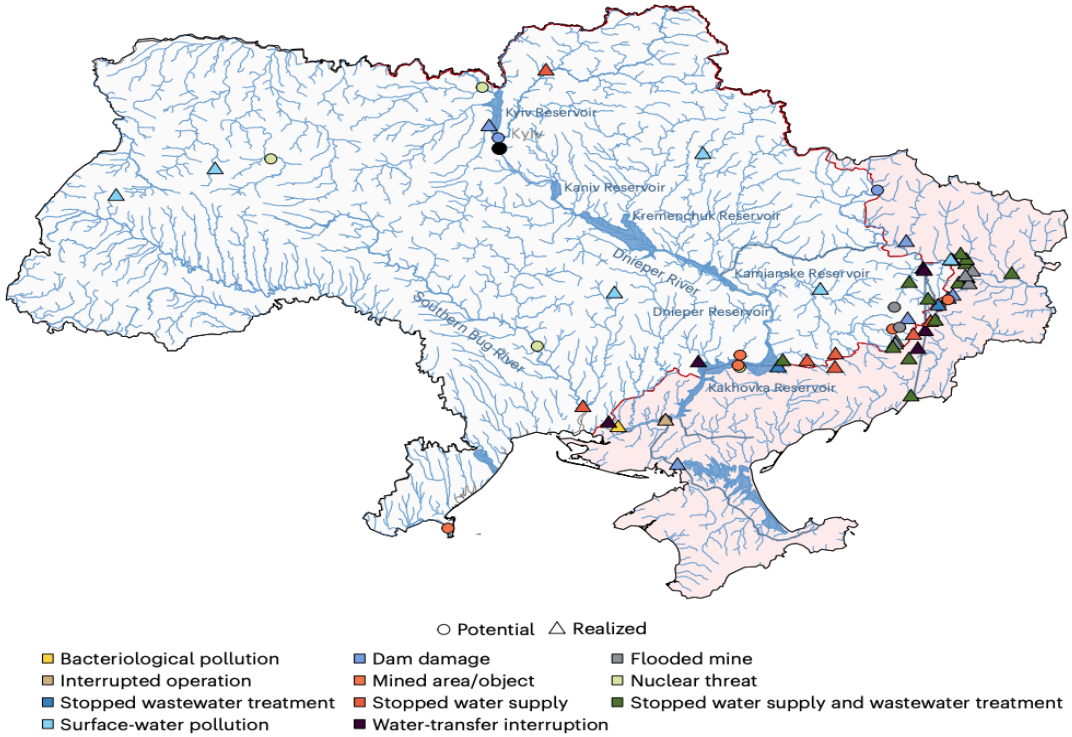
[90] Water @ Wilson | Water and Conflict: Updates from the Russia-Ukraine War. Wilson Center, 2023. (6:35)

[91] Shumilova, Oleksandra, Klement Tockner, Alexander Sukhodolov, Valentyn Khilchevskyi, Luc De Meester, Sergiy Stepanenko, Ganna Trokhymenko, Juan Antonio Hernández-Agüero, and Peter Gleick. "Impact of the Russia–Ukraine Armed Conflict on Water Resources and Water Infrastructure." *Nature Sustainability*, 2023. (pp. 2)

the rest at reservoirs), six cases of mine inundation, one case of bacteriological pollution from mass poultry killing (both livestock and wild), and one case of a hydroelectric operation disruption at the Kakhovka Hydroelectric Station along the Dnieper River.[92]

The map below (figure 3)[93] identified impacts on water resources and infrastructure in Ukraine from 18 February 2022–24 May 2022. Of these instances, 17 come from deliberate targeting of infrastructure for the purpose of inundation (missile strikes on Kyiv dams and Kakhovka hydroelectric plants), as well as a combination of both power supply cutoffs and the collateral damage of military objects being discharged and sinking into surface waters leading to deprivation of water.



[92] Ibid

[93] Shumilova, Oleksandra, Klement Tockner, Alexander Sukhodolov, Valentyn Khilchevskyi, Luc De Meester, Sergiy Stepanenko, Ganna Trokhymenko, Juan Antonio Hernández-Agüero, and Peter Gleick. "Impact of the Russia–Ukraine Armed Conflict on Water Resources and Water Infrastructure." *Nature Sustainability*, 2023. (pp. 4)

Slow Violence -

Conversely, slow violence refers to the seemingly veiled and long term effects of warfare on the environments in which it takes place. As a result of the war, many coal mines have been abandoned, and without the personnel to continue proper pumping and treatment functions, the potential of acid mine drainage arose which refers to the formation and movement of highly acidic water rich in heavy metals.[94] These toxins have seeped into the groundwater, which many of the surrounding towns rely on for drinking water. Samples taken east of Lviv showed concentrations of ammonia and nitrates in river waters were 163 and 50 times above the normal standards, respectively, which came as a result of missile debris damaging fertilizer tanks in the area.[95]

The underwater decomposition of ammunition and other explosive military materials release large amounts of toxic compounds such as PCBs that could last for decades, with its destructive reach extended by seepage into irrigation systems that would render the agricultural cropping and the quality of food production toxic. Extensive and expensive cleanup operations would be required in order to decontaminate these spaces. As an environmental health hazard, PCBs impact organisms at every level of the food web.[96]

While it is difficult to get a full view of the far-reaching impacts of the ongoing Russian invasion and attacks on Ukrainian water systems, what has been recorded already shows detrimental and long standing consequences for the environment and people of Ukraine. Russia's

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[94] "Abandoned Mine Drainage." EPA. *Environmental Protection Agency*, December 22, 2022.
[95] Rawtani, Deepak, Gunjan Gupta, Nitasha Khatri, Piyush K. Rao, and Chaudhery Mustansar Hussain. "Environmental Damages Due to War in Ukraine: A Perspective." *Science of The Total Environment* 850 (December 1, 2023): (pp. 2)
[96] Hooper, Scott W., Charles A. Pettigrew, and Gary S. Sayler. "Ecological Fate, Effects and Prospects for the Elimination of Environmental Polychlorinated Biphenyls (PCBS)." *Environmental Toxicology and Chemistry* 9, no. 5 (May 1990). (pp. 658)

relentless attacks on these supplies which violates international shows their unabashed method of total war on all aspects of Ukraine from their armed forces, to their civilians, to water, the most basic necessity of life, in order to incite a breakdown of health, spirit, and the resolute defense of their country that Ukrainians have displayed thus far in the war. While many of the Russian attacks have presented immediate issues of water sanitation energy access, there are also issues of PCBs and other toxins seeping into the groundwater that will remain there and contaminate those areas long after the wastewater and energy distribution infrastructure is restored. While they are both extreme detriments, instantaneous and slow violence operate on different time scales and will affect different generations of people although originating from the same conflict.

Ecosystems: Forests & Biodiversity

Instantaneous Violence -

Under the rubric of ecosystem targeting and weaponization, the war in Ukraine involves direct and immediately calamitous consequences for the forests, soils, and wildlife that inhabit them, but these initial instances of violence will also have more slowly presenting, much longer legacies in the Ukrainian environment that could last generations after the war is concluded. In primarily terrestrial combat zones, as the ones that are in dispute in Ukraine, the deployment and movement of troops and military hardware have caused large-scale deforestation and wildfires. Similar to the United States' defoliation campaign during the Vietnam War, the start of the Russian invasion from February 24th through the end of May saw more than 160,000 hectares of Ukrainian forest burned down in conflict ridden regions.[97] Specifically, on March 24, 2022, reports stated that more than 7,600 hectares of forest and grasslands in the western part of

[97] Dickinson, Peter. "Russia's Invasion Is Putting the Future of Ukraine's Forests at Risk." *Atlantic Council*, August 5, 2022.

Chernobyl were ablaze.[98] The forest fires themselves hold significant negative externalities through the dense smog polluting the air. Conflict-ridden regions are made easily identifiable by following the shrouds of dark clouds produced by military-induced wildfires. A comparison between the rates of forest fires from a year prior to the invasion to post-February 24, 2022 blatantly shows the magnitude of terrestrial loss as a result of war with the total area of forest fires increasing 45-fold, accounting for 1500 reported circumstances of ecosystem destruction. This ecosystem disruption and total destruction presents massive consequences for the biodiversity of Ukraine and the rest of the European continent as a whole. These rural areas of Ukraine are home to 35% of European biodiversity, with at least 44% of Ukraine's most valuable natural spaces (including national parks, and biosphere reserves) newly serving as rotating sets for war.[99] The International Union for the Conservation of Nature voiced serious concerns over the damage to 'speechless lifeforms', as the Russian attacks have even deliberately targeted specific wildlife clusters. The oldest zoo in Ukraine, located in Mykolaiv, is home to over 4,000 animals and has been relentlessly struck by numerous missiles and cluster bombs. The Ministry of Environmental Protection and Natural Resources of Ukraine released a table (figure 4)[100] breaking down the varied attacks on the environment, as well as the collateral damage it has incurred as a result of the conflict:

[98] Environmental Damages Due to War in Ukraine: A Perspective." *Science of The Total Environment* 850 (December 1, 2023): (pp. 3-4)
[99] "War in Ukraine Has Devastating Consequences for Biodiversity." IFAW, February 24, 2023.
[100] Eco Threat, Official resource of the Ministry of Environmental Protection and Natural Resources of Ukraine, 2022.

Particulars	Extent of damage
Crimes against the environment recorded by Ukraine	254 cases
Cases of ecosystem destruction	1500 sites
Increase in area of forest fires as compared to 2021	45 times
The extent of valuable natural areas (including national parks and biosphere reserves) in a war zone	44 %
Number of explosive devices and bombs neutralized that may contaminate water and soil	120,789 explosives and 1978 aircraft bombs
Fire of petroleum products	Quantity destroyed: 84,979 tonnes Emissions released: 294,242 tonnes
Forest fires	Extent of forest fires: 250,484 ha Emissions released: 180,759,581 tonnes
Ignition of other objects	Extent of damage: 14,493,711 m^2 Emissions released: 1,150,022 tonnes
Number of industries destroyed or damaged	Factories: 92 Power stations (thermal and hydro-electric): 7

Slow Violence -

Apart from the immediate destructive acts towards Ukrainian ecosystems, these effects have altered the web of life whose new trajectory will carry forth in this altered long after the war is through. Migratory birds have encountered obstacles as their flight paths have been obstructed and altered. It is probable that indigenous species which thrive in distinctive habitats will vanish entirely before the war is through.[101] While the deployment of troops on the ground is very much present in this conflict, much of the most damaging environmental destruction occurs from remote air and ground strikes, with targeting informed by the air reconnaissance of drones and other surveillance technology. Russia's neglect of the wellness of these natural spaces originates from the military strategy of defoliating and destroying the environment's natural cover in order to expose, target, and eliminate the Ukrainian guerilla forces on the ground that rely on it for hiding places and refuge. The Russian military is acting in complete ignorance of the impacts of their bombardments; thus the slowly violent consequences are not an immediate

[101] Ibid

concern allowing for them to manifest into these ecosystems. By destroying the forests and animals that inhabit them, Russia is altering the food chain and organization of ecosystems whose violent effect will present themselves slowly through spoiling the flow of energy and nutrients within the ecosystem. While President Zeleynskyy is constantly outputting strong messages of Ukrainian Nationalism and a call to arms to defend their lands, these deliberate Russian attacks on the ecosystems of Ukraine weaponize the forests and wildlife against Ukraine in both the short and long term in distinct ways. The slowly violent damages to ecosystems are much longer lasting, hard to abate, and will in turn transform the exports of Ukraine. Through the destruction of farmlands possessing rich and fertile soil, what was once labeled the "breadbasket" of Europe and elsewhere, will now transform to center its economic activities around industrialism which will further degrade the environment of Ukraine and contribute to global climate change in the long run.

Nuclear and Chemical Plants

Instantaneous Violence -

The presence of power plants throughout Ukraine was already a subject of concern when the war began, but these concerns were exacerbated as Russians showed little caution when detonating explosives and carrying out immediately destructive military operations in close proximity to various plants. The Russian forces seem to disregard the risky nature of disrupting any of the 15 nuclear power plants situated across Ukraine. In the first days of the conflict, Russian forces entered the Chernobyl site, shutting down the radiation monitoring systems through their conquest for two days. This reckless action in nuclear sites that are extremely precarious and require constant gamma radiation readings, shows the myopic approach military

commanders have towards this invasion as the risks of fighting in proximity to the Chernobyl site and the functioning Zaporizhzhya Nuclear Power Plant does not only pose major threats (the release of radioactive waste, and the risk of reactor imbalancement) to the environment of Ukraine and its neighbors (Russia included), but to the rest of Europe as a whole.[102] Residents of the northern town of Novoselitsa were told to seek shelter after an ammonia leak at a nearby chemical factory, as intense fighting with Russian forces in the area continues. The Sumy regional governor says the area within a 5km radius around the ammonia plant is hazardous. Residents were told to seek refuge in basements or on lower levels of buildings to avoid exposure, and if ammonia is detected, to breathe through gauze bandages soaked in citric acid.[103] The effects of these chemical leaks will severely affect those exposed to its toxicity, in the worst-case causing death.

Slow Violence -

There are other cases where exposure to these kinds of toxins can take root in humans in the form of chronic illnesses with the potential of being passed down genetically. These sorts of ramifications are slowly violent as they have the potential to persist for generations after being initially exposed. Radiation and thermal energy exposure from conflict taking place around chemical and nuclear plants work synergistically to induce higher mortality rates.[104] When armed combat takes place around plants, acute radiation exposure results in tissue degradation and death under sufficiently high radioactivity levels which are increased through leakages due to

[102] Weir, Doug. “Environmental Trends in the Ukraine Conflict, 10 Days In.” CEOBS, March 7, 2022.
[103] Al Jazeera. “Ukrainian Town Told to Shelter after 'Leak' at Ammonia Plant.” Russia-Ukraine war News | Al Jazeera. Al Jazeera, March 21, 2022.
[104] Lawrence, Michael J., Holly L.J. Stemberger, Aaron J. Zolderdo, Daniel P. Struthers, and Steven J. Cooke. “The Effects of Modern War and Military Activities on Biodiversity and the Environment.” *Environmental Reviews* 23, no. 4 (December 2015). (pp. 450-451)

damaged infrastructure. These effects could represent a substantial source of mortality following a weapon detonation on ecosystems on an acute time scale. Radioactive exposure also lends itself to more chronic impacts on animal populations. Ukrainians exposed to nuclear weapon emissions have shown an elevation in the rates and risk level of developing a chronic disease, such as neoplasia. It is expected to significantly reduce life expectancies and survival in humans and wild animals alike.[105] These negative potential externalities are particularly damaging as instead of instantaneously afflicting the people present for the initial violence, the slowly violent damages could propagate in the form of a chronic genetic illness for the generations of people whose ancestors were caught in the line of fire during the Russian invasion of Ukraine.

Soils

The extensive adverse effects of military activities on the soils of Ukraine directly affect the economic industry of Ukraine and their immediate access to food, as well as through slowly violent ways, cut off the future societal industry and access to food. Ukraine has been known as the "breadbasket of Europe" and was among the top five grain exporting countries in the world prior to Russia's invasion. The Ukrainian landscape holds a globally notorious fertile soil called *chernozem*, which is a rich black soil with a lighter lime rich layer beneath the topsoil that is perfectly conducive to grain growth. The Ukrainian people rely upon this grain growth not only for monetary reasons through export, but also as sustenance for these people.

Instantaneous Violence -

[105] Ibid

Military actions, especially those that involve the detonation of explosives are most immediately harmful to the soil. “Bombturbation” is the term associated with soil disturbances caused by grenades and bombs, missile strikes, as well as other excavation practices which destroy soil horizons and especially the topsoil. The image below (figure 5)[106] shows a section of fields sown with winter crops in the Kharkiv region with its area approximately one km². experts of the Ukrainian Nature Conservation Group, counted 480 funnels from shells.

As a result of the shelling, the flat surface of the field is damaged, missile fragments fall into the soil, and toxic gasses are released into the atmosphere that unfold their effects in slowly violent ways, differing from the immediate soil and landscape morphology as a result of the blast.

Slow Violence -

Soil pollution is an example of the kind of slow violence that occurs over long-time horizons in armed conflicts. The abandonment of ammunition and other unexploded ordinances will cause widespread irreversible damage as they will continue to deposit toxic chemicals into

[106] “Munitions and Chemicals: How Does War Damage Soils, and What Are the Solutions?” *Ecorubric*, July 15, 2022.

the soils and water until they are removed or detonated.[107] Contained within them are radioactive elements, heavy metals, dioxins from herbicides, and polycyclic aromatic hydrocarbons whose runoff is incredibly toxic to the landscapes.[108] These are some of the toxins that will lie within the ecosystems of Ukraine, seemingly dormant, until unpredictable issues with soil nutrients and tree growth are recognized and understood years after the conflict has ceased. Fragments of projectiles like ammunition casings are made of cast iron alloy. If the fragments remain in the ground, over time, they begin to oxidize, enter the cycle of environmental substances, and enter food chains. In addition, some of the munitions have elements made using depleted uranium. According to calculations taken from a study by the Ukrainian Nature Conservation Group, 50 tons of iron, 1 ton of sulfur compounds, and 2.35 tons of copper got into the soil because of the shelling of just one square kilometer of the field in the Kharkiv region—these are only the substances with the highest content.[109]

While the overall impacts on the soil and its morphology in Ukraine are constantly unfolding and worsening by the day, to date there is already much evidence to the sorts of bombturbation that has detrimentally damaged the soils of Ukraine for years to come. One-third of the world's chernozem soil is located in Ukraine, which contributes to their mass domestic growth and international export of grain. By collaterally damaging these soils, Russia is weaponizing the destruction of fertile landscape in two separate ways: they are not only inhibiting Ukraine's ability to maintain their international exports, but also the citizens' access to grain-based foods in general. In the long term, the destruction of this soil will shift the

[107] Environmental Damages Due to War in Ukraine: A Perspective." *Science of The Total Environment* 850 (December 1, 2023): (pp. 3)
[108] Pereira, Paulo, Ferdo Bašić, Igor Bogunovic, and Damia Barcelo. "Russian-Ukrainian War Impacts the Total Environment." *Science of The Total Environment* 837 (September 1, 2022): 155865. (pp. 4)
[109] Ibid

industry of Ukraine from one of farming to those of factories that will further contribute towards global climate change. This is another example of the Russian strategy of cutting off essential items of sustenance, not only from the Ukrainians that are fighting on the ground, but also from the Ukrainians that are stuck in the line of fire and unable to flee the conflict. These efforts are made to physically weaken the people of Ukraine, as well as spiritually break them into submission. While the destruction from Russian shelling was an expected consequence at the start of the war, the Russians have shown that their shelling of soils is deliberate and seeks to inflict long term consequences of spoiling the country's main export while simultaneously limiting food supply to Ukrainians in the short term.

Weather

Lastly, Russia is weaponizing the weather in their strategy towards the conquest of Ukraine. While cloud-seeding technology used to literally alter weather patterns for a variety of military tactics was officially banned from wartime practice in the wake of the Vietnam War, the Russians have had displayed little reluctance in other prohibited wartime engagements; specifically by making the lives of Ukrainians as untenable as possible through depriving them of basic necessities to survive the country's harsh winter months.[110] The banned cloud seeding technology was one that did inflict slow violence on the climate of Vietnam and fortunately the Russian have not employed it thus far. As a result, the weaponization of the climate in this conflict has shown only instantaneously violent effects for the people and armed forces of Ukraine.

[110] "Ukraine: Russian Attacks on Energy Grid Threaten Civilians." *Human Rights Watch*, December 12, 2022.

Instantaneous Violence -

The main way in which the weather is weaponized in this conflict is through the indirect means of expanding its attacks on civilian infrastructure in order to allow the harsh climate of the Ukrainian winter to take hold on not only the Ukrainian forces, but on the civilians stuck in battle ridden regions. While many Ukrainians welcome winter as it marks the approach of Christmas and snow time activities like skating and other snow-based recreation, the enjoyment of these winter pleasures has been overpowered by their increasing lack of protection against the dropping temperatures. Due to missile blasts many people's homes have broken windows, and even more concerning is the Russians' concerted effort of restricting civilian access to electricity, simultaneously restricting their access to heated water and homes. This is an example of Russia's strategic deprivation of Ukraine's ability to move energy and simultaneous neglect of the laws of war that prohibit this method of attack.

Targeting objects indispensable to the survival of civilian populations with the primary purpose of spreading terror among people shows blatant disregard of the laws and harm they are including among non-combatants.[111] Since the start of the war the health systems of the country have been increasingly overstretched, and in small towns all over central and eastern Ukraine, electricity is intermittent and constantly being threatened by long range missile and drone strikes which are now commonplace occurrences for people who remained in these contested towns. In November of 2022, the Ukraine energy ministry stated, "Russia tries to destroy all of the energy supply chains. Generating facilities – especially thermal power plants – distribution systems and power lines." As of October 2022, Russian attacks have damaged approximately 40% of the country's thermal generating capacity. Renewable energy sources were also targeted with 90%

[111] Ibid

and 40% of wind and solar power sources either under occupation or damaged respectively.[112] Reported over the course of October and November 2022, there were 92 individual attacks on Ukrainian energy infrastructure equating to almost 11 million household power disruptions across the country. There is a significant lag in restoration repair times, and further concerns stem from the fact of the interconnectedness of Ukrainian infrastructure as further strikes in quick succession threaten an uncontrolled blackout in larger regions of Ukraine, that would take at least three days to bring back online.[113]

This terroristic approach towards energy is a Russian attempt to create a humanitarian crisis in the midst of an already time and energy intensive conflict. Millions of Ukrainians are turning to firewood to heat their homes, which is causing further environmental disruption perpetuated by the Ukrainians themselves. Since the start of the war the Ukrainian Environmental Ministry has sent numerous warnings on the prohibition of unpermitted logging. Their need to protect forests from civilian disruptions is heightened as the effects of increased civilian clearing of forests are compounded by the ongoing destruction of forests as a result of war activity. The government has moved to supply people with imported firewood to disincentivize unpermitted logging. When these wood imports become unavailable, however, many will be forced to turn to burning combustible household objects like books in order to heat homes perpetually afflicted with blackout periods.

While it is hard to tell whether the Russian thought of this consequence of widespread unpermitted logging through their targeting of heating and energy infrastructure, it shows another way in which the immediate consequences of Russian attacks manifest themselves in

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[112] Rott, Nathan, Claire Harbage, and Hanna Palamarenko. “How Russia Is Weaponizing the Ukrainian Winter.” *NPR*. NPR, November 20, 2022.
[113] “Ukraine: Russian Attacks on Energy Grid Threaten Civilians.” *Human Rights Watch*, December 12, 2022.

long term ones that will take a long and heavy toll on the environments of Ukraine if proper cleanup efforts in the aftermath of the war are not enacted.

Conclusion

The extreme hardships millions of Ukrainians are currently facing as a consequence of the war captures most people's attention when thinking about and being reminded of the conflict. This is not a new phenomenon, as humans are most struck by armed conflicts in the way that they can relate to or imagine themselves in, upon hearing stories of these experiences. During ongoing conflicts, most of the conversations and records that come out of them have an anthropocentric focus with figures on human casualties, displacements, and civilian infrastructure destruction. With the increasing international attention and measures taken to decrease climate change, this anthropocentric notion of wartime damages is changing to include a wider perspective that interprets harm towards voiceless, non-human entities alongside those of humans. These non-human, environmental considerations are indispensable especially within the context of warfare, as wartime activities have caused among the worst instances of environmental degradation that have rendered entire regions uninhabitable for any forms of life.

This thesis tells an important side of the story of the war in Ukraine, especially since the aggressors of the conflict have shown little to no sustainability considerations in their invasion and have further targeted and weaponized elements of the environment of Ukraine to bolster their position in their conquest. The background gave insight into the ways in which Russian and Ukrainian identities have overlapped as well as distinctly diverged, and further explained the nation's adoption of the prevailing Ukrainian nationalist agenda instilled by President Zelensky and the rest of the Ukrainian government since the 2014 annexation. By applying the conceptual frameworks of violence that take root over varying time horizons, as well as environmental strategy and weaponization from previous wars to the reports made in Ukraine over the first year of the Russian invasion, I analyzed a variety of environmental considerations within the context

of war. This yielded identification of five main environmental elements involved in Russian military strategy through both deliberate targeting and weaponization. Violence towards water, ecosystems – forests and biodiversity –, soils, ecosystems surrounding nuclear and chemical power plants, and weather carried out in the short and long term comprised the subsections of both the literature review and the discussion. These specific elements spotlighted the varying approaches of both strategic and tactical, deprivation and inundation of environmental elements, with the Russian motivations, in many cases, stemming from the objective of restricting Ukrainian access to basic human necessities. Particularly with regard to Russia's deprivation of drinking water and energy flow from both the armed forces and everyday civilians of Ukraine, Russia is weaponizing water and weather in their charge to break the will of Ukrainians by inhibiting their health, spirit, and resilience towards resistance.

Thus far, the Russian offensive has become a slog, and in the borderlands, it has been a war of attrition, while strengthening the nationalism and unity of Ukrainians and corralling the support of their Western allies. While speaking about the Russia-Ukraine conflict, U.S. Secretary of State Antony Blinken said, "Winning a battle is not winning the war. Taking a city does not mean Vladimir Putin's taking the hearts and minds of the Ukrainian people. On the contrary, he is destined to lose."[114] With each missile that strikes an innocent family or destroys the power grid for an entire town, Putin is alienating Ukrainians from Russians and driving them closer together to unite by any means against the imposing Russian forces, airstrikes, and occupations.

After the first few days of the Russia invasion of February 2022, war historians and military scholars alike speculated on the trajectory of the conflict saying that Russian forces will have taken over Kyiv in as soon as a couple weeks to a couple months. Almost 14 months later,

[114] Byrne, Fionn. "How Countries Weaponize Landscape Design in War - Fast Company." *Fast Company*, May 16, 2022.

the conflict seemingly has no end in sight in terms of strength of forces. This is a testament to the bravery and sacrifice Ukrainians are making for the freedom of their country, as well as the immense monetary, military, and industrial support NATO allies have delivered to Ukraine. Even so, the biggest threat to Ukraine losing their hold is if the support from allies in the form of long-range missiles and ammunition dries up.

The extension of the war's timeline to an indefinite one takes an extreme toll on the people caught in the conflict (both fighting armed forces and civilians alike), but also on the voiceless environmental elements of Ukraine whose damages are increasing by the day. While this thesis highlighted the precarious nature of water, ecosystems, soils, power plants, and weather in association to the conflict, all aspects of the Ukrainian environment are under massive threat as long as the war persists, especially if the Russian means of warfare are made increasingly violent and damaging. In WWII, the United States saw it as a necessary evil means to end the war on the Pacific front by dropping atomic bombs on Japan, and although it's hard to believe Russia would use nuclear weapons in the conflict due to their close proximity to Ukraine, it's impossible to know what kind of catalyst would prompt anyone to use such immensely devastating and world altering weapons. What is for certain is that the longer the conflict extends, the immediate damages that come as a result of Russia's deliberate targeting and weaponization of the environment will also manifest itself into slowly violent ecological scars that will persist and will be experienced by generations of Ukrainians to come.

To fully consider the environmental consequences of war then the people who possess the power to make influential decisions on these armed conflicts must be simultaneously cognizant of the damages that present themselves in the long term and well as the short. Oftentimes the slowly violent consequences come as a secondary, and at times, worse

consequences than the immediate ones, as their damages have the power to render environments indefinitely inhabitable for all kinds of life. Rob Nixon's theoretical framework of slow violence has been increasingly applied to environmentally degrading circumstances such as war, but has been heavily associated with the veiled, unintended, and neglected consequences of these conflicts. The significance of the slow violence highlighted in this thesis is that its damage has been calculated and deliberately induced. Conflicts from the Persian Gulf War to today's ongoing war in Ukraine are prime examples of this deliberate infliction of slow violence, and thus the nations and people making these decisions must be held accountable for their actions whose effects will only show years on from the initial damage.

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