UNIVERZITA KARLOVA

CHARLES UNIVERSITY

FACULTY OF SOCIAL SCIENCES

Institute of Political Studies

Department of Political Science

Bachelor's Thesis

2024 **Mariami Gavasheli**

CHARLES UNIVERSITY

FACULTY OF SOCIAL SCIENCES

Institute of Political Studies

Department of Political Science

"Come War or High Water": Investigating the Weaponization of Water through Manipulation of Dams in the Russia-Ukraine War (2014-2023)

Bachelor's Thesis

Author of the Thesis: Mariami Gavasheli

Study programme: Politics, Philosophy, and Economics

Supervisor: Mgr. Eliška Pohnerová

Year of the defence: 2024

Declaration

1. I hereby declare that I have compiled this thesis using the listed literature and resources only.
2. I hereby declare that my thesis has not been used to gain any other academic title.
3. I fully agree to my work being used for study and scientific purposes.

In Prague on 30.04.2024 Mariami Gavasheli

References

Gavasheli, Mariami. (2024). "*Come War or High Water": Investigating the Weaponization of Water through Manipulation of Dams in the Russia-Ukraine War (2014-2023)".* [Unpublished Bachelor's Thesis]. Charles University.

Length of the Thesis: 71,451 characters with spaces; 10,550 words.

Abstract

This thesis delves into the multifaceted dynamics of turning water infrastructures, particularly dams, into weapons within the context of the ongoing war between Russia and Ukraine. Through a comprehensive examination and analysis of dam destructions, blockages and breaches the study investigates the specific case studies where both parties opted for water weaponization as a part of their warfare strategy, whether it was offensive or defensive manner. The thesis sheds light on how such military weaponization of natural resources and their infrastructures accelerated the conflict dynamics. The acceleration of conflict in this thesis is measured by the military advancement gained by "weaponisor". Additionally, to acceleration the thesis explores the potential backlash effects on both countries and evaluates consequent implications caused within the International Humanitarian Law framework (IHL). The thesis aims to contribute to a deeper comprehension of the complexities surrounding water weaponization in the modern warfare and its ramifications for international legal, environmental, and military frameworks.

Abstrakt

Tato práce se zabývá mnohotvárnou dynamikou přeměny vodní infrastruktury, zejména přehrad, ve zbraně v kontextu probíhající války mezi Ruskem a Ukrajinou. Prostřednictvím komplexního zkoumání a analýzy destrukcí, blokád a narušení přehrad zkoumá studie konkrétní případové studie, v nichž se obě strany rozhodly pro zbrojení vodou jako součást své válečné strategie, ať už šlo o ofenzivní, nebo defenzivní způsob. Práce osvětluje, jak takové vojenské vyzbrojování přírodních zdrojů a jejich infrastruktury urychlilo dynamiku konfliktu. Urychlení konfliktu je v této práci měřeno vojenským pokrokem, který zbrojení získalo. Kromě toho k urychlení práce zkoumá potenciální zpětné účinky na obě země a hodnotí následné důsledky způsobené v rámci mezinárodního humanitárního práva (MHP). Cílem práce je přispět k hlubšímu pochopení složitostí obklopujících vyzbrojování vodou v moderním válčení a jeho důsledků pro mezinárodní právní, environmentální a vojenský rámec.

Keywords

Water weaponization, dams, Russia, Ukraine, USSR, strategic tool.

Název práce

“Come War or High Water “: Vyšetřování zbrojení vody prostřednictvím manipulace přehrad v rusko-ukrajinské válce (2014-2023)

Acknowledgement

I would like to express my gratitude to my supervisor, Mgr. Eliška Pohnerová for her invaluable support throughout this journey. Her guidance and dedication to the themes explored in my thesis have played pivotal role in shaping my research in the most comprehensive and impactful manner possible.

Table of Contents

Introduction

Water, a cornerstone element of humanity, has historically played a pivotal role in shaping both basic human needs and fostering development. Encompassing 71% of Earth's surface, water's distribution is starkly disparate: 97.2% resides in oceans, leaving a mere fraction to glaciers, groundwater, lakes, streams, wetlands, and swamps. Freshwater, the lifeblood of countless organisms, accounts for 2.8% of water on Earth (USGS, 2019). This paradoxical abundance juxtaposed with scarcity motivated the global community to enshrine the human right to water in 2010, stating that: "the human right to water entitles everyone to sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic uses" (UN Committee, 2002). In the global climate of the modern era the "water problems" encompassing water scarcity and pollution have been placed as a crucial topic on the international agenda. Despite its pivotal role in sustaining life and scarcity, water has also been wielded as a weapon throughout history, with dams emerging as strategic targets in times of conflict. Thus, the rational use and protection of water resources remains as the today's most acute and complex problems.

Water has been employed by humanity to destroy and contaminate it over and over again throughout history whether in ancient Mesopotamia or wartime Europe during the Second World War (WWII). The dynamics of conflict evolve, simultaneously challenges related to water problems and environmental concerns grow; water reflects the extent to which war ideologies lead humanity. Armed conflicts, disruptive by nature, weaken the social-ecological systems essential for meeting the basic needs of societies. Water resources often become targets in armed conflicts, and the destruction of water infrastructure and contamination of water sources can lead to dire

consequences for civilian populations (Schillinger et al., 2020). The toll of conflicts on water systems is particularly severe, with war actors leveraging their power over water infrastructure to gain ground in combat. This deliberate manipulation of water resources exacerbates the detrimental effects on humankind. The weaponization of water and the caused danger inflicted upon water infrastructures persist in a manner that are diffuse, less publicized, and challenging to quantify. Dams, in particular, hold immense strategic value due to their ability to control water resources, regulate floods, and generate hydroelectric power. The deliberate targeting of dams in armed conflict represents a calculated attempt to undermine the enemy's infrastructure and achieve military means.

Today's ongoing conflict between Russia and Ukraine, which has escalated into war since 2022, stands as the most significant confrontation in Europe in recent history. Beginning in 2014, this conflict has exerted profound effects on geopolitics, the economy, infrastructure, and the environment on a global scale. Zooming out from this geopolitical conflict, wars worldwide have had far-reaching impacts on the various aspects of society, be it natural world, the economic systems, international trade, and individual's livelihoods. These consequences are manifested in increased expenses, unsustainable economic expansion, and persistent fluctuations in macroeconomic conditions. Furthermore, stemming from geographical and conflict-related risks the neighboring nations and trading partners also experience uncertanties (Khudaykulova et al., 2022).

Amidst the current focus on immediate and catastrophic events, the long-term repercussions of violence tend to be less important than an immediate military utility. The

oversight of long-term, lasting impacts of warfare techniques such as water weaponization, which also harm the aggressor and have the potential to backfire, underscored the need to broaden our understanding beyond immediate military gap. This thesis seeks to address this gap by examining indices of water weaponization recorded during the Russia-Ukraine conflict, with a specific focus on dam explosions. Thus, the thesis poses the question of how the utilization of water as a weapon accelerated the conflict between Russia and Ukraine. Acceleration in this context refers to the progression in gaining tactical advantages and attaining territorial or strategic goals. This research is juxtaposed with the opposition to the drawbacks the same water weaponization cases caused, such as restoration costs for Ukraine or complications in water supplying for Russia. These inquiries are achieved by reading across disciplines, reading daily updates, and bringing news reports on the current conflict with a broader idea of warfare and water weaponization, the thesis explores how the weaponization of water accelerates the ongoing conflict. This analysis will be conducted within the framework of International Humanitarian Law (IHL), which provides critical guidance on protecting civilian populations and essential infrastructure during armed conflicts and its implications for conflict escalation.

The thesis will be structured as follows, after the introduction to the problematics of water weaponization, which is essential to comprehend the way water is utilized in violent manner, the research proceeds with laying grounds for understanding the theoretical framework IHL. This framework serves as the lens through which the subsequent case studies and their analyses will be examined. Furthemore, the evolution of conflict into warfare will be explored, with a specific focus on the Scorched Earth Policy – a long-standing military strategy employed by the USSR involving the destruction and weaponization of natural resources to achieve military means. Lastly, the thesis

will delve into the analysis of four case studies – two from Ukraine and two from Russia – examining closely them from the perspectives of IHL compliance, military gains of the weaponisor and the following backfire and repercussions of weaponization on the "weaponisor".

Chapter 1 - Literature Review

1.1. Defining Water Weaponization

The utilization of water and its infrastructure remains a long-standing form of violence used during warfare. A weapon, fundamentally, refers to "a means of contending against another" (Merriam-Webster, 2019). A weapon wielded by war actors' manifests in diverse forms and through various means. The concept of using water as a weapon or in other words, water weaponization, entails the exploitation of human need for water by deliberately rendering water infrastructures causing terror, and advancing strategic goals (King & Hardy, 2023).

Historical records trace instances of water weaponization back to the ancient Mesopotamian civilization 2500 years ago (Travis, 2024). In early 1503, Leonardo da Vinci alongside Niccolo Machiavelli had an unsuccessful attempt to divert the Pisa's lifeline, the Arno River away from Florence's rival city. This would deprive Pisa of access to the sea and block the principal water source (Isbouts, 2018). During World War II operation "Chastise" led by Royal Air Force Squadron 617 also known as "American Dam busters" destroyed three German-controlled dams (IWM, n.d.). In May 1943, the British Royal Air Force (RAF) bombed dams on the Möhne, Sorpe, and Eder rivers in Germany, which killed more than 1000 people and caused massive downstream flooding. Followed by a 1944 instance of German troops destroying several

dams on the Liri River in Italy to flood territory occupied by Allied troops (Geissler & Guillemin, 2010). A few centuries later, the destruction of water infrastructure as a war strategy still continues to thrive. The so-called Islamic State (IS) has been using water as a weapon to achieve its political aims by gaining control over dams on the Euphrates and Tigris, leading to manipulation of the water resources (von Lossow, 2016). The practice of water weaponization has continued through this day - all while climate change puts a high stress on water resources.

Despite its historical significance, water weaponization remains an under-researched topic. The foundational framework for exploring water weaponization stems from Chalecki's (2002) environmental resources abuse research as she differentiated between ecocide, environmental terrorism, and environmental warfare. Environmental terrorism encircles the unlawful use of force against environmental resources to deprive populations of their benefits or the destruction of property. Environmental warfare refers to the deliberate destruction, exploitation, or any manner of modification of the environment, where resources become the subject of the military strategy. Ecocide focuses on the long-term irreversible effects that unlawful environmental deliberate harm may cause. Such a manner of definitions provided the foundation for conceptualizing water weaponization, introducing a framework, where resources could function either as a means or as objectives in conflict scenarios. When employed as a tool, resources transform, becoming the weapon itself, whereas acting as targets leads to indirect effects on consumers of water sources. Water, alongside other resources, can be adaptable to both roles (Chalecki, 2002).

Building upon this foundation, Von Lossow (2016a) expanded the concept of water weaponization by highlighting the vulnerability of various water infrastructure components to

military violence and destruction. This includes treatment plants, piping systems, pumping stations, and reservoirs, which can all be targeted to disrupt essential services. On the other hand, the strategic use of water as a weapon extends beyond physical infrastructure attacks. Von Lossow emphasizes that water can serve as a means to exert pressure on society and political leaders, with actions aimed at undermining resistance, coercing support, or disrupting vital sectors like agriculture and food production. Control over water resources, particularly rivers, holds significant strategic importance in conflict scenarios. Military actors can impact distant regions without direct occupation by exerting influence over upstream water sources. Von Lossow identifies three primary methods of water weaponization: restricting availability, increasing abundance, or compromising water quality. These strategies have been consistently employed by groups like IS, resulting in far-reaching impacts at local, regional, and national levels (Von Lossow, 2016b).

Stemming from Gleick's (1993) search on water weaponization typology, Gleick analysed the multifaceted nature of water weaponization based on the Pacific Institute Water Conflict chronology research (Pacific Institute, 2018). This characterization of the integrated methodologies group follows in this manner:

Military Tool: A nation or state employs water resources or systems as a strategic tool or weapon during military action.

Military target: water resources or systems become objectives of military strategies carried out by nations or targets.

Terrorism or domestic violence, including cyberterrorism: Nonstate actors target water resources or systems as tools for violence or coercion.

Development dispute: Water resources or systems emerge as significant sources of contention and dispute within the economic and social development context.

Based on this "database" Gleick & Shimbaku (2023) analysed the water conflicts in the framework of water as a trigger, weapon, and causality. Water can serve as a trigger when conflicts arise due to scarcity, or physical or economic lack of water driven by political or ideological motives. Then water or water infrastructure is used as a weapon, where water itself is weaponized to inflict harm on the population and serve military purposes. Gleick's interpretation of the water utilized as a weapon emphasizes the restrictive nature of water as a weapon and the limitation of applying it to specific contexts where water serves as the tool of warfare. Lastly, water as casualty refers to resources or systems that water provides that are shaped into intentional "casualties of conflict" or targets of violence. This encompasses attacks on civilian objects, whether they are intended targets or suffer collateral damage.

Following the water in the conflict, Zeitoun (2014, pp. 55-59) in "Understanding our use and abuse of Water" explores water as a tool of war, where weaponized water becomes a tactic to win the war and assist in hiding atrocities, flood enemy lines, or lure villains into crosshairs. In a more strategic sense, water can also be used to clear the killing fields or conquer the territory. Whether water weaponization is manifested in one form or another Zeitoun points out that "people turn on themselves in the cruel biosphere of war, when cowardly men use water and their skills to

kill the desperate from so far away" (p. 58) and to achieve one's objectives using water as a tool becomes intentional strategic or tactical military move.

The latest classification of water weaponization belongs to King & Hardy (2023), who divided it into a six-category matrix. The matrix conveys the compounding effects of the concept and points out its power to drive instability across different spectrums. Table 1 conveys the dimensions of water weaponization and differentiates between the strategic, tactical, coercive, unintentional, and instrument of psychological, and instrument of extortion or incentivization weaponization of water.

Table 1: Dimensions of Water Weaponization

Source: King & Hardy, (2023), Water Weaponization: Its Forms, Its Use in the Russia-Ukraine War, and What to Do About It.

Strategic W.	The use of water to destroy large or important areas, targets, populations, or infrastructure
Tactical W	The use of water against targets of strictly military value within the battlespace
Coercive W	The use of water provision to fund territorial administration or weapons acquisition with aspirations of achieving legitimacy
Unintentional W.	Attempted water weaponization causes collateral damage to the environment or its human component
Instrument of Psychological Terror	The use of the threat of denial of access or purposeful contamination of the water supply to create fear among non-combatants
Instrument of Extortion or Incentivization	The use of water provision to reward the behaviour of subject populations and support the legitimacy of the perpetrator

1.2. Water Weaponization and Dams

Dams, as critical components of water infrastructure, hold particular significance within the realm of water weaponization. Serving means such as flood mitigation, water provision, hydroelectricity generation, recreational activities, and beyond, more than 45,000 dams are approximated to exist (Hjorth & Bengtsson, 2012). Their significance determines dams' potential to inflict serious damage on adversaries, therefore, dams often become targets during conflicts. Throughout history, controlling dams has been a strategic objective in conflicts stemming from their ability to regulate water flow, supply, and distribution. The dam demolition or manipulation has the power to disrupt water supplies, cause flooding, and disrupt essential services, thereby endangering the stability and resilience of targeted populations.

Conversely, dams can also be used as coercion by the military forces seeking to exert control over territories or populations. Through controlling dams and regulating water flow, military forces can manipulate agricultural production, disrupt economic activities, or coerce civilian populations into compliance. This tactic exploits communities' dependence on water resources, leveraging access to water to exert power and influence. Following King and Hardy's characterization of water weaponization, this would classify as a coercive use of dams, which exploits communities' dependence on water resources, leveraging access to water as a means to exert power and influence. Using dams as tools for warfare can be also categorized as strategic or tactical weaponization depending on the circumstances. In specific tactical situations, dams can be weaponized to achieve immediate military objectives. Strategic utilization would involve the deliberate destruction of dams to achieve broader means, for instance, disrupting enemy

infrastructure or taking control of water resources to gain territorial advantage. As for tactical use, it may involve the targeted destruction of dams during military operations to create certain obstacles such as flooding enemy positions and making an impact on battlefield dynamics.

Whichever form water weaponization will take, the consequences of the utilization of water infrastructures raise ethical, humanitarian, and legal concerns regarding the protection of civilian infrastructure and the prohibition of attacks on essential services. Additionally, targeting dams can have severe environmental consequences such as dam destruction leading to flooding, displacement of populations, destruction of ecosystems, and overall worsening of the humanitarian crisis in conflict-affected areas. Water supply distribution can also result in shortages of potable water, sanitation issues, and increased risk of waterborne disease, further compounding challenges faced by affected communities (UN, 2023).

The literature on the nature resource weaponization in particular water weaponization through utilizing the infrastructure that holds this vital resource is lacking the perspective of the military dimension. The usual approach to the weaponization is from environmental security paradigm where the silent victim of the war, environment, is put at the centre and showcases how already existing problems such as climate change or water stress contributes to conflicts and green military should be integrated (Bigger & Neimark, 2017). This thesis addresses the gap of how water weaponization itself can turn into a strategic military tactic, since it has the power to backfire. Furthermore, the existing research tends to typically overlook military perspective of the infrastructure weaponization as it is not traditional warfare tool, consequently, it requires more prudent approach when/if water infrastructures are turned into a weapon. This thesis looks into

this gap as well as addresses how in military, environmental, post-war reconstruction and legal sense “harm” by weaponizing dams is inflicted on both the victim and “weaponisor”.

Chapter 2 - Theoretical Framework

Water, as a fundamental resource, constitutes a web of interconnected casualties that engage cultural, political, and social dynamics, especially in times of armed conflict. Water stress has already been identified as a security matter by CNA’s Military Advisory Board, which claimed that “access to vital resources, primarily food, and water, can be an additional causative factor of conflicts” (CNA, 2007). Competition to access water resources can intensify grievances and lead to violence, including insurgencies against governing authorities. The weaponization of dams exacerbates water stress, as control over vital water infrastructure becomes a strategic objective for warring parties. This escalation in water-related hostilities highlights the urgent need for robust frameworks to safeguard civilians and essential infrastructure during armed conflicts. Multifaceted implications of water weaponization, particularly related to dams, sheds light on the crucial aspect of addressing these challenges, which require a comprehensive understanding of the legal and ethical frameworks governing armed conflict.

The IHL provides a critical framework addressing water stress and underscores the ethical and legal dimensions of water-related conflicts. Rather than merely defining water stress as a causality, IHL emphasizes the protection of civilian populations and essential infrastructure during armed conflicts. Adherence to IHL principles becomes imperative in mitigating the humanitarian consequences of water-related hostilities and safeguarding civilian populations from the devastating impacts of water weaponization.

The IHL seeks to impose certain limitations on the destruction and suffering caused by armed conflict through its principles of distinction between civilians and combatants, and between civilian objects and military objectives, the principle of proportionality, and the principle of military necessity. The first distinction principle is a cornerstone of IHL and prohibits altogether any attack on civilians and civilian infrastructures. As for the principle of proportionality it is codified in Article 51(5)(b) of the 1977 Additional Protocol I, which reflects customary international law, and states that attacks should be prohibited if:"(it) may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive concerning the concrete and direct military advantage anticipated"(ICRC, Study on Customary International Humanitarian Law, 2005, Rule 14). Lastly, the principle of military necessity requires that a party of an armed conflict to only resort to the "destructive" methods if achieving the means serve the legitimate purpose.

These principles are grounded in the international efforts to protect the natural environment in times of war. Deriving from them, stems the water protection rules and regulations which underwent several stages over time. Before these efforts, Article 23 (g) of the fourth Hague Convention allowed the destruction of the enemy's property under "special" circumstances: "imperatively demanded by the necessities of the war" (Article 23(g)), nevertheless, after the WWII the alternation of specific legal frameworks led to Geneva Protocols of 1997, particularly, Article 51 (2), which emphasized that targeting civilian populations is prohibited under any occasion.

As for the infrastructure itself, Article 56 of Protocol I and Article 15 of Article II of the 1977 Protocols to the Geneva Conventions prohibit attacks on the infrastructure and explicitly address the protection of water contaminations, such as dams and states that:

"Works or installations containing dangerous forces, namely dams, dykes, and nuclear electrical generating stations, shall not be made the object of attack, even where these objects are military objectives if such attack may cause the release of dangerous forces and consequent severe losses among the civilian population. Other military objectives located at or in the vicinity of these works or installations shall not be made the object of attack if such attack may cause the release of dangerous forces from the works or installations and consequent severe losses among the civilian population" (Article 15).

The article also articulates in which cases should Article 56 (I) should cease: "(a) for a dam or a dyke only if it is used for other than its normal function and in regular, significant and direct support of military operations and if such attack is the only feasible way to terminate such support". The article consolidated regulations governing the safeguarding of water infrastructures within the realism of IHL.

The protection of water systems in IHL is principally grounded in the essential human requirement of water and sanitation, crucial for human rights health, and food security, constituting indispensable elements for civilian survival. Dams and dikes are identified as water contamination systems harboring hazardous potential since their destruction could significantly harm civilian populations. Thus, attacking such structures is almost universally prohibited. Water resources and other environmental elements are categorized as civilian entities under IHL, affording them the same safeguarding as civilian populations (Tignino & Sjöstedt, 2020).

By referencing IHL, this thesis acknowledges the legal imperative to safeguard dam infrastructures and mitigate the humanitarian consequences of their destruction in armed conflicts. It delves into the intricate role of water infrastructures within the conflict dimensions, striving to mitigate the reverberating effects of mankind stemming from parties deploying water resources for their destructive potential. Water, with its dual capacity to serve as both a means and a method of warfare, underscores the imperative for protective measures to safeguard humans. Through the IHL lens, efforts are directed toward curtailing the indiscriminate harm inflicted by the weaponization of water.

Furthermore, the analytical framework of IHL offers avenues for comprehensively evaluating the multifaceted impacts of water stress caused by water weaponization. By integrating sectoral models and considering diverse spatial scales, such a framework can shed light on the how international arena can safeguard the water infrastructures from turning into part of the military strategy.

The weaponization of water, particularly through strategic targeting of dams, despite having a “positive” military acceleration effect for the “aggressor” in that time moment, in the long-term it has tendency of further contributing to warfare. Within this framework, IHL emerges as a crucial guiding principle, and by adhering to its principles, parties involved (Russia and Ukraine) in armed conflict can mitigate the devastating impacts of water-related hostilities, safeguarding civilians, and essential infrastructures.

In light of these considerations, this thesis will delve into the specific dynamics of dam warfare within the context of the Russia-Ukraine conflict. By focusing on dams as strategic targets

and applying the IHL framework, this study aims to contribute to a deeper comprehension of the complexities of armed conflicts and the imperative of protecting critical infrastructure, particularly dams, in conflict zones. Furthermore, it will explore the decision-making processes surrounding water management during warfare, aiming to contribute to a deeper understanding of the intricate dynamics shaping conflicts.

Chapter 3 - Methodology

3.1. Research Question and Hypothesis

The central inquiry guiding this research circles around the examination of how water weaponization exacerbated the war between Russia and Ukraine. Specifically, the research question poses: How did the utilization of water as a weapon accelerate the conflict between Russia and Ukraine? The acceleration of conflict in this thesis encompasses the advancement of the aggressor's objectives through the strategic utilization of water as a weapon. This acceleration entails the progression of military strategies serving as the means to gaining tactical advantages and achieving the territorial or strategic goals of the parties. This is researched in opposition to the drawbacks the same water weaponization events caused (such as restoration costs for Ukraine or water delivery complications for Russia). The thesis dives deeper into how this aggressive use of water backfires, leading to unintended environmental and socio-economic consequences for the "weaponisor"; thus water weaponization undermining their military strategy and national security in the long term. This query serves as the focal point for the investigation of the multifaceted dynamics of water weaponization within Russia-Ukraine's armed conflict.

Analysis of conflict acceleration in the Russia-Ukraine conflict employs a combination of different approaches. With a thorough literature review of existing researches, policy documents, and media reports, the thesis identifies key factors of water weaponization, which contributed to conflict escalation during different cases with the advantage of one side then another.

The research employs thematic analysis techniques to uncover patterns and causal relationships between military advantages and conflict dynamics. Through integrating findings from qualitative analyses, the study develops a comprehensive understanding of conflict acceleration dynamics, and consequently, it's severity and trajectory. This evidence-based approach applies the IHL framework to evaluate the military acceleration and how it affected both parties.

Consequently, the complementing hypothesis to the question states that water weaponization accelerated the conflict between Russia and Ukraine by initially providing tactical advantages to the respective parties, nevertheless, the lasting consequences and unintended repercussions of water utilization ultimately exacerbated conflict tensions, partly hindering the goals of the aggressor and potentially backfiring on their strategic aims in the long run. This hypothesis highlights the complex nature of water weaponization and its impacts on conflict dynamics.

3.2. Research Objectives

The overarching goal of this research is to explore the intricate dynamics of water weaponization detected within the dam explosion paradigm and its role in the Russia-Ukraine

conflict acceleration. To achieve this aim, the study is guided by three primary objectives. Firstly, the research endeavors to explore water weaponization's key role within Russia-Ukraine conflict. Through scrutinizing contemporary incidents, historical patterns, and scholarly analysis, the research aims to elucidate the multifaceted dimensions of water weaponization within the armed conflict context. Secondly, the study examines the specific case studies of water weaponization and this objective involves an in-depth analysis of the military advantages gained through the water utilization, legal implications of targeting water infrastructures, and the repercussions of such actions for the aggressors. Lastly, the thesis aims to evaluate the enduring complications and consequences of water weaponization on conflict escalation. The study sheds light on how targeting dams and their utilization as weapons exacerbates conflict dynamics and perpetuates long-term consequences which affects both the "victim" and "weaponisor".

3.3. Case Study Selection

The critical aspect of this research methodology was the selection of case studies, which provide empirical evidence to support the study's objectives. The chosen case studies are the North Crimean Canal blockage in 2014 and the Irpin dam breach in 2022 carried out by Ukraine; on the other side are the destruction of the infamous Kakhovka Dam in 2023 and dam explosion on the Mokri Yaly River in June 2023 carried out by Russia. The case studies are selected based on their relevance to the phenomenon of water weaponization, its influence on the Russia-Ukraine conflict and their backfiring effect on the "weaponisors" itself.

Several criteria inform the selection process, including geographic importance, and the availability of comprehensive data for analysis. By examining several case studies, ranging from

strategic dam destruction to water supply disruption, the research aims to capture the different manner of water weaponization manifestations carried out by both sides of the conflict.

Data collection methods encompass a combination of qualitative approaches, aiming to gather comprehensive insights into the water weaponization. Primary data sources include official reports, and scholarly literature, providing first-hand analyses of water weaponization typologies and their respective case study. As for the secondary data, supplementary to the primary data, sources include news articles, and historical records offering diverse perspectives on the conflict. By triangulating data from multiple sources, the research aims to enhance the validity and reliability of its findings.

3.4. Limitations and Considerations

As the research voices the modern-day news, several limitations exist that may impact the research outcomes and interpretations. Constraints on data availability, potential biases in source materials, and the dynamic nature of the Russia-Ukraine conflict pose significant challenges to the research process.

It should be acknowledged that the complexity of the analysis of geopolitical conflicts and the inherent subjectivity of interpretation may introduce uncertainties and limitations in the study's findings. It is essential to recognize these limitations and exercise caution in drawing conclusions based on the available evidence.

Ethical considerations are paramount throughout the research process as the topic could be delicate matter for the reader. Thus, special attention is paid to the sensitivity of the subject,

particularly in contexts involving armed conflict and humanitarian crises. By adhering to ethical principles and guidelines, the research endeavors to uphold integrity and trustworthiness in its analysis, findings and recommendations.

Chapter 4 - Russia-Ukraine Conflict

4.1. Conflict Overview

The seed of war between Ukraine and Russia was sowed in the year 2014. It incited a bitter and bloody war, which has devastated Ukraine, further isolated Russia from the West, and fueled economic and environmental vulnerabilities around the globe. As President Viktor Yanukovych announced his rejection of a deal for greater economic integration with the European Union a violent crackdown by state security forces was sparked, which led to protests manifesting as an armed conflict in Eastern Ukraine. While Mr. Yanukovych was stealing the "Ukrainian Dream" (BBC News, 2013) and murdering protestors in Kyiv, Putin reclaimed Crimea with the "wishful desire" to protect the rights of Russian citizens (Myers & Barry, 2014).

Russia's denial of direct military involvement was shattered by their support for separatist forces in Eastern Ukraine which heightened ethnic divisions and motivated pro-Russian separatists in the Eastern Ukrainian regions of Donetsk and Luhansk who held their independence referendums (Walker et al., 2014). Sporadic armed conflict stirred international efforts, such as the Minsk Accords initiated in 2015, which aimed to ceasefire and restore Ukrainian control over the conflict zone (Powirska, 2022). Meanwhile, NATO bolstered its presence in Eastern Europe to deter potential Russian aggression by deploying troops and

conducting military exercises in the region. On a more individual level, countries-imposed sanctions to have a signaling effect on individuals and companies related to the conflict. Entrenched interests in the Russia-Ukraine conflict determined the failing factors of the agreements and international efforts which hoped to bring about a lasting peace.

Initiated on February 24, 2022, Russia's large-scale invasion of Ukraine stirred a significant shock to the global order. Vladimir Putin's authorization of "special military operation" against Ukraine О проведении специальной военной операции (O provedenii spetsial′noy voyennoy operatsii) was a televised broadcast which aimed to demilitarize and denazify Ukraine, alleging genocide of Russians in Ukrainian territories (Siddiqui et al., 2022).

4.2. Water Weaponization as a Long-Standing Tradition

Environmental destruction as a strategic tool trace back to the traditional Russian idea of retreating to victory by "Scorched Earth" policy, which refers to the military tactic of destroying everything that enables the enemy to wage war (Vaughan, 2019). Russia historically has turned to its long-standing tradition of using Scorched Earth policies when faced with the challenges of failure in organization or leadership (Josephson, 2023). Currently, Russia has moved on from scorched to flooded and radioactive earth, as dams and nuclear power plants have become the new target of destruction.

However, previously, the instances of Scorched Earth policies are traced back to Red Army troops deliberately rupturing the dam of the Dnieper Hydroelectric Station (DniproHES), located approximately 210 kilometers upstream from the present-day Nova Kakhovka dam in

August 1941, when Nazi forces advanced towards Zaporizhya during the German invasion of the Soviet Union. The special team carried out its secret mission of tearing a hole in the dam and temporarily cutting off part of the city from the invaders. The explosion occurred without warning to those in the flood's path, resulting in a tidal surge that killed thousands of unsuspecting civilians, as well as Red Army officers. The destruction of the dam reverberated across the USSR, symbolizing a significant blow to Soviet heavy industry (Moroz & Bigg, 2013).

Mikhail Pervukhin, overseeing the Soviet Union's electric power stations, noted that the flooding was a strategic move to impede the enemy's progress and cause significant damage to their forces and equipment, in other words, it was a successful manifestation of water weaponization practices. His notes retrieved from the diary stated that: "The explosion should be organized in such a way as not only to prevent the enemy from moving to the other shore but also to destroy as much of his equipment and manpower as possible" (RFE/RL's Ukrainian Service, 2023).

Occupying German forces attempted to repair the power station but ultimately resorted to blasting the dam themselves in 1943. Before the explosion Germans drained the water from the upper brief and they opted for the same methods as the Red Army in 1941 - lowering the water level and then when the Soviet troops passed the outer defensive perimeter in the direction of Zaporizhya, the Germans blew up part of the dam (RFE/RL's Ukrainian Service, 2023). After the consecutive explosions, the dam underwent a full restoration by 1950 and is now operated under private ownership. The similarities between the 1941 and 2023 assaults can be explained through

the similarities between Stalin's management and "Little Stalin's" admiration of sending one's men to the slaughter to achieve means of war (RFE/RL's Ukrainian Service, 2023).

Chapter 5 - Analysing Dam Explosions: A Case Study

Water systems and infrastructure have emerged as pivotal elements in Russia-Ukraine conflict frequently targeted or impacted by the conflicts' violence and wielded both defensively and offensively. Analyzing various case studies of dam explosions within the context of the Russia-Ukraine conflict sheds light on the intricate dynamics of water weaponization. Through mapping these incidents to respective categories of water weaponization matrix, as outlined by King and Hardy's (2023), it becomes evident that each case embodies strategic, coercive, and tactical dimensions of these deliberate actions. The study will dive deeper into each case, examining the degree of conflict acceleration by pinpointing who gained military advantage by water utilization and how. Furthermore, IHL principles will be applied where applicable, evaluating the legality and ethical considerations of the actions. Finally, the thesis will evaluate whether and how each action backfired at "weaponisor", revealing the implications and consequences of water weaponization in modern day warfare.

5.1. Russia

5.1.1. The massive Kakhovka Dam on the Dnipro River is destroyed, causing massive upstream and downstream consequences - 2023.

A critical dam on the front line of southern Ukraine was destroyed on June 6, 2023, resulting in a cascade of water pouring through the breach and endangering thousands of lives.

Accusations flew from both sides, with Ukrainian President Volodymyr Zelensky attributing the destruction to “Russian terrorists” while the Kremlin’s spokesman, Dmitri S. Peskov, claimed Ukrainian forces orchestrated a “sabotage” attack to sabotage Crimea’s water supply, which already faced a water scarcity problem (Culler & Poster, 2023).

Regardless of the attribution of the blame, the impact was dire: the spillway dam and adjacent structures were completely obliterated, which led to the flooding of four cities and several dozen villages, resulting in loss of life and extensive damage to both urban and industrial infrastructure. Initial reports and videos circulated on social media depict the massive breach in the dam and the subsequent flooding downstream toward Kherson. UkrHydroEnerho, the Ukrainian dam operator, later confirmed that the Nova Kakhovka station was "fully destroyed" and beyond repair (Ross, 2023). The dam’s destruction had an impact on its hydraulic structure, the downstream territories, and the Kakhovksi reservoir. In the immediate aftermath, the loss of the spillway sections and part of the dam’s roadway thwarted Ukrainian forces’ attempts to cross the river. Uncontrolled water releases led to a drop in the reservoir’s water level and caused widespread pollution in the Dnipro-Buin estuary and the Black Sea’s North-Western region. The environmental damage extended further as pollution reached Odesa and the mouth of the Dniester River (Vyshnevskyi et al., 2023).

Before its collapse, the dam stood 30 meters high and stretched 2 kilometers in length and served multiple purposes, powering the Kakhokva hydroelectric plant, providing drinking water and for agriculture, supplying cooling water to the Zaproihzhia Nuclear Power Plant, which is currently under Russian control (Vyshnevskyi et al., 2023). Being one of six dams situated along

the Dnipro River, the Kakhovka dam's significance expanded beyond its immediate vicinity, spanning from the north of the country to the Black Sea.

The Post-Disaster Needs Assessment (PDNA) carried out by the UN in Ukraine and the Government of Ukraine assessed overall the direct damage to the infrastructure of approximately $2.79 billion, however, the monetary value does not add up to the lasting environmental impact. In particular, the breach of the Kakhovka dam resulted in extensive environmental devastation, submerging an area of 620 square kilometers and affecting 330,000 hectares of protected areas along with 11,294 hectares of forested land (United Nations Ukraine, 2023). This water weaponization caused significant alterations to the morphology of the river and introduced chemical pollutants to the water, consequently, destroying habitats. The PDNA estimated the damage to protected areas and forests accounting for over $6.4 billion in losses, which comprises 58% of the total losses incurred. Addressing the environmental aftermath, an estimated $59.5 million including the costs of demining efforts, clean-up operations, surveys, and assessments of contaminated sites. Despite the financial efforts, the ecological impacts may be irreversible, potentially triggering cascading effects across various sectors for decades to come (United Nations Ukraine, 2023).

The destruction of the Kakhovka Dam on the Dnipro River in 2023, which shocked the global community, represents a combination of strategic and coercive water weaponization tactics. This military act not only endangered thousands of lives and caused extensive infrastructure damage but also disrupted water resources vital for industry, agriculture, and power generation, underscoring the far-reaching consequences of water weaponization. The socio-economic,

environmental, and military disadvantages are visible form of water weaponization; however, the question still stands on who benefited from this "vandalism" and how.

The several suggestions were made from both sides and the global arena regarding the dam destruction. The one which was dismissed right away referred to the possible technical failure of the dam which has been operating for many decades, thus, it was logical speculation that dam failed. Especially, after Russia media a day before dam breach reported that the water level increase was detected. This speculation only lasted for a day as experts claimed that these dams are proofed for increased water levels, and it would not have caused dam breach. Additionally, even if it did (if is a key word here) the collapse of the dam would have begun in the area near the shore, rather than the central part of the Kakhovska dam as it did (Glanz et al., 2023).

As the structural failure and self-destruction are dismissed the two theories dominated the international arena - Russia did it or Ukraine did it. Russia immediately denied any involvement in the disaster and pointed fingers at Ukraine as they claimed that Kakhovka dam breach damaged their own interest since it deprived Crimea of water. Nevertheless, zooming out from Russia's accusations without any back up evidence, the analysis showcases how military advantage was still gained by Russia as the left (Eastern) bank Kherson which was flooded became a no-go area for Ukrainian forces.

Despite these speculations, the legal assessment still questions who the mastermind might be behind the dam explosion. The attacks should be assessed under the Article 49 - Definition of attacks and scope of application "acts of violence against the adversary, whether in offence or in defence" if Russia was one to commit the crime (ICRC, 1949). Technically, Russia could argue

that since dam was located under the Russia-controlled territory the “crime” would not classify under the categorization of attack. From IHL perspective to hold a state accountable for the crime or attack (if it is assumed as an attack) military objective should be identified and whether the harm inflicted on the object was under the protection of IHL or not. In Kakhovka dam explosion the problem of accountability persists since meeting the first part of identifying the military objective of Russia puzzles the global arena and complicates IHL holding Russia accountable.

Assessing the legal framework surrounding accountability necessitates acknowledging the timely amendment of the Russian law, a week prior before the Kakhovka Dam was destroyed. According to the Decree No.873, enforced on May 31 st, 2023, states that: “Until January 1, 2028, a technical investigation of accidents at facilities and emergency hydraulic facilities that occurred as a result of military operations, sabotage and terrorist acts was not carried out” (Government of the Russian Federation, 2023). In the clauses of the document the territories include the occupied land which Russia considers under its legislation.

The preemptive attempt by Russia to shield itself from potential legal repercussions for actions, sheds light on how Russia attempted to act as its own safeguard against the IHL principles prior to the Kakhovka dam explosion. By enacting legal measures that limit investigation into incidents such as the Kakhovka Dam breach, Russia took protective measures before their future actions backfired on them, nevertheless, it paradoxically contributed more to Russia being accountable for the destruction in the eyes of the international law. Even though conclusions have been drawn on how explosion would have given more military advantage to Russia rather than

Ukraine and there are several other evidence which logically led up to Russia being responsible for the action, IHL still requires tangible and factual evidence for so (ICRC, 1949).

5.1.1.1. Poor "strategic" weaponization backfiring on Russia.

Even if the Russia gained one score with this move, behind the curtains of this evil mastermind stands the fact that Russia's water weaponization in this instance demonstrated poor strategic planning and it has disrupted the strategic chessboard in southern Ukraine, forcing not only Ukrainian military but also Russian forces to undergo major adjustments. The main goal behind dam weaponization was to deter Ukrainian counteroffensive, however, the areas hit by the flooding reflect on how disaster backfired on Moscow's military since the areas worst damaged were serving staging grounds for Russian military forces (Cotovia et al., 2023).

In addition to altering Russian military strategies, the destruction of the Kakhovka led to potential problems for a canal supplying water to Crimea. As the reservoir feeds yet another Soviet-era North Crimean Canal, which traditionally supplied around 85% of Crimea's water. Despite implementing the margin of safety as Peskov mentioned, the consequences for Crimea and consequently for Russia would be immense as the water provided by the Kakhovka Dam to the North Crimean Canal flagged a potential threat ahead regarding agriculture and drinking water (Osborn, 2023).

As the masterplan backfired for Russia, communities on both the Russian and Ukrainian-controlled sides of the flooded Dnipro are left now with a sanitation crisis with limited access to drinking water and an increased risk of water-borne diseases. Alongside the environmental and

humanitarian degradation, the flooding in the region potentially disrupted the Russian defenses and supply routes.

At first sight, the water weaponization in this manner hurt Ukrainians more, however, this was in the near term. In the long run, it will also have an impact on Russian defenses along the Dnipro, flooding the first line of Russian defense. Mikhail Razvozhayev, Russia's appointed governor of Sevastopol, the largest city in Crimea and a major Black Sea Port, denied all the potential threats and mentioned that damage to the reservoir would not have any effect on the city's water supply, as the city has its reservoir filled at maximum. However, the reality tells a different story. As the water flooded the region the Moscow-backed mayor of Nova Kakhovka, Vladimir Leontyev, said residents in Russian-controlled areas were being evacuated as their houses had been flooded (Granados & Mellen, 2023). Despite attempts to downplay the damage, the Kakhovka Dam destruction illustrates the poorly executed water weaponization carried out by Russia.

5.1.2. Echoes of Kakhovksa Dam Destruction: Occupiers blow up dam on the Mokri Yaly River – June 2023

Just after a few days of the Kakhovka Dam destruction on 11 th June 2023, a spokesperson for Ukraine's Tavria military sector – Valeriy Shershen – stated that in response to Ukraine's counteroffensive and their operations to retreat the occupied villages along the Mokri Yaly River in the Donetsk Oblast, the Russian forces blew up a dam, causing flooding on both banks of the river (Tyshchenko, 2023). The hydraulic structure's destruction was carried out to slow down Ukraine's military forces' advance, thus, Russia resorted once again to the dam weaponization tactic. The flood water receded up to 5cm an hour downstream of the wrecked dam, while upstream

as the reservoir was draining the mud flats and dead fish covered the vast land. The Ukrainian authorities claim that 72% of the reservoir's capacity was lost (Borger & Sabbagh, 2023).

As Ukrainian forces mounted a determined effort to recapture lost occupied territories in the Zaporizhia region, along the Mokri Yaly River, Russia encountered difficulties, which prompted Russian forces once again to resort to the crude strategy of dam weaponization. Despite the previous Kakhovka dam explosion, the Ukrainian counteroffensive was not deterred for as long as Russia wished. Thus, on the 11 th of June, Russia once again carried out the dam destruction operation, but this time in a more localized manner to slow down advancing Ukrainian forces. Nevertheless, this water weaponization once again exemplified Russia's infamous, poorly executed dam weaponization, as news on June 12th started circulating in media outlets of Ukraine's successful and challenging operations on the front lines (Ratynskyi, 2023). The flooding caused by an unsuccessfully carried out operation might have given a military advantage to Russia at that moment, nevertheless, the impact only lasted for the day as showcased by Ukraine's advancement on the front line. Russia's dam weaponization tactic has fallen short of its objectives. Instead, the tactical advantage gained by Russia for a brief period quickly backfired as Ukrainian forces recaptured villages along the Mokri Yaly River the day after the explosion. The precise details of the explosion are limited, however, the swift reversal of territorial gains by Ukraine indicates how Russia's poor dam weaponization did not achieve its strategic objectives, and the effect of the deterrence only lasted for a day.

From a legal point of view, this manner of water weaponization falls under the Geneva Conventions, specifically, Protocol I, which addresses the protection of civilians during the armed

conflict, as well as customary IHL principles addressing the prohibition of attacks against civilian objects. The attack on a civilian target such as a dam can only be "justified" if it is referred to as a military necessity, otherwise, if the military advantage and the civilian damage are disproportional (military advantage is small, while civilian damage is catastrophic) the action is considered as the violation of IHL (BBC, 2023).

Nevertheless, the legal dimensions cannot serve as tangible solutions in this instance due to the complex nature of the conflict and, more importantly, due to Russia's attitude that legal considerations nor the international arena's viewpoint are not their primary concerns. Instead, the dam weaponization is the manifestation of the Soviet legacy and Russia's adherence to a Scorched Earth policy. This approach prioritizes causing disruption and harm to the opposing side and its operations, regardless of the potential consequences for the aggressor itself. In this particular case, whether the dam explosion achieved their intended military objective or not was not even the primary concern, the underlying motivation for Russia's actions was driven by a commitment to a Scorched Earth policy and employing any means to deter Ukraine from further advancement.

5.2. Ukraine

5.2.1. The North Crimean Canal shut down by Ukraine to block water to Crimea - 2014

The North Crimean Canal, originally constructed during the Soviet era, served as a vital water conduit from Ukraine's Dnieper River to Crimea, addressing the peninsula's arid conditions. Extending over 400km and linked to a network of reservoirs, the canal played a pivotal role in satisfying 85% of Crimea's water requirements for decades, fostering agricultural, industrial, and

tourism development. In 2014, in response to Russia annexing Crimea, Ukraine blocked the canal with a dam as a strategic tool to severe Crimea's water supply. Ukraine halted the operation of the North Crimean Canal, which typically conveys approximately 3 billion cubic meters of water annually from the Kakhovka Reservoir, situated on the Dnieper River. The reservoir covers an area of 2155 square kilometers, spanning 230 kilometers in length, and holds a volume of stored water amounting to 18.2 cubic kilometers (Gocłowski, 2016). This action led to a rapid decline in the canal's condition, causing profound agricultural setbacks in Crimea. Despite Russian attempts to mitigate the water shortage through various means like redirecting rivers and investing in desalination, the situation worsened, culminating in accusations of genocide and ecocide against Ukraine by Russia. Ukrainian officials argued that, as per the Geneva Convention, Russia, as the occupying force, was responsible for ensuring essential needs like water for the local population (Reuters, 2022).

The shutdown of the North Crimean Canal can be mapped out on the water weaponization typology as the strategic and tactical water utilization since it was used as a tool of coercion to sever Crimea's water supply in response to Russia's annexation. This action represents the geopolitical maneuvering and the deliberate disruption of crucial resources to exert control over territories. The goal was achieved by damming the canal with the bags of sand and clay to prevent the Russian-occupied Crimean Peninsula from benefiting the freshwater that was supplied through this canal. Cutting of the water supply for the civilian population can be also characterized under the Instrument of Psychological Terror as the denying civilians from the water definitely served as an instrument of stirring up fear within non-combatants. However, according to Ukrainian Prime Minister, Denys Shmyhal, Ukrainian citizens were not the target in this military act:" We would

like to supply water to our citizens in Crimea, but we do not have the technical ability till Crimea deoccupation" (Ukraine's Government Portal, 2020); it was more of psychologic terror caused for Russia - giving them "headache" of thinking how to provide fresh water for the occupied territories rather than exerting fear within civilians (Wesolowsky, 2020). The Ukrainian officials claim that severing water supply was only few of the non-military levers that could have inflicted harm on Moscow after the annexation (Troianovski & Browne, 2022).

Despite action not including any of the claimed military maneuvers, it still achieved the military goal of causing Kremlin expensive challenges and stirring up tension within Crimean residents as they began to suffer from chronic water shortages. It took Russia eight years to restore a piece of Ukrainian infrastructure which is referred to as the "land bridge" – connecting vessel of Russian territory to the Crimean Peninsula. This was the objective pre-move before Russia in 2022, two days after invasion blew up a dam that Ukraine had built to cut of Crimea's water primary supply. The strategic weaponization of water in 2014, referred to as "non-military", has fumed Kremlin ever since. Thus, restoring the water of water towards Crimea and blowing up the dam was the first military act on Russia's warfare agenda.

Prior to referring to water weaponization tactic, the Russian Investigative Committee's Central Investigation had an attempt to solve the matter in a more "civilian" manner and took the case to the European National Court, with a hope that Crimea would get water back with IHL assistance. According to the Russian Attorney General's office "The claim is intended to draw the attention of the European Court and the entire world community to the gross and systematic violations of human rights by the Ukrainian authorities," (Beaubien, 2022). This announcement

raises several questions that led to case being dismissed; how IHL can assess the Ukraine cutting of supply to Crimea as the international law breach, when Crimea legitimately is still Ukraine. Following this trail of thought, Crimea's case should be considered under the law of occupation – the Fourth Geneva Convention – which gives all the responsibility to Russia when it comes to supplying Crimea with fresh water. In addition, the shutdown canal was not the primary drinking water source, and Ukraine is under no obligation to give Crimea water for agricultural needs.

North Canal Shutdown stirred lots of tension between Russia and Ukraine. While it might not have been acknowledged by the global arena as the ecocide or as the "gross and systematic violation of human rights", it undoubtedly provided Ukraine with strategic advance in 2014 as it was a response to Russia's annexation of Crimea. However, it also laid the groundwork for future water weaponization and the eventual destruction of the dam by Russia in 2022, thus, while initially advantageous for Ukraine, the shutdown ultimately resulted in unintended consequences provoking Russia's aggressive response in the future.

5.2.2. Daring move: Ukraine's Strategic Dam Breach to save Kyiv - March 2022

As Russian troops advanced towards Kyiv at the early beginning of March 2022, Ukrainian forces blew up the Soviet dam of the Kyiv reservoir, which served as flood contamination and flooded Irpin. This tactical water weaponization was a crucial maneuver, enabling Ukraine to regroup on the foothold across the river and repel advancing Russian troops (Dzhulay, 2023). Analysis of the dam explosion's impact was facilitated through satellite images provided by Maxar technology. These images revealed the Russian artillery positions on the west of the Russian-held Antonov Air base northwest of the capital, Kyiv (RFE/RL, 2022). The images also capture that

damages are inflicted from both sides, emphasized by the two distinct fires reflected in the images, since from the Russian military the strikes were also detected across Irpin.

By strategically weaponizing water, Ukraine effectively flooded the Irpin River, obstructing the advance towards Kyiv. The Irpin River served as the critical advancement move towards Kyiv, thus, breaching the dam thwarted Russian troops' military objectives, preventing them from crossing the river and seizing Kyiv from the west. Even though it seemed strategically wise for Ukraine to breach the dam international news reporters still state that it is unclear how the dam began flooding the Irpin River basin, various reasons are explored such as gates being opened on purpose by the Ukrainians to flood the area, or that the dam was hit by a military strike (Mundy, 2022).

Ukraine's strategic dam breach to save Kyiv exemplified another tactical water weaponization as a defensive measure to withstand Russian military objectives. This maneuver effectively achieved its means to flood the Irpin River, obstructing the advance of Russian troops toward Kyiv and showcasing the role of water as a strategic asset in military operations.

5.2.2.1. What Now?

Ukraine's Hero River saved Kyiv in 2022, but it raised critical question simplified as "what now?". Irpin at the end of February might have played a huge role in the defense of the capital and sacrificed its safety of the territorial defense. The rebuilding of the Irpin dam poses a significant challenges and financial burdens for Ukraine, potentially highlighting how Ukraine's move may have backfired in long-term.

The pressing question in assessing the consequences of water weaponization tracing back to the "weaponisor" begins with how it impacted the socio-economic degradation and influenced Ukraine's efforts in post-war reconstruction. Rebuilding destroyed dams raises another set of questions who will pay for what, and who should control the process and funds? What kind of money should be required and how should Ukraine act? The questions are ongoing and grappling with these thorny issues begins with assessing the damage.

Destroying dams took a toll on the socio-economic readiness of Ukraine, as well as reconstruction efforts, which stirred up the tension of requiring extra funds. Extra pressure means the overwhelming environmental, economic, and social impacts as dams require billions to be rebuilt and take years to complete this process while playing a key role in disrupting the natural flow of the ecosystem (Parshley, 2018).

Damaging the Irpin dam, Ukraine's infrastructure in 2022 might have served as the country's strategic move to survive, however, the restoring costs will take up a significant amount from the post-war reconstruction funds. According to the Infrastructure Ministry, more than 300 bridges and overpasses have been damaged or fully destroyed and many of these operations were carried out by Ukrainian forces to achieve the strategic goal of destroying Irpin dam (KSE, 2022). According to the World Bank, the recovery would add up to around $350 billion, and about a third would be due to the direct damage to the water infrastructures (The World Bank, 2022).

The costliness of dam reconstruction further incites Ukraine to depend on external support and funding, which is already a sore topic for the international agenda. Some countries, like Estonia, Latvia, Lithuania, and Slovakia, have also suggested confiscating the $300 billions

of Russian Central Bank assets frozen and putting it to good use to rebuild Ukraine, however, this idea was shut down due to its hard to implement nature in 2022. The EU lawmakers raised the topic again two years later and pointed out how war-torn country was in dire need of further funding and the commission presented a proposal as well (Jozwiak, 2024).

On 16th of April, The Parliamentary Assembly of the Council of Europe (CoE) unanimously voted for frozen Russian assets being utilized as the new funding source for Ukraine's reconstruction and compensation of natural and legal persons affected by Russia's invasion and illegal actions and it has been adopted with 134 votes in favor (Taylor, 2024). More recently, the REPO Act has been reintroduced as the part of Ukraine's aid package passed by Congress on 21st of April. The REPO Act is the bill which ,,requires or authorizes various actions related to the confiscation and disposition of Russian sovereign assets" (which include funds and other property of Russia's central bank, direct investment fund, or ministry of finance) now it is one policy of the U.S aid which provides a legal basis to transfer Russian state assets, that adds up to approximately $6 billion out of the $300 billion of the frozen assets located in U.S banks to Ukraine; compensating Russian illegal aggression during the war (Congress, 2024; Schecter et al., 2024). The several news is circling regarding the REPO act in the media outlets, however, according to the Congress's official website the bill has been introduced and will undergo the legislative procedure as followed: Introduction and Referral of Bills, Committee Consideration, Calendars & Scheduling, House Floor, Senate Floor, Executive Business in the Senate, Bicameral Resolution, Presidential Actions and lastly the bill will be adopted as the public law (Congress, 2019).

The further assistance of this legislative process would be the accountability matter stemming from IHL perspective; accounting Russia for committing war crimes could make this "dream come true" reconstruction efforts into a tangible, legal reality. The IHL can further assist in turning the REPO act bill into a law as it would define how Russian funds can be utilized for compensation of environmental crimes.

5.2.2.2. Other Considerations

The aftermath of Irpin's heroic actions significantly increased water levels, which will cause difficulties for crossing of the river for military troops not only for Russian forces but also for Ukrainians. The flooded ground will also have an impact on Ukraine's counteroffensive operations as it will struggle to hold the weight of heavy artillery - limits the pathway for an attacking force. On this scale of the disaster, alongside with the military measurements, one must introduce human factors such as scarce water resources, which Ukraine has been struggling with from the beginning and the displacement of civilians further complicating any military operations in the region.

Conclusion

Water weaponization in Russia-Ukraine conflict turned into a war reveals a complex web of strategic maneuvering, geopolitical tensions, and humanitarian consequences. Evaluating the key water utilization instances through dam explosion case studies from 2014-2023 timeline, further pinpoints how water infrastructures can be turned into a powerful tool in the arsenal of modern warfare.

Such manner of deliberate actions targeting dams not only imposes immediate threats to civilian populations, infrastructure, and the environment but also acts as the means of coercion and geopolitical leverage. The water weaponization frequently used by both parties of the war has the ability to accelerate the conflicts mere: acceleration in this thesis was defined as the military advantage gained by the parties, which employed dam weaponization as the part of their military strategy. The case studies reflected on how dams as a warfare tool are calculated approach to gain military advantage, disrupt enemy operations and assert power over contested territories.

Despite the strategic nuances behind water utilization, Russia and Ukraine showed different approaches toward the military tactic. One (Russia) using water infrastructures as an offensive mechanism is more similar to Soviet warfare strategies such as “Scorched Earth Policy”, disregarding any consequences or inflicted harm on themselves as well; while another side (Ukraine) refers to water weaponization as a defensive mechanism towards the aggressor or even if it used as an offensive mechanism the inflicted harm on civilian population is minimized as much as possible.

Nevertheless, whether water weaponization was carried out “smartly” or “poorly” the research demonstrated that these tactics might have achieved successes, however, it is crucial to acknowledge that such actions can also backfire for the “weaponisor”, leading to long-term challenges for both parties. And thus, are not very strategic.

This finding should serve as a crucial message for the international arena that while water weaponry may initially accelerate conflict by providing tactical advantages, it also introduced

impediments to further military operations. For the defending party, containing water becomes complicated mission, while offensive troops cannot advance on land or face the risk of losing their own water sources. Additionally, the aftermath of war, including the post-war reconstruction efforts is affected by the consequences of water (dam) weaponization (of course, this concern places as secondary matter compared to the imminent need of winning the war).

As showcased in this thesis the water weaponization comes with significant costs and unintended consequences, as visualized in the backfiring effect, population displacement, environmental degradation, and the costly post-war reconstruction efforts. Thus, the weaponization raises ethical, legal, and humanitarian concerns, highlighting the importance of upholding IHL principles and protecting civil populations and infrastructures. As the Russia-Ukraine conflict turned into a warfare, unfortunately, continues to unfold, it is crucial for international arena to prioritize de-escalation efforts and humanitarian assistance to mitigate the impacts of water weaponization through upholding human rights principles and have a hope for sustainable post-war reconstruction.

Summary

The thesis investigates the multifaceted nature of water weaponization in on-going Russia-Ukraine war. Primarily, the focus is on manipulation of water infrastructures dams and analysing four case studies were both parties of the war turned to manipulation of dams as weapons to gain military advantage in the moment. The research articulates on the four case studies chosen based on their relevance to the war and geopolitical context. Drawing from a historical perspective, the thesis unveils the long-standing utilisation of water as strategic tool within the USSR and then juxtaposes these past practices with contemporary examples of water weaponization. By mapping out these modern instances on their relevant water weaponization matrix, the thesis scrutinizes how these dam manipulations accelerated the conflict. The acceleration in this thesis is understood as the military advantage gained by the "weaponisor" in the instance, through assessment of weaponization impact on defender and the advantage gained by the offender, the thesis shows how the weaponization was carried and for what purposes. In additional to the acceleration, the thesis claims that water weaponization has the potential to backfire on the "weaponisor" and alongside the military advantage gained in that particular time frame, in the long term it has capacity to inflict harm on "weaponisor" well. The backfiring effect is measured through comprehensive analysis of the environmental, legal, and humanitarian frameworks. The study concludes that water weaponization – dam manipulation – comes with severe costs for both parties. It raises concerns in various paradigms and, thus, requires prudent approach from war parties and international arenas.

Souhrn

Práce zkoumá mnohostrannou povahu vodních zbraní v probíhající rusko-ukrajinské válce. Primárně se zaměřuje na manipulaci s přehradami vodní infrastruktury a na analýzu čtyř případových studií, kdy se obě strany války obrátily k manipulaci s přehradami jako zbraněmi, aby v tuto chvíli získaly vojenskou výhodu. Výzkum se zaměřuje na čtyři případové studie vybrané na základě jejich relevance pro válečný a geopolitický kontext. Na základě historické perspektivy práce odhaluje dlouhodobé využívání vody jako strategického nástroje v SSSR a tyto minulé praktiky pak staví vedle sebe se současnými příklady vodních zbraní. Zmapováním těchto moderních případů na jejich relevantní matici vodních zbraní práce zkoumá, jak tyto manipulace s přehradami urychlily konflikt. Akcelerací je v této práci chápána vojenská výhoda získaná „zbraňovou osobou“v případě, prostřednictvím posouzení dopadu zbraně na obránce a výhody získané pachatelem, práce ukazuje, jak byla zbraň provedena a za jakým účelem. Kromě zrychlení práce tvrdí, že vodní zbrojení má potenciál obrátit se proti „weaponisoru“a vedle vojenské výhody získané v tomto konkrétním časovém horizontu má z dlouhodobého hlediska schopnost způsobit poškození „weaponisoru“. Účinek selhávání se měří prostřednictvím komplexní analýzy environmentálních, právních a humanitárních rámců. Studie dochází k závěru, že vodní zbraně – manipulace s přehradami – jsou spojeny s vážnými náklady pro obě strany. Vyvolává obavy v různých paradigmatech, a proto vyžaduje obezřetný přístup od válečných stran a mezinárodních arén.

References

BBC. (2023, June 10). What attacks have there been on dams in Ukraine? *BBC News*. https://www.bbc.com/news/world-65753136

BBC News. (2013, November 30). New Ukraine protests in EU deal row. *BBC News*. https://www.bbc.com/news/world-europe-25162563

Beaubien, J. (2022, June 13). Russia has achieved at least 1 of its war goals: return Ukraine's water to Crimea. *NPR.org*. https://www.npr.org/2022/06/12/1104418128/russia-ukraine-crimea-water-canal

Bigger, P., & Neimark, B. D. (2017). Weaponizing nature: The geopolitical ecology of the US Navy's biofuel program. *Political Geography*, *60*, 13–22. https://doi.org/10.1016/j.polgeo.2017.03.007

Borger, J., & Sabbagh, D. (2023, June 12). Ukraine accuses Russia of destroying another dam to slow counteroffensive. *The Guardian*. https://www.theguardian.com/world/2023/jun/12/ukraine-accuses-russia-of-destroying-another-dam-donetsk

Chalecki, E. L. (2002). A New Vigilance: Identifying and Reducing the Risks of Environmental Terrorism. *Global Environmental Politics*, *2*(1), 46–64. https://doi.org/10.1162/152638002317261463

CNA. (2007). *National Security and the Threat of Climate Change*. Security and Climate.

Congress. (2019). *The legislative process: Overview.* Congress.gov. https://www.congress.gov/legislative-process

Congress. (2024). *S.2003 - REPO for Ukrainians Act*. https://www.congress.gov/bill/118th-congress/senate-bill/2003

Cotovia, V., Pleitgen, F., Bonnett, W., & Tarasova, D. M. (2023, June 6). *"Everything is drowning." Nova Kakhovka dam collapse brings added danger to frontline city of Kherson*. CNN. https://edition.cnn.com/2023/06/06/europe/ukraine-kherson-nova-kakhovka-flood-intl/index.html

Culler, M., & Poster, J. (2023, June 6). *A Critical Dam Is Destroyed on Ukraine's Front Line*. The New York Times. https://www.nytimes.com/2023/06/06/briefing/ukraine-dam-livgolf-prince-harry-coinbase.html

Dzhulay, D. (2023, February 26). *Revealed: How Ukraine Blew Up A Dam To Save Kyiv*. Www.rferl.org. https://www.rferl.org/a/ukraine-russia-moshchun-irpin-kyiv-war-battle/32286263.html

G7 Germany. (2022). *G7 Statement on Support for Ukraine | G7 Statement on Support for Ukraine*. https://www.g7germany.de/resource/blob/974430/2057196/4628490eda0863e429c30136ec180feb/2022-06-27-g7-erklaerung-ukraine-en-data.pdf?download=1

Geissler, E., & Guillemin, J. (2010). German Flooding of the Pontine Marshes in World War II: Biological Warfare Or Total War Tactic? *Politics and the Life Sciences*, *29*(01), 2–23. https://doi.org/10.2990/29_1_2

General Staff of the Armed Forces of Ukraine. (2022, October 6). *Facebook Post - Operational Information of 18.00 06.10.2022*. Www.facebook.com. https://www.facebook.com/GeneralStaff.ua/posts/pfbid0cEZqa6GoiQYWReBCeZ2EsMWoTAxqbbXZqtki75hLPC2eicH5sHxid6x358nt3n5Cl

Glanz, J., Santora, M., & Pérez-Peña, R. (2023, June 6). Internal Blast Probably Breached Ukraine Dam, Experts Say (Cautiously). *The New York Times*. https://www.nytimes.com/2023/06/06/world/europe/ukraine-kakhovka-dam-russia.html?smid=nytcore-ios-share&referringSource=articleShare

Gleick, P. H. (1993). Water and Conflict: Fresh Water Resources and International Security. *International Security*, *18*(1), 79–112. https://doi.org/10.2307/2539033

Gleick, P. H., & Shimabuku, M. (2023). Water-related conflicts: definitions, data, and trends from the water conflict chronology. *Environmental Research Letters*, *18*(3), 034022. https://doi.org/10.1088/1748-9326/acbb8f

Goclowski, A. (2016). *Natural conditions of geo-political importance of Crimean Peninsula*. https://bibliotekanauki.pl/articles/2078212

Government of the Russian Federation. (2023). *Постановление Правительства Российской Федерации от 30.05.2023 № 873 · Официальное опубликование правовых актов*. Publication.pravo.gov.ru. http://publication.pravo.gov.ru/document/0001202305310067

Granados, S., & Mellen, R. (2023, June 6). *Maps show how damaged Kakhovka dam hurts both Ukraine and Russia*. Washington Post. https://www.washingtonpost.com/world/2023/06/06/kakhovka-dam-maps-impact-russia-ukraine/

Henckaerts, J.-M., & Doswald-Beck, L. (2009). Customary International Humanitarian Law: Taking Stock of the ICRC Study. *Nordic Journal of International Law*, *78*(4), 435–468. https://doi.org/10.1163/090273509x12506922106795

Hjorth, P., & Bengtsson, L. (2012). Large Dams, Statistics and Critical Review. *Encyclopedia of Lakes and Reservoirs*, 475–479. https://doi.org/10.1007/978-1-4020-4410-6_28

ICRC. (1949). *Article 49 - Definition of attacks and scope of application*. Icrc.org. https://ihl-databases.icrc.org/en/ihl-treaties/api-1977/article-49

Isbouts, J.-P. (2018, August 26). *Leonardo's Most Daring Project*. Medium. https://jpisbouts.medium.com/leonardos-most-daring-project-d76466a68e70#:~:text=But%20Leonardo%20and%20Machiavelli%20were

IWM. (n.d.). *The Incredible Story Of The Dambusters Raid*. Imperial War Museums. https://www.iwm.org.uk/history/the-incredible-story-of-the-dambusters-raid

Josephson, P. (2023). *The deep historical roots of Russia's scorched earth policy*. Engelsberg Ideas. https://engelsbergideas.com/essays/the-deep-historical-roots-of-russias-scorched-earth-policy/

Jozwiak, R. (2024, March 22). EU Eyes Frozen Russian Assets For Rearming Ukraine. *Radio Free Europe/Radio Liberty*. https://www.rferl.org/a/russia-eu-assets-ukraine-arms/32873026.html

Khudaykulova, M., Yuanqiong, H., & Khudaykulov, A. (2022). Economic Consequences and Implications of the Ukraine-Russia War. *International Journal of Management Science and Business Administration*, *8*(4), 44–52. https://doi.org/10.18775/ijmsba.1849-5664-5419.2014.84.1005

King, M., & Hardy, E. (2023, June 1). *Water Weaponization: Its Forms, Its Use in the Russia-Ukraine War, and What to Do About It*. The Center for Climate & Security.

KSE. (2022). *Damage caused to Ukraine's infrastructure during the war increased to $113.5 bln, minimum recovery needs for destroyed assets is almost $200 bln*. Kyiv School of Economics. https://kse.ua/about-the-school/news/damage-caused-to-ukraine-s-

infrastructure-during-the-war-increased-to-113-5-bln-minimum-recovery-needs-for-destroyed-assets-is-almost-200-bln/

Merriam-Webster. (2019). *Definition of WEAPON*. Merriam-Webster.com. https://www.merriam-webster.com/dictionary/weapon

Moroz, D., & Bigg, C. (2013, August 23). Ukrainian Activists Draw Attention To Little-Known WWII Tragedy. *Radio Free Europe/Radio Liberty*. https://www.rferl.org/a/european-remembrance-day-ukraine-little-known-ww2-tragedy/25083847.html

Mundy, V. (2022, May 11). Ukraine's "hero river" helped save Kyiv. But what now for its newly restored wetlands?. *The Guardian*. https://www.theguardian.com/environment/2022/may/11/ukraine-hero-irpin-river-helped-save-kyiv-but-what-now-for-its-newly-restored-wetlands-aoe

Myers, S. L., & Barry, E. (2014, March 18). Putin Reclaims Crimea for Russia and Bitterly Denounces the West. *The New York Times*. https://www.nytimes.com/2014/03/19/world/europe/ukraine.html

Osborn, A. (2023, June 6). Canal irrigating Crimea getting "drastically less" water after Ukraine dam blast, says Kremlin. *Reuters*. https://www.reuters.com/world/europe/ukraine-dam-blast-could-threaten-crimean-water-supply-says-top-russian-official-2023-06-06/

Pacific Institute. (2018). *World Water*. Https://Www.worldwater.org/. http://worldwater.org/chronology.html

Parshley, L. (2018, January 5). *The Costs and Benefits of Hydropower*. Smithsonian; Smithsonian.com. https://www.smithsonianmag.com/innovation/costs-and-benefits-hydropower-180967691/

Powirska, L. (2022, May 18). *Through the Ashes of the Minsk Agreements*. Epicenter.wcfia.harvard.edu. https://epicenter.wcfia.harvard.edu/blog/through-ashes-minsk-agreements

President of Ukraine. (2023). *Ukraine has always been a leader in peacemaking efforts*. https://www.president.gov.ua/en/news/ukrayina-zavzhdi-bula-liderom-mirotvorchih-zusil-yaksho-rosi-79141

Ratynskyi, V. (2023). *"Extraordinarily difficult operation": All eyes on Ukraine attack*. Al Jazeera. https://www.aljazeera.com/news/2023/6/12/extraordinarily-difficult-operation-all-eyes-on-ukraine-attack

Reuters. (2022, February 26). Russian troops destroy Ukrainian dam that blocked water to Crimea - RIA. *Reuters*. https://www.reuters.com/world/europe/russian-troops-destroy-ukrainian-dam-that-blocked-water-crimea-ria-2022-02-26/

RFE/RL. (2022, March 23). *Satellite Images Reveal Devastation In Mariupol, Flooding Near Kyiv*. RadioFreeEurope/RadioLiberty. https://www.rferl.org/a/maxar-ukraine-satellite-mariupol-russia-kyiv/31766243.html

RFE/RL's Ukrainian Service. (2023, June 7). Waters Of War, Echoes Of History: Ukraine's Other Great Manmade Flood. *Radio Free Europe/Radio Liberty*. https://www.rferl.org/a/ukraine-dam-destruction-flood-1941-world-war-ii-german-invasion/32448719.html

Ross, K. M. (2023, June 7). *Russia blamed for Nova Kakhovka dam breach*. Power Technology. https://www.power-technology.com/news/russia-accused-of-destroying-nova-kakhovka-dam-in-ukraine/

Schecter, A., Lebedeva, N., & Bradley, M. (2024, April 20). *Congress passes bill that could unlock billions in frozen Russian assets for Ukraine*. NBC News.

https://www.nbcnews.com/news/world/house-vote-billions-dollars-russian-government-money-sitting-us-banks-rcna148671https://www.nbcnews.com/news/world/house-vote-billions-dollars-russian-government-money-sitting-us-banks-rcna148671

Schillinger, J., Özerol, G., Güven-Griemert, Ş., & Heldeweg, M. (2020). Water in war: Understanding the impacts of armed conflict on water resources and their management. *WIREs Water*, *7*(6). https://doi.org/10.1002/wat2.1480

Siddiqui, D. S. S. M., Aamir, D. S. B., & Khan, D. S. M. (2022). Russia Ukraine War: Analytical Study. *Pakistan Journal of International Affairs*, *5*(2). https://doi.org/10.52337/pjia.v5i2.493

Taylor, A. (2024, April 16). *Council of Europe unanimously votes to use seized Russian assets to fund Ukraine reconstruction, compensation*. Www.euractiv.com; EURACTIV. https://www.euractiv.com/section/europe-s-east/news/council-of-europe-unanimously-votes-to-use-seized-russian-assets-to-fund-ukraine-reconstruction-compensation/

The World Bank. (2022, September 9). *Ukraine Recovery and Reconstruction Needs Estimated $349 Billion*. World Bank. https://www.worldbank.org/en/news/press-release/2022/09/09/ukraine-recovery-and-reconstruction-needs-estimated-349-billion

Tignino, M., & Sjöstedt, B. (2020). Searching for holistic approaches to protect water in relation to armed conflict. *Review of European, Comparative & International Environmental Law*, *29*(1), 3–6. https://doi.org/10.1111/reel.12334

Travis, C. (2024). Ancient Warfare, 1500 BCE–128 CE. *Historical Geography and Geosciences*, 7–25. https://doi.org/10.1007/978-3-031-50856-1_2

Troianovski, A., & Browne, M. (2022, June 8). Satellite Imagery Shows Ukrainian Water Flowing Again to Crimea, as Russia Nears Big Objective. *The New York Times*. https://www.nytimes.com/2022/06/08/world/europe/crimea-water-canal-russia.html

Tyshchenko, K. (2023). *Окупанти підірвали дамбу на Донеччині, виникло підтоплення (Donetsk region, flooding occurred - the Defense Forces) – Сили оборони*. Українська правда. https://www.pravda.com.ua/news/2023/06/11/7406385/

Ukraine's Government Portal. (2020). *Cabinet of Ministers of Ukraine - We would like to supply water to our citizens in Crimea, but we do not have the technical ability till Crimea deoccupation, says Prime Minister Denys Shmyhal*. Www.kmu.gov.ua. https://www.kmu.gov.ua/en/news/mi-hotili-bi-podavati-vodu-nashim-gromadyanam-u-krimu-ale-ne-mayemo-tehnichnoyi-zmogi-do-deokupaciyi-pivostrova-denis-shmigal

UN. (2023). *Potential Long-Term Impact of the Destruction of the Kakhovka Dam | United Nations in Ukraine*. Ukraine.un.org. https://ukraine.un.org/en/235545-potential-long-term-impact-destruction-kakhovka-dam

UN Economic and Social Council. (2002). *The right to water (arts. 11 and 12 of the International Covenant on Economic, Social and Cultural Rights)* . https://www2.ohchr.org/english/issues/water/docs/CESCR_GC_15.pdf

United Nations Human Rights Office of the High Commissioner. (1997). *Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of Non-International Armed Conflicts (Protocol II)*.

United Nations Ukraine. (2023). *Post-Disaster Needs Assessment 2023 Kakhovka Dam Disaster, Ukraine*. https://ukraine.un.org/sites/default/files/2023-10/PDNAFinalandCleared2016Oct.pdf

USGS. (2019). *How much natural water is there? | U.S. Geological Survey*. Www.usgs.gov. https://www.usgs.gov/special-topics/water-science-school/science/how-much-water-there-earth

Vaughan, D. (2019). Scorched earth policy | warfare. In *Encyclopædia Britannica*. https://www.britannica.com/topic/scorched-earth-policy

Viktor Vyshnevskyi, Shevchuk, S. A., Viktor Komorin, Oleynik, Y., & Gleick, P. H. (2023). The destruction of the Kakhovka dam and its consequences. *Water International*, *48*(5), 631–647. https://doi.org/10.1080/02508060.2023.2247679

Von Lossow, T. (2016a). The Rebirth of Water as a Weapon: IS in Syria and Iraq. *The International Spectator*, *51*(3), 82–99. https://doi.org/10.1080/03932729.2016.1213063

Von Lossow, T. (2016b). *Water as Weapon: IS on the Euphrates and Tigris The Systematic Instrumentalisation of Water Entails Conflicting IS Objectives*. https://www.swp-berlin.org/publications/products/comments/2016C03_lsw.pdf

Walker, S., Amos, H., & Grytsenko, O. (2014, May 12). Ukraine: pro-Russia separatists set for victory in eastern region referendum. *The Guardian*. https://www.theguardian.com/world/2014/may/11/eastern-ukraine-referendum-donetsk-luhansk

Wesolowsky, T. (2020, March 29). Pray For Rain: Crimea's Dry-Up A Headache For Moscow, Dilemma For Kyiv. *Radio Free Europe/Radio Liberty*. https://www.rferl.org/a/pray-for-rain-crimea-s-dry-up-a-headache-for-moscow-dilemma-for-kyiv/30515986.html

Zeitoun, M. (2023). Reflections: Understanding Our Use and Abuse of Water. In *Google Books* (pp. 55–59). Oxford University Press. https://books.google.ge/books?hl=en&lr=&id=fxKrEAAAQBAJ&oi=fnd&pg=PP1&dq=

zeitoun+on+water+weaponization&ots=cg0b5z0vJm&sig=GUvkU17z0vWL_4L6BuJ08a20hBM&redir_esc=y#v=onepage&q=zeitoun%20on%20water%20weaponization&f=true