The Impact of CBRN Threat on International Security and Strategic Stability in the Black Sea Region in the Context of the Russian-Ukrainian War of 2022-2025

Vakhtang Maisaia,

Caucasus International University, Georgia

vakhtang.maisaia@ciu.edu.ge

https://orcid.org/0000-0003-3674-3570

Alika Guchua

Caucasus International University, Georgia

alika_guchua@ciu.edu.ge

https://orcid.org/0000-0003-0347-9574

http://doi.org/10.52340/ejts.2026.15.01.01

Abstract:

The aim of the paper is to demonstrate the impact of the CBRN threat on international security, strategic stability and military conflict in the Black Sea region security format that caused by the concrete actor – Russia. The Chemical, Biological, Radiological, and Nuclear threats present significant challenges to global security and pose grave risks to human life, infrastructure, and the environment. Identifying CBRN threats accurately and efficiently is crucial for effective prevention, preparedness, and response measures. This article examines the chemical, biological, radiological, and nuclear (CBRN) security strategies of Black Sea states and analyzes their security policies in this regard. Considerable attention is also given to the Russian-Ukrainian war and the CBRN security challenges it has created in the Black Sea region. Research methods: policy analysis, content analysis, comparative analysis and document analysis methods to analyze and describe the threats posed by CBRN weapons. The theories are used in the research process: "Theory of Political Realism", "Theory of the Balance of Power", "Theory of Securitization" and "Theory of Nuclear Deterrence". The article concludes by discussing the main trends and conclusions drawn from the study of current CBRN security policies in the Black Sea region, taking into account Russia's aggressive role and NATO's involvement.

Key Definitions: *Asymmetric challenges, CBRN threat, CBRN terrorism, "Securitization" theory, Black Sea region, international security.*

Introduction

The utilization of chemical, biological, radiological, and nuclear (CBRN) weapons is not novel; although seldom, it remains a global concern due to their capacity to induce extensive mass-casualty incidents and their potential risk to international security. Identifying CBRN threats is a complex and multidimensional task that requires the integration of theoretical concepts and practical modalities. The theoretical concepts of securitization theory and risk assessment provide valuable frameworks for understanding the perception and evaluation of CBRN threats. Securitization theory allows to examine the discourses and policies that shape the perception of these threats as security concerns, while risk assessment enables the prioritization of threats based on their severity and likelihood. Therefore, as a theoretical frame of the research has been opted for the Securitization theory with three rings out of five one perception – military, economic and political ones. Moreover, the other theoretical implications sought to be "The Theory of Nuclear Deterrence" implies that wherein the nuclear powerful states would respect the authority of one another and prevent the use of nuclear weapon in the light of deterrence (DeVolpi, 2004:13). That is why nuclear states are restricted in their rational behaviors to launch full-pledged military campaign, mainly with concentration of regional security parameters. In this context, it should be mentioned low-intensity military conflict between two nuclear power nations CPR and the USSR in 1969-71 in the Far East region.

Having said above-mentioned, due to the new realms of post-bipolar period of time with concentration of new strategic threats in CBRN proliferation cases is interesting to formulate the research question of the one. Here is formulation of the research question: *by what means and the CBRN threats could provide instability to the regional stability in aegis of the Black Sea area deriving from aggressive actions by Russia?*

Based on the purpose of the work, the comparative research method was used, with the help of which we obtained an objective picture within a specific case, which is one of the components of the situational analysis. The essence of the comparative method lies in the specific analysis of the information received, which involves a comparison of events. This is especially effective in the analysis of regional politics and for studying the interests of participants in a particular geopolitical event. The content analysis method was also used within the framework of the study, as a result of which we analyzed the current political processes in the Black Sea region in the context of CBRN threats. An important role in the research process was played by the policy research method, with the help of which we analyzed the impact of CBRN threats on international stability, including regional security of the Black Sea, as a result of which we identified and presented specific security parameters in the work.

Weapons of mass destruction (WMD) are frequently used to group CBRN weapons together. Given their dissimilarities in composition, ease of production, and capacity for destruction, this is strange to say the least. For example, the raw materials for chemical and biological weapons are frequently easily obtained on the open market; however, the more difficult aspects involve the actual weaponization and efficient distribution of these agents, which calls for technological expertise that has so far largely eluded non-state actors. In contrast, achieving or mastering the manufacture of the essential materials-enriched uranium or plutonium-remains a major barrier for prospective nuclear nations even in 2024. This is the biggest challenge to achieving nuclear capacity. Rough designs for the building of fission and fusion devices are available in the public domain, making the weaponization of these materials a relatively easier task, even if it still requires a significant amount of technological know-how, particularly for state actors.

Throughout the 20th century, chemical, biological, radiological, and nuclear (CBRN) weapons have been used. Examples include the mustard gas (a chemical weapon) used by both sides in World War I, Japan's experiments in China in the 1930s and 1940s with various

biological agents, the US dropping nuclear bombs on Japan at the end of World War II, Iraq's use of chemical weapons (CW) against its own people in 1988, and the sarin gas (CW) spread throughout Tokyo's subway system by the religious sect Aum Shrinikyo in 1995. However, there hasn't been any widespread use of CBRN, even with a few other cases (The Future of CBRN, 2010: 9).

The accessibility of CBRN materials by terrorist organizations and individuals has been facilitated by various factors, including advancements in technology, the globalization of information, and illicit black-market networks. The rapid dissemination of knowledge and the ease of communication have enabled the acquisition, production, and dissemination of CBRN materials by non-state actors, expanding the potential reach and impact of their terrorist activities. Furthermore, the transnational nature of CBRN terrorism transcends national borders, making it a global security concern that demands international cooperation, intelligence sharing, and coordinated efforts to identify, track, and neutralize potential threats.

The emergence of chemical, biological, radiological, and nuclear (CBRN) terrorism poses a significant and complex challenge to global and national security, necessitating comprehensive understanding, effective countermeasures, and international cooperation. The increasing accessibility of CBRN materials and the transnational nature of terrorist organizations create a heightened risk of devastating CBRN attacks on a global scale. These attacks have the potential to cause mass human casualties, public health crises, destabilization of nations, and psychological trauma, thereby undermining societal resilience and challenging the ability of governments to protect their citizens. The vulnerability of critical infrastructure and essential services further compounds the complexity of addressing CBRN terrorism.

Thus, the ongoing political processes in the Black Sea region against the backdrop of the Russian-Ukrainian war further complicate the issue of security in the area of chemical, biological, radiological and nuclear weapons and require the adoption of significant and effective

measures to ensure overall regional stability, which is a rather difficult task given Russia's hard-liner policies**.**

CBRN Threats and Protection of National Security

National security serves as a critical modality for promoting stability within nations and across the globe. It encompasses a range of strategies, policies, and practices aimed at protecting a country's sovereignty, safeguarding its citizens, and maintaining social order. This paper explores the significance of national security as a key modality for promoting stability, highlighting its various dimensions and contributions to maintaining peace, order, and progress within societies.

National security refers to the measures and actions taken by a government to protect its interests, values, and assets from internal and external threats. It encompasses dimensions such as military defense, intelligence gathering, economic stability, societal cohesion, and environmental resilience. Stability, on the other hand, refers to the condition of calm, order, and predictability within a nation. It encompasses social harmony, the rule of law, economic prosperity, and the absence of significant conflicts or threats that could disrupt the functioning of a society. National security plays a fundamental role in promoting stability by ensuring the protection of a nation's interests and the well-being of its citizens. It serves as a shield against various threats that can destabilize a country, including terrorism, transnational crime, cyberattacks, and internal unrest. By effectively addressing these threats, national security contributes to creating an environment of peace, order, and progress.

One of the primary objectives of national security is to safeguard a nation's sovereignty and territorial integrity. Sovereignty refers to the authority and independence of a state to govern itself without interference from external forces. National security measures aim to protect a country's territorial boundaries, prevent external aggression, and maintain military capabilities that act as a deterrent against potential threats. By ensuring sovereignty and territorial integrity,

national security provides stability within a nation. It establishes a sense of security among citizens, as they are assured that their government has the capacity to defend and protect their homeland. This stability fosters trust, unity, and a sense of national identity, which are crucial for the functioning of a harmonious society.

National security is instrumental in maintaining internal order and social cohesion. It involves the protection of citizens from internal threats, such as terrorism, organized crime, civil unrest, and political instability (Colletta, 2013, 84). Effective law enforcement mechanisms, intelligence networks, and counterterrorism measures contribute to ensuring the safety of citizens and preventing internal threats. Consequently, the Threat Identification Matrix provides a comprehensive analysis of the CBRN threat as a provision for national and global security challenges. By examining the strengths, weaknesses, opportunities, and threats related to the CBRN threat, decision-makers can develop strategies to mitigate risks, enhance preparedness, and respond effectively (Frank, 2009). Addressing weaknesses through increased public awareness, resource allocation, and regulatory frameworks is crucial for strengthening defenses against CBRN threats. Leveraging opportunities, such as technological advancements, international cooperation, and public-private partnerships, can enhance response capabilities. Proactive measures are necessary to address emerging threats, counter the involvement of non-state actors, and manage the potential dual-use implications of advanced technologies. By considering the multifaceted nature of the CBRN threat, nations can develop comprehensive and integrated strategies to protect national and global security and mitigate the risks posed by CBRN incidents (Kolencik, 2021).

The national security dilemma is a key modality for geopolitical instability, as it creates tensions between states seeking to protect their national interests. When one state makes a solid effort to enhance its security by increasing military capabilities, it simultaneously creates concerns for other nations who perceive this increase in power as a potential threat. This triggers

a response from those nations to increase their military capabilities in the same way, finally leading to an escalating arms race dynamic that can ultimately lead to conflict. The book- The Security Dilemma: Fear, Cooperation and Trust in World Politics, by Ken Booth and Nicholas J. Wheeler discusses how the national security dilemma creates tensions between states seeking to protect their national interests. There is highlighted how the security dilemma at a national level can cause friction between countries trying to safeguard their interests while also underscoring the importance of building trust through diplomatic channels aimed at resolving disputes peaceably without resorting to military force.

Increasingly, it was recognized that international relations were not only about conflictual interactions between states but also about cooperative efforts to build a more stable and secure global community. Yet even as scholars looked for ways of promoting cooperation over competition among nations, they could not ignore the fact that geopolitical instability continued to be driven by an enduring feature of statecraft known as the security dilemma. This concept refers to a situation where one state's efforts to enhance its own security can inadvertently lead other states to feel threatened or insecure. The result is often a spiral of mistrust and tension as each side seeks to counterbalance perceived threats from others (Wheeler, 2008, 3). Any type of conventional conflict could potentially turn into a nuclear conflict if decision-makers make mistakes in the hectic environment that frequently envelops them during armed conflict. Risk of Nuclear Imbalances: The balance of power cannot be guaranteed to be maintained by nuclear proliferation, either vertically or horizontally. Proliferation does, in fact, necessarily lead to transient imbalances that hostile powers may then take advantage of. After all, it was precisely this kind of military imbalance that led to the dropping of the bombs on Hiroshima and Nagasaki. Nuclear weapons that are capable of being used. Recent advancements have concentrated more on creating nuclear weapons that are usable by having a more targeted, controlled impact. These nuclear weapons, be they tactical or battlefield, are no longer only symbolic. This gave rise to the notion of nuclear use target selection (NUTS), which suggests

that a limited nuclear exchange may happen while rejecting the logic of MAD. Nuclear weapons deterrence was effective in the bipolar first nuclear age, but it is much less effective in the less stable, multipolar conditions of the second nuclear age. This is an example of irresponsible nuclear power. The likelihood of a nuclear first strike depends on the existence of a military or political leadership that does not fear taking risks or that, in spite of strategic concerns, embraces symbolic violence as a means of waging total war due to its principles and beliefs. So, the biggest worry is that nuclear weapons could end up in the hands of despotic military regimes or even terrorist groups, who could be less hesitant to use them (Heywood, 2011, 72).

The Nuclear Non-Proliferation Treaty (NPT) has played a role in decelerating nuclear proliferation, particularly among developed countries that possess the financial and technological capability to develop atomic weapons. Even when the specific provisions of the NPT were not fully implemented, bilateral treaties between the United States and the Soviet Union helped to reduce tension and promote caution, which may have ultimately helped to bring about the end of the Cold War.

Presentation of the Threat of Proliferation of Weapons of Mass Destruction in the Black Sea Region in the Context of Hybrid Warfare

The previous geopolitical landscape and the circumstances for the dominance of traditional warfare vanished during the past 30 years as a result of the effects of globalization and the decline of broad ideological divides. This created room for non-linear, hybrid, and asymmetric threats. Conflicts may result from the geopolitical environment, which is characterized by the collision of the goals and objectives of out-of-state power centers that express their interests through state institutions, international organizations, or non-governmental organizations. Low intensity and vague kinds of exposure are common features of modern

conflicts. Real security hazards and threats are commonly referred to as hybrid security threats in scholarly and analytical discourse (Mitrovic, 2019).

The Black Sea region is strategically located between Europe and Asia, with several countries bordering its shores. The Black Sea region has seen conflicts in recent years, including the annexation of Crimea by Russia in 2014 which raised serious concerns among other nations regarding territorial integrity/sovereignty issues impacting security across regions (NATO PA, 2023). It is possible to identify a few key factors in terms of the WMD proliferation threat from this regional perception. This area is interconnected and interchangeable with significant countries such as Russia, Turkey, Iran and NATO members like Romania, Bulgaria, and Ukraine. The Black Sea Region offers convenient access to transportation routes that connect different parts of the world. Unfortunately, this also means that there are significant risks associated with the smuggling and trafficking of advanced weapon technologies in the area. These threats must be taken seriously. Conflicts and escalations are frequent in this region. There is always a chance that incidents that escalate instability could lead to less effective countermeasures against WMD proliferation. In return, destructive outcomes and more tension could emerge within such scenarios. We should mention that multiple states have varying capabilities and resources needed for monitoring and managing sensitive material and technologies linked to WMD developments. Lack of adequately enforced regulatory frameworks, suitable governance mechanisms, and limited collaboration among governments increase risks of unchecked power dynamics that could cause long-term destabilization of security across regions.

One of the reasons the notions can appear confused is because hybrid threats and hybrid warfare/war are sometimes used interchangeably. Furthermore, the ideas have been investigated from a wide range of disciplinary perspectives, including political science, history, military studies, strategic studies, security studies, and international relations, to mention a few. The true nature of hybrid threats is further obscured by this mosaic of interdisciplinary analysis. The term

"Hybrid Threats" is used as a catch-all in this report, and the activities falling under this category include hybrid warfare and war (Fridman, 2018, 23-24).

Frank Hoffman, who is frequently recognized as the originator of the concept of hybrid warfare, has stated that his approach is based on multiple schools of strategic thinking, creating a synergy between the notions of hybrid warfare and hybrid threats. Yes, the ideas have changed over time. Hoffman's concept centered on non-state actors such as Hezbollah and Al-Qaida, and aimed to achieve synergistic effects by directing and coordinating their tactical and operational military activities within the main battle space. The concept also included tactics utilized by transnational networks, such as transnational organized crime, and state actors.

At the time Frank Hoffman started to use the “hybrid warfare” label, it was only one of many labels, which also included “New Wars”, fourth-generation warfare and asymmetric warfare amongst others. These were being used by analysts to conceptualize changes in contemporary warfare in line with the idea that war had become “substantially distinct” from older patterns of conflict. There are plenty of other concepts that describe new forms of conflict/warfare: “surrogate warfare”, “grey zone activity”, “raiding”, “unrestricted warfare” (origins Chinese), “reflexive control” (origins Russian), “new generation warfare”(origins Russian), “competition short of conflict”, “active measures” (origins Russian), “non-linear warfare”, “asymmetric warfare”, “compound warfare” “ambiguous warfare”, “political warfare”, “information warfare”, “cyber warfare”. All of these attempt to characterize acts that are strikingly similar to the concept of hybrid threats: operations and interventions that use a variety of tactics to target institutions and states. However, the idea of hybrid threats is unique in that it addresses the problem of democratic systems' structural vulnerabilities as specific targets and makes a strong case for a complete strategy that involves early-on civil-military cooperation (Fridman, 2018, 23-25).

In academic circles, there has been a growing discussion surrounding the idea of hybrid threats. Approximately 9,990 results were returned from a recent Google Scholar search for the phrases hybrid threats and hybrid warfare; the majority of these papers, or about 6,970, were published after 2014 (Fridman, 2018, 23-25). This suggests that the idea of hybrid threats is here to stay. It does not, however, imply that the idea is grasped and accepted in its whole. The terms "hybrid threats" and "hybrid warfare" are employed in a political context in addition to a scientific and military one, which began with the annexation of Crimea in 2014. The term "political use of hybrid threats" refers to the use of a range of instruments to cause undue and manipulative influence, such as the dissemination of false information, the construction of compelling historical narratives that are either entirely false or only partially true, election meddling, cyberattacks, and economic leverage, to mention a few. It is possible that certain behaviors are not inherently unlawful. Since hybrid threats are defined as a collection of activities, one action by itself does not, according to academic study, qualify as a hybrid activity, and in certain situations, the threat element itself may even be called into doubt. Strictly speaking, these behaviors and acts do not make them Hybrid Threats. They do, nevertheless, fit into the category of hybrid threats. Therefore, hybrid threats might be viewed politically as unwanted foreign meddling in the internal affairs and territorial integrity of sovereign states.

The term "Hybrid Threats" refers to a wide range of activities, including operations, campaigns, influence, warfare, and conflict. These actions can all be viewed as unwanted intrusions of one kind or another into a nation's internal territory. Remember that the phrase "hybrid threats" refers to a Western idea used to describe a security conundrum faced by states that either have a democratic state structure or are democratizing. The majority of the Western literature on hybrid threats frames the context in this way. Although the idea has been mentioned in Chinese and Russian works, they did not refer to it as "Hybrid Threats/Hybrid Warfare" until it became well-known in the Western security community. There are examples of hybrid warfare in both Chinese and Russian literature. They assert that hybrid warfare is being used against

them by Western nations. This assertion, which provides strong backing for the state's official viewpoint, is frequently made without providing any background. The references from Western literature are utilized without acknowledging that they describe an act of hostility by a hostile actor against Western nations. There is no mention of this fact.

Three stages were noted in the study, each with varying levels of activity and threat type. This indicates the possibility of an escalation. In this document, these stages are described subsequently. With a few minor adjustments, the phases and actions adhere to a fairly common concept of how a danger develops and could intensify. Although the phases and actions by themselves do not define a threat as hybrid, they are an essential component in comprehending the nature of the threat element associated with hybrid threats since they are part of the threat landscape. An important current discussion pits traditional methods against modern approaches to influence and meddling (Murray and Mansoor, 2012, 56). Both sides of this argument-those who contend that hybrid threats are nothing new and those who view them as a completely new security challenge-have valid points. Senior scholar Mikael Wigell of the Finnish Institute of International Affairs has contended that "many scholars and analysts contest the utility of the hybrid label, criticizing it for conveying little that is new, for being imprecise, or outright misleading. The author called hybrid methods are used alongside more usual deterrence policies" coupled with the term `warfare', critics warn, there is the danger of unnecessarily militarizing the language of international politics with potentially dangerous consequences" (Wigell, 2019, 256). It basically comes down to remembering that the "hybrid warfare" notion has extremely limited use as a tool for analyzing military capabilities and that its analytical utility is debated from the perspective of military-strategic thought.

The structure of the world order has changed recently, and this has had an impact on the stability of the current international security system. International politics have been extremely unpredictable in recent times. The primary goals of international security, which are seen as the

structural components of world politics, continue to be preventing wars and other armed crises and assessing the potential of power. The United Nations Charter (UN Charter, 1945) is linked to the idea of "international security."

Comparative Analysis of CBRN Security Strategies of Romania, Bulgaria, Ukraine, Turkey, Russia, and Georgia

Chemical, biological, radiological, and nuclear (CBRN) security has emerged as a critical dimension of national and regional security in the post–Cold War era, particularly for states situated along NATO's eastern flank and in proximity to ongoing or frozen conflicts. The Black Sea and Eastern European region represents a complex security environment where NATO members, aspirant states, and revisionist powers coexist, each facing distinct threat perceptions, institutional capacities, and geopolitical constraints. This comparative analysis examines the CBRN security strategies of Romania, Bulgaria, Ukraine, Turkey, Russia, and Georgia, focusing on institutional frameworks, doctrinal orientation, international alignment, and resilience capacity. By comparing these states, the analysis highlights structural asymmetries, shared vulnerabilities, and regional implications for CBRN risk management.

NATO Member States: Romania, Bulgaria, and Turkey

Romania and Bulgaria, as NATO and EU member states, demonstrate CBRN security strategies that are strongly embedded within alliance-based and normative frameworks. Their primary strength lies in institutional alignment with NATO's comprehensive CBRN defense architecture, which emphasizes prevention, preparedness, detection, and consequence management (Lentzos & Rose, 2017). Both states have adopted standardized civil–military coordination mechanisms and benefit from interoperability with NATO CBRN units, training programs, and intelligence-sharing platforms.

However, these strengths are counterbalanced by structural limitations. Romania and Bulgaria face capacity constraints, particularly in terms of advanced detection technologies, specialized personnel, and sustainable funding. Their CBRN strategies remain largely defensive and reactive, relying heavily on alliance support rather than autonomous capability development (Hart & Triezenberg, 2019). This dependency represents a strategic vulnerability in scenarios involving delayed external assistance or hybrid threats.

Turkey occupies a distinct position within NATO due to its geographic exposure to conflict zones, migration routes, and non-state actors. Turkey's CBRN security strategy benefits from robust military capacity and operational experience, particularly in border security and counterterrorism contexts. Unlike Romania and Bulgaria, Turkey maintains a more autonomous strategic posture, integrating CBRN preparedness into broader national security and counter-proliferation frameworks (Yanik, 2020). Nevertheless, regional instability complicate coordination, potentially undermining collective response mechanisms in high-risk scenarios.

Non-NATO and Conflict-Affected States: Ukraine and Georgia

Ukraine and Georgia represent a category of security-vulnerable, reform-oriented states operating under persistent external pressure. Ukraine's CBRN security strategy has undergone significant transformation since 2014, driven by active conflict and heightened awareness of hybrid and unconventional threats. Ukraine's principal strength lies in its operational learning under wartime conditions, which has accelerated institutional adaptation and international cooperation (Kuzio, 2022). However, ongoing conflict severely constrains resources, infrastructure protection, and long-term strategic planning, rendering Ukraine's CBRN posture largely reactive and crisis-driven.

Georgia's CBRN security strategy reflects a strong normative commitment to international non-proliferation regimes and partnership with Western institutions. Its strengths

include legal harmonization, international cooperation, and high transparency, particularly in public health–related biological security (Nixdorff & Bender, 2018). Nonetheless, Georgia's limited territorial control, financial constraints, and proximity to Russian military presence constitute significant structural weaknesses. CBRN preparedness remains highly dependent on external assistance and capacity-building programs.

Russia: Centralized and Strategic CBRN Posture

Russia's CBRN security strategy differs fundamentally from those of the other states examined. It is characterized by **centralized governance, strategic integration, and doctrinal opacity**. Russia maintains extensive CBRN capabilities inherited from the Soviet era, supported by institutional continuity and significant state investment (Smithson, 2019). From a strengths perspective, this centralized model allows for rapid mobilization, high-level coordination, and integration of CBRN considerations into military doctrine.

However, Russia's approach exhibits critical weaknesses that undermine regional security. Limited transparency, restricted international cooperation, and the instrumentalization of CBRN narratives for strategic signaling increase mistrust and escalation risks (Lentzos, 2021). Additionally, the fusion of CBRN capabilities with hybrid warfare concepts blurs the boundary between deterrence and coercion, raising concerns about norm erosion and crisis instability.

The European Union is actively involved in mitigating chemical, biological, radiological, and nuclear threats in the Black Sea region, supporting regional states (with the exception of Russia, which has refused assistance) to effectively respond to existing risks and challenges. Significantly, on May 28, the EU announced a new strategy aimed at strengthening stability and security in the Black Sea region. The strategy covers Ukraine, the Republic of Moldova, Georgia, Turkey, Armenia, and Azerbaijan. This clearly demonstrates the strategic importance of this region for the European Union.

Comparative Assessment

This comparative analysis demonstrates that CBRN security strategies in the Black Sea and Eastern European region are shaped less by technical capability alone than by geopolitical alignment, institutional maturity, and strategic culture. While NATO members benefit from structured cooperation and normative consistency, their reliance on alliance mechanisms introduces dependency risks. Ukraine and Georgia exhibit resilience and adaptability but remain constrained by conflict and limited resources. Russia's centralized model offers operational strength but contributes to regional instability through opacity and strategic ambiguity. Enhancing CBRN security across the region will require balancing sovereignty with cooperation, deterrence with transparency, and national preparedness with collective responsibility.

The Impact of the Russia-Ukraine War on Black Sea Regional Security in the CBRN Context

Russia's invasion of Ukraine, initiated on February 24, 2022, is among the most-if not the most-significant shocks to the global order since World War II (Brunk and Hakimi, 2022, 688). Against the background of the ongoing war between Russia and Ukraine, the threat of radiation proliferation and the use of nuclear weapons is emerging before international security. Several rockets fell in the vicinity of the nuclear reactors of Ukraine, directly in the Zaporizhzha Nuclear Power Plant and the Chernobyl nuclear power plant. All this represents a significant risk in terms of security and a direct threat in terms of the spread of radiation. On April 26, 1986, the radiation spread as a result of the explosion of the Chernobyl nuclear power plant in Ukraine covered Eastern Europe, Belarus, the present-day part of Russia, Turkey and the South Caucasus region. According to many experts, it was the worst nuclear disaster in the history of the world. Similar or much worse events could develop if Zaporizhzha Nuclear Power Plant or Chernobyl nuclear power plant sarcophagus were damaged. The dimensions of the threats have increased since

Russia transferred tactical nuclear weapons to Belarus at the end of 2023. After that, Russia conducted the second phase of tactical nuclear weapons exercises in Belarus in parallel with the full-scale war in Ukraine (Lancaster, 2023). Missile units and aviation of the Aerospace Forces, as well as operational-tactical missile complexes, "Iskander" and aeroballistic missiles "Kinzhal" were used during the exercises.

Since Russia's full-scale invasion of Ukraine in February 2022, policymakers in Moscow have regularly employed nuclear rhetoric to shield and further their war of aggression by leveraging the risks of nuclear escalation (Horovitz and Arndt, 2023, 1). A number of other risk variables exist in addition to the numerous warnings from Russian officials, varying interpretations of Russian nuclear policy, and the widespread usage of dual-capable weapons in Ukraine. During the period from February 2022 to June 2023, Russian officials issued over 66 nuclear warnings and 15 escalatory statements to deter western help and coerce Ukraine (Hlatky and Lambert-Deslandes, 2024, 527-528). Russia's nuclear arsenal has loomed large over the conflict in Ukraine. They have been used by Russia to thwart Western backing for Ukraine and intervention. When Russia experiences defeats on the battlefield, it has also tried to control the risk of nuclear war. It's doubtful that these trends will alter very soon. Actually, in order to make up for its conventional losses and further its larger strategic goals, Russia is probably going to depend more and more on nuclear threats. The decision-making processes in Russia are notoriously opaque. Its army has repeatedly attacked the Zaporizhzha Nuclear Power Plant and disregarded nuclear security when it seized control of the Chernobyl Nuclear Power Plant, both of which had the potential to cause nuclear disaster and still could. These examples demonstrate two points. First, there is a lack of general awareness among the Russian military regarding nuclear materials and the potential collateral damage that their actions could bring. Second, the unpredictable and non-professional nature of the Russian forces may result in nuclear catastrophe (Sinovets, 2023: 34). Russia controls the risk of the conflict in Ukraine by using

nuclear weapons. Nuclear hyperbole seems to be used to discourage Western intervention and support for Ukraine, and it is linked to events on the battlefield (Williams, et al. 2024, 8).

Disarmament has solidified itself as the most compelling alternative to the nuclear status quo as a result of the events that have transpired since February 2022. One of the most notable tools used in this story is the TPNW. The nuclear status quo's policies have resulted in ongoing arsenal modernizations, nuclear coercion in the heart of Europe, and a turn away from the arms control measures that previously gave the great powers' disarmament pledges under Article 6 of the NPT some legitimacy. Although the global nuclear order is not disintegrating, Russia's war in Ukraine has made its injustices all too evident (Gibbons and Herzog, 2023, 23). U.S. relations with the Global South may still be hampered by nuclear worries. Additionally, a revival of interest in the TPNW in Europe or Australia may result in significant adjustments to the composition of U.S. defense alliances. It would be foolish to keep ignoring the Nuclear Ban Treaty since the US and its allies should understand the reasons behind this movement and agreement.

The current Russian-Ukrainian war can be viewed in the format of the theory of limited war. The term "limited wars" refers to conflicts with constrained goals or combat capabilities. Generally speaking, states will employ military action if they believe the risks and expenses are "proportionate and appropriate" to the goals they hope to achieve. This implies that they will pick their fights carefully, but it also implies that they might adhere to specific restrictions throughout the conflict in order to lower expenses or dangers. States may impose restrictions on the areas in which they fight, the resources they use, or the goals they pursue. States back their friends in proxy conflicts while completely excluding their own soldiers from the conflict. During the Cold War, limited war was especially interesting since an unrestricted conflict between the US and the USSR would have resulted in nuclear destruction. For the sake of national existence, any crisis or conflict had to be kept to a minimum (Gurantz, 2024, 15).

Concerns about escalation persist in the era of nuclear-armed big powers competing with one another. They are obviously involved in the conflict between Russia and Ukraine. Avoiding war with Russia has been one of the United States' guiding principles, even if it has made a significant commitment to defend Ukraine. The US has not imposed a no-fly zone, sent soldiers into Ukraine, or taken any other steps that could lead to direct combat. The US has been hesitant to provide Ukraine the ability to launch an attack inside Russia. Russia has likewise taken pains to steer clear of direct conflict. Moreover, Russia has not employed nuclear weapons. Both sides are worried about what might happen if the conflict spreads farther than it is now. One of the main aspects of the war's conduct is the boundaries that Russia and the United States have upheld (Gurantz, 2024, 15-16). Within the framework of the nuclear deterrence policy and taking into account the balance of power policy, both sides are well aware of the consequences of using nuclear weapons, which will not only destroy their countries and, consequently, Ukraine, but will also create a major threat to international and global security. This depends on the intensity of the conflict and what resources will be used, including nuclear weapons. Considering that the use of nuclear weapons will cause serious losses to all parties, up to and including total destruction, nuclear states, following the example of Russia and the United States, resort to a pragmatic policy, fearing mutual destruction.

Russia poses a serious threat to the Black Sea region's security in the areas of chemical, biological, radiological, and nuclear (CBRN), as its aggressive war against Ukraine has undermined regional security and stability. This has led to new outbreaks of uncontrolled chemical weapons along the Russian-Ukrainian border, exacerbated by Russia's use of prohibited chemical weapons against Ukrainian soldiers. Russia's active rhetoric about the use of nuclear weapons and the transfer of tactical nuclear weapons to Belarus further weaken already fragile regional security and create new challenges.

Conclusion

As of right now, the acceleration of integration processes and the phenomenon of globalization have led to the identification of security as having a global component. A new meaning of global security has arisen in the languages of international relations and security studies as a result of the significant impact that threats and hazards have on global politics. According to them, states, as international political actors, are required to abide by these ones by maintaining sovereignty untouchable and taking legal action in the event that it is violated. As in other geopolitical regions, the issue of CBRN threats in the Black Sea region is a very relevant issue, especially when military operations are underway in the region in the form of the Russia-Ukraine war and in parallel asymmetric threats, which pose many challenges to regional security policy.

The modern international relations and security environment is characterized by many threats and challenges. Along with technological development, the rise of aggressive non-state groups, extremist forces, and individual terrorist groups has created many threats. Consequently, asymmetric threats are becoming more and more common. Important among them are threats from bioterrorism, which can lead to catastrophic consequences. It should be noted here that the risks and dangers arising from biological warfare pose significant threats and challenges to the international community and the entire world. Biological warfare and bioterrorism can destroy a large number of people and the biosphere in the shortest time and with minimal costs. All this is really a serious problem for global security. Based on all of this, it is necessary to actively develop international cooperation mechanisms to ensure a modern biosafety system. In the light of modern threats and challenges, it is very important to develop scientific research in the field of prevention and control of biological threats. Also, the most important issue is the activation of cooperation between states, and regional and international organizations regarding the prohibition and control of biological weapons and the fulfillment of obligations.

One of the main events in modern international political developments is the military dimension of global security. Any state has at least two obligations towards its citizens: to ensure their *security* and create conditions for any citizen to increase their *well-being* (both material and spiritual). Security covers many aspects of public life and implies the neutralization of completely different types of dangers. This may refer to the physical rescue of a citizen and the protection of their life from a bandit attack or, say, protection from the encroachment of their life by the military force of another country. At the same time, the state must be able to protect its own institutions and the inviolability of the borders of the country, which is primarily carried out by using the military forces and capabilities of the country. In this regard, it is important to discuss a phenomenon in this context, which is an essential component of the security of a country, that is - *military security*. The term ***military security*** itself *means the ability of a state to defend or prevent military aggression from another country or countries (*Maisaia and Guchua, 2020, 10-12*).*

One of the important new dimensions of military security, which determines global and regional security conditions in the military-political context, is the term: **"Geostrategic environment".** Under the auspices of the mentioned term, the *combination of political, economic, socio-technological, and military factors that have a negative impact on the military security of the country* is meant. The components of the geostrategic environment are represented by three important things:

- ✓ **Geopolitical transformation -** the end of US hegemony and the development of a multipolar world order and the emergence of non-state actors or new centers of influence in it;
- ✓ **Military-technical confrontation -** considerable lag in the military potential Defense Forces in the field of offensive weapons and conventional weapons compared to neighboring countries;
- ✓ **The new wave of military confrontation between the states, "arms race" -** the development of the new "Cold War" and its epicenter in the Black Sea area.

It is also worth noting the fact that the modern geostrategic environment at the global level, which clearly experiences high turbulence, was formed after passing through certain evolutionary phases, within which the modern military strategic culture and art were formed.

States have invested a great deal of time and money on preventing the spread of CBRN weapons and getting ready for the possible consequences of CBRN attacks. However, many state and non-state entities still prioritize achieving or maintaining CBRN weapon capabilities.

Chemical, biological, radiological, and nuclear (CBRN) use threats are changing quickly in tandem with technological advancements and shifts in the political landscape. Particularly, the ongoing use of chemical weapons (CW) in armed conflicts has highlighted how flimsy current arms control accords are. A new concern - state-sponsored assassination or attempted assassination-must now be included in national security policy, as evidenced by a number of recent attacks in Asia and Europe that used radioactive materials and deadly poisons. The globe faces significant problems, as evidenced by the confirmed use of CBRN materials in these situations by both state and non-state actors. Therefore, it is critical to recognize the risks associated with the application of CBRN and to comprehend the barriers to regional and global collaboration. In response to the above question, it should be noted that CBRN threats have a significant impact on regional stability, as their detection and timely adoption of preventive mechanisms are becoming increasingly difficult with the development of modern technologies, which have provided aggressive groups with greater capabilities and knowledge in the production and misuse of chemical or biological weapons. In addition, there is a threat of damage to nuclear reactors and the spread of radiation, artificially or naturally, due to technical malfunctions.

The research question presented in this paper, concerning the impact of the threat of chemical, biological, radiological, and nuclear weapons on international security and strategic stability in the Black Sea region in the context of the 2022-2025 Russia-Ukraine war, revealed

key findings related to the need to strengthen regional stability through cooperation and the exchange of strategic information on CBRN threats. A general analysis revealed that regional security policy is quite complex and requires a timely response, conceptualized within the framework of securitization theory and balance of power theory, and sufficiently supported by content analysis and a comparative analysis of the problem. This comparative analysis identified key areas of CBRN security in the Black Sea region that require significant attention and timely resolution. Either being indicated Russia's on fall based military actions, posing CBRN elements threat (including menace of exploitation of tactical nuclear warheads during the warfare zone against Ukraine) toward not only Ukraine but also neighboring areas in order to create balance of terror perception at the regional level.

Comparatively, NATO member states prioritize normative compliance, alliance integration, and resilience, whereas non-NATO partners such as Ukraine and Georgia emphasize adaptive survival and international cooperation under constraint. Russia stands apart through its emphasis on strategic autonomy and centralized control, at the cost of transparency and confidence-building. Across all cases, a common vulnerability emerges in the form of CBRN risk amplification through hybrid threats, cyber vulnerabilities, and infrastructure fragility.

Opportunities for regional CBRN security enhancement lie in strengthened cross-border cooperation, harmonization of early-warning systems, and depoliticized technical dialogue. Conversely, persistent geopolitical fragmentation and declining trust represent systemic threats that undermine collective preparedness and response.

The situation in the Black Sea region is extremely complex in the context of the ongoing Russian-Ukrainian war, where the threat of using nuclear weapons is still relevant. Accordingly, the countries of this region and other global players, including regional and international organizations, must make greater efforts to prevent further escalation of the war.

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