PUBLIC SECURITY CONDITIONED BY EXPLOSIVE REMNANTS OF WARS AND RESIDUAL CONTAMINATION

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Abstract: *The term "security" can be heard every day, regardless of whether it is about individual, public, state, national and international security. Society as a whole wants a sense of security for personal advancement. One of the ways of creating security is accompanied by armed conflicts. The consequences of armed conflicts, in addition to losses, are accompanied by explosive remnants of war and residual contamination. The aforementioned consequences represent a danger that constantly affects the safety of society as a whole and prevents the progress of society. The steps that must be taken are accompanied by obligations in various fields of the public sector, private companies, non-governmental organizations, education, ecology and the development of social awareness of responsibility. The foundation is based on planning, organizing and implementing humanitarian demining. Demining that follows modern achievements in the world, regardless of whether it is technical progress or in the field of social responsibility in terms of passing legal regulations. Long-term practice in the world has indicated the necessity of taking steps towards complete humanitarian demining. Complete demining is necessary due to observed failures to implement demining at depths of up to 0.6 m, which enables the first step towards the use of agricultural land. Due to the approach that soil release is carried out in a "shallow" layer, the phenomenon of residual contamination is present. As such, it prevents the application of the terms social security and social progress. The aforementioned practice, based on the example of the Republic of Serbia, indicated the necessity of solving the issue of residual contamination that reaches a depth of 12 meters. Only with this approach to solving the issue of residual contamination are conditions created for the application of the term safety of society in the conditions of the existence of the danger of explosive remnants of war and residual contamination.*

Key words: *security, society, humanitarian demining, residual contamination*

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1. IN GENERAL ABOUT PUBLIC SECURITY

Today's world is marked by the term "security" which can be heard every day and which is exploited the most. It is used at any time with the desire to describe the desired state in a special way or to indicate the existence of a potential danger that is looming with the aim of endangering the desired state. According to Milosavljevic B., "…we are talking about individual (human, personal), public, state, national (internal and external) and international security (which can be considered as regional, collective and global security), then, about military, political, social, economic and environmental security, etc. There are even narrower terms…". (Milosavljevic, 2014).

Defining the term "security" is not at all easy if one knows the fact, pointed out by Milosavljevic B., "that in the Republic of Serbia there are at least 300 legal and by-laws regulating the field of security" (Milosavljevic, 2014).

In order to have a more complete overview of the definition of the mentioned term, it is necessary to use the etymological approach as a starting point. A significant number of authors were guided by that approach (Caldwell&Williams, 2006, Gacinovic, 2014, Gacinovic, 2014a, Milosavljevic, 2014), so they started "from the Greek word *asphaleia* (asphaleia), which was formed from the word sphallo (mistake, cause of ruin, decay, stumbling, defeat, confusion, disappointment" (Milosavljevic, 2014). The Latin expresion for security *securitas/secures* – „no worries“ (Caldwell&Williams, 2006) is derived from the phrase sine cura, composed of the words sine (without) and cura/curio (trouble, concern, caution, attention, suffering, pain, anxiety, grief, sadness...). Today's forms of the word security in a number of modern languages originate from the aforementioned sources (for example, *sècuritè* and *sûretè* in French, *security* and *safety* in English, *sicurezza* and *scurità* in Italian, , *sicher* and *sicherhiet* in German). (Milosavljevic, 2014) In Serbian term secure meanes “secured from danger, protected, while security is described as the state of one who is safe, secure, a state in which no danger is felt" (Serbo-croatian dictionary, 1990).

Due to various events in the world and our recent history (read the last 30 years), the term "security" often appears alongside the term "safety" (Small political encyclopedia, 1966). The appearance of this term is not a creation of this century. (Stefanovic Karadzic, 1852) In the Serbian language, it is explained as "a state, a characteristic of one who is safe, that which is certain, in which someone or something is not threatened by danger, the absence of danger, security, confidence, confidence, determination, firmness" (Serbo-croatian dictionary, 1990).

All the complexity of the issue and the desire to define security have been expressed centuries ago by many philosophers: Jean Boden, Thomas Hobbes, John Locke. While the aforementioned philosophers dealt with the security issues of people who would be integrated into the community - the state, after the First World War and then after the Second World War, the aforementioned issues gained primacy with orientation towards other spheres of interest. It is especially expressed through the preoccupation of the entire world with the issue of human and international security. The last decades of the 20th and the beginning of the 21st centuries are characterized by considerations of security as an integral category. As Milosavljevic B. points out, “it theoretically contemplates, legally regulates and practices on three basic levels: individual, national and international, that is, as individual, national and international security. In addition, security should be considered separately in five areas or sectors: military, political, economic, social and environmental.” (Milosavljevic, 2014) In further paper, the definition presented by Gacinovic R. will be used, according to whom "security is a state that guarantees the human population the continuity of free functioning from which the processes of building a real sense of freedom, justice and a healthy environment where one can live, work and develop their own intellectual abilities are developed." (Gacinovic, 2014)

Regardless of all the events that characterize the modern world (read conflicts, military interventions, humanitarian interventions, the fight against terrorism...) the need and desire for the human population to develop and live freely imposes obligations on all constituents of society to make maximum understandable efforts to create the necessary conditions for the smooth development of the community and a sense of a healthy environment. In addition to creating a sense of security within its borders, the state has the obligation to undertake measures and procedures that can demonstrate its desire to export security to other states or participate in joint security with the potential it has.

2. EXPLOSIVE REMNANTS OF WARS

With the emergence of man and his subsequent association, communities emerge. The need to fulfill desires resulted in the emergence of conflicts. The development of different types of weapons and technological achievements changes the way (tactics) of conducting conflicts. Consequences are common to all conflicts. Consequences that are reflected in the number of dead and wounded, summing up damage to infrastructure and losses to society in general. With the increase in the use of different types of ammunition and tools, the number of missiles that did not fulfill their basic purpose increased (expressed in the number of killed-wounded people and the destruction of different types of targets - objects). The main purpose is realized by activating a certain amount of explosives that are inside the projectile. In addition to the above, in order to achieve the desired situation, the parties in the conflict resort to activities that are reflected in the placement of various types of mines (anti-personnel, anti-tank, improvised) or simply the placement of certain amounts of explosives in certain locations with the aim of causing losses in manpower to the enemy.

What is an immeasurable danger, after the cessation of armed conflicts in a certain locality, is shown by the fact that not all samples: mines (anti-personnel, anti-tank, improvised), explosives, hand grenades, grenades, mortar mines, missiles, rockets, ammunition for recoilless guns, explosive submunitions (cluster bombs and mines), aerial bombs, guided anti-tank weapons, portable missile systems, anti-aircraft defense systems, long-range rockets, fuses, demining prevention devices, improvised munitions and missiles for drones and other different types of ordnance have served their purpose. In addition to the fact that a large number of the specified types of ordnance (percentage is expressed from 1-2% or even up to 30-40%, depending on a number of factors fired-thrown-placed) (GICHD, 2025) were not activated (due to various reasons). As such, they remain even after armed conflicts, in the localities where they were placed, thrown or discarded.

Due to its characteristics, the definition used is that explosive remnants of war are defined as "unexploded ordnance and abandoned ordnance left by a party to an armed conflict after the cessation of hostilities" (United Nations, 2004). Also, explosive ordnance is defined as conventional ammunition containing explosives. Due to the large number of armed conflicts and the ingenuity of the participants, an omission was recognized in the aforementioned definition of the United Nations (2004) which does not include any reference to explosive remnants of war (hereafter ERW) in the form of improvised explosive devices. In 2020, the threat of cluster munitions was recognized as "an example of ERW that has a long history of conventional use by state actors during warfare" (UNODA, 2020a). Their characteristic that they are "designed to cover an area with their explosive power and produce damage from the explosion of a single projectile, which fragments into multiple smaller explosive ordnance that then detonates over a large area" (Bolton and Nash, 2010). It is important to point out the special type of danger that is expressed through the influence of residual inactivated (unexploded) missiles during their basic use.

Exploziv remnants of war – ERW is a term that refers to unexploded ordnance – UXO and abandoned explosive ordnance – AXO. (GICHD, 2025) A third category called improvised explosive devices – IED can be added to the above, as devices that are constructed and deployed in a non-standard manner, usually using locally available materials, and are often used as a mode of action by non-state actors and insurgents in asymmetric warfare. (Baselt, et. al, 2023) Ordnance is a general term that includes military weapons and ammunition (bombs, rockets, artillery shells, mortars, grenades, etc.) that were used but did not detonate as intended. The aforementioned failure rates depend on a number of factors, such as originality of manufacture, age of the weapon, storage conditions, usage and environmental conditions.

Abandoned explosive ordnance – AXO refers to explosive ordnance that was not used during the armed conflict, but that was left behind or thrown by the party to the armed conflict and is no longer under the control of the party that left or threw it. Abandoned explosive devices may or may not be detonated, fuse armed or otherwise prepared for use.

The most common representatives of abandoned explosive devices are mines (anti-personnel, anti-tank and surprise mines). After the cessation of armed conflicts, they represent an acute problem, a dangerous and expensive obstacle in the area where they were installed, and they manifest themselves in a strong impact on people and the environment. (Blagojevic, et al, 2022) By their effect, in addition to causing loss of human life or injuring people and livestock, they can block access to the area for the delivery of food and medical supplies. (Ember, Kovács, 2020) As remnants of war activities, mines can be found everywhere within the area affected by war events, in fields, roads, agricultural areas, in bushes, forests, deserts, along borders, next to houses, schools and other places. (Kovács, 2008)

In addition to the mentioned dangers, practice has pointed to another danger that the explosive remnants of war present, which manifests itself through negative effects on the population due to the release of chemicals or chemically active compounds in the area where they were abandoned. This can have long-term consequences when the population is exposed to chemicals through contamination of water, soil, food sources and the environment in general. One such example is the presence of depleted uranium, which has had a significant impact on the health of conflict-affected populations and their environment since being introduced into conventional warfare. (UNODA; 2020b) Depleted uranium has a high density, making it a useful component of kinetic weapons such as anti-tank weapons (Murray et al. 2002.) This has led to the widespread use of depleted uranium weapons, with the remnants of the exploded particles being inhaled by those who work and live in and near conflict areas. (Murray et al, 2002). Due to global warming and frequent fires, especially in parts of the territory affected by armed conflicts and contaminated by explosive remnants of war, in addition to the burning of the terrain, there is also an uncontrolled redistribution of radioactive particles - which has a profound negative impact on the health of the population. (UNDRR, 2020)

The armed conflict on the territory of Ukraine has shown new ways of using different types of ammunition and explosive devices. By using different types of drones, conditions have been created so that they can carry different modified ammunition (such as grenades - hand grenades, mortar mines, different types of submunitions - removed from cluster bombs) and mines (anti-personnel or anti-tank). Different types of improvised explosive devices – IED should be added to the above, which are composed of a small quantity of military explosive charge contained within a fragmentation collar and equipped with an impact fuse, either electrical or mechanical, which is designed to operate when it hits the ground or target. (Explosive Ordnance Guide for Ukraine GICHD, 2025) Due to the situation, it often happens that the military fuse system is modified with the deliberate removal of the safety and arming function of the fuse, which usually increases the sensitivity and danger associated with such type of ammunition. As a result, additional problems arise, which are manifested in residual contamination.

3. BASIS OF RESIDUAL CONTAMINATION

The issue of humanitarian demining and creation of safe conditions for the life and work of society is one of the risky issues that is constantly highlighted in the world. A large number of countries are dealing with the above issue. However, in the last 10 years or so, a smaller number of countries have highlighted the problem of residual contamination. The mentioned problem is a natural sequence of events that affects all countries that have had armed conflicts

on their territories. The mentioned issue of humanitarian demining often turns into a problem of residual contamination.

The term residual contamination "refers to contamination resulting in a residual risk that remains after all reasonable efforts have been made to identify, define and remove all presence and suspicion of explosive ordnance through non-technical reconnaissance, technical reconnaissance and/or clearance". (EORE in RCM, 2023)

The starting point in creating a safe environment is taking steps in humanitarian demining (after armed conflicts). Then the greatest attention is focused on the increased risk of mines and visible (surface) unexploded ordnance. As the danger of mines decreases with the increased involvement of state and private participants in humanitarian demining, the issue of humanitarian demining gradually ceases to be the focus of attention. The problem of humanitarian demining is generally dealt with by one or two national (government) agencies and several specialized military/police units. The state government finances the aforementioned resources, while the engagement of commercial clients and investors is done through individual projects only when necessary. (Residual Risk Management - Technical Note 07.14, IMAS, 2020)

The reduction of engagement is directly conditioned by the set goals prescribed by the state and is directly related to the depth of the land that is released (cleared) (see Figure 1). In situations where the priority is focused on the release of agricultural land (which is usually the first and basic requirement) that is cultivated with basic means, the depth of clearing is defined to mitigate the danger of the said community (and is often determined by removing the danger from anti-personnel mines and cluster mines, generally 0.1-0.2 m deep). In situations and on an area that is cultivated with heavy agricultural machinery, the task is called protection against anti-tank mines (in principle up to a depth of 0.5 m). The largest part of the territory is called "liberated from the danger of UXO" after the mentioned works. The reason for this approach is contained in the fact that undertaking work on the release of soil at a greater depth (up to 12 m) requires considerable funds, more complex mechanization and more time. It is precisely in these postulates that the existence of risk, the need to undertake reasonable efforts and determine the necessary financial resources is hidden. Very often, many infrastructure works are disabled due to the "discovery" of various types of explosive remnants of war and unexploded ordnance. As shown in Figure 1, the depth at which ERWs are located can range from 1.0 m to 12 m.

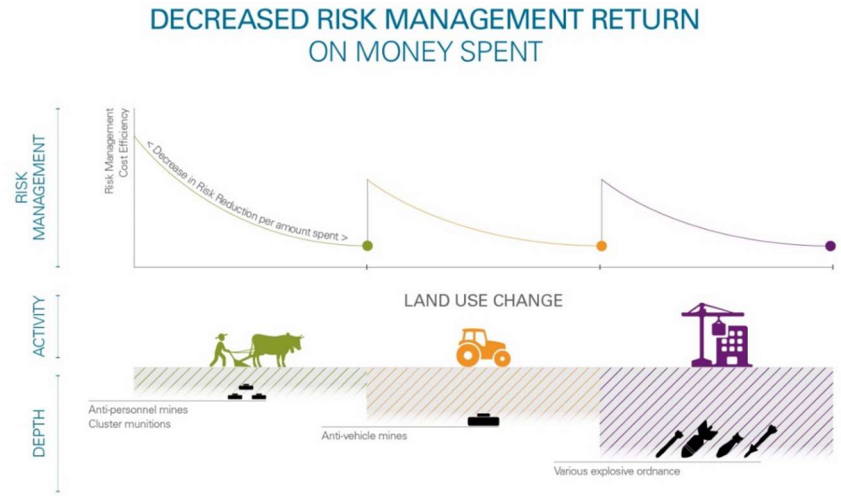


Figure 1: Risk menagement cost effectiveness evolition with change in Lande Use
Source: Residual Risk Menagement - Technical Note 07.14/01, Version 1.0, February 2020, Internatioanl Mine Action Standards (IMAS), pp.12

The depth is determined by a number of factors (mass of ERW, height from which it falls on the soil - water surface, angle at which it penetrates the soil - water, composition of the soil it penetrates and thus the direction of movement, existence and height of groundwater, existence of various natural or artificial obstacles within the soil - water, existence of clay pockets within the soil, etc.). The mentioned factors are very influential in determining the direction of movement and thereby defining the exact location of the ERW. There are not a few examples of individual aerial bombs of significant mass or artillery-rocket projectiles being found hundreds of meters from the place where they penetrated the ground, and even, contrary to common sense, moving downwards - parallel to the ground - up towards the surface.

The remaining samples of ERW and UXO that are inside the ground or under the water surface (rivers, canals, lakes, seas) stay for many years. In order to raise awareness of the dangers of "sleeping killers" the term residual contamination was created. This approach raises the awareness of the community that it is necessary to work on the complete liberation of the area from all remaining ERW and UXO that are located on the territory of the state (regardless of whether they are left over from the last wars or wars that were fought 50-100 years ago). To the above should be added the fact that the term residual contamination includes items of ordnance left after explosions in ammunition warehouses and special industry factories. As an example, the explosion in the military ammunition warehouse in Curpija or the dedicated industry factory in Cacak can be pointed out.

The necessity of taking measures, activities and procedures to regulate the issue of residual contamination is evidenced by the examples that have been implemented in the territory of the Republic of Serbia through various infrastructure projects. Regardless of the fact that the works at depths of up to 0.6 m were realized and the conditions for safe work were created, steps were taken towards a more detailed search at depths of up to 12 meters, which justified the steps taken. Over the past 7 years, a large number of projects have been implemented to release land through humanitarian demining. During the implementation of the works, 22,403 pieces of various types of ERW and UXO were found. Of the stated number, as a result of the explosion in the dedicated industry factory in Cacak, 20,211 pieces of ordnance were found. The complexity of the issue of residual contamination is also represented by the fact that during construction works on infrastructure projects, where there were no signs of EOR or UXO, two aerial bombs were found, which imposed the need to open a humanitarian demining project. 285 pieces of various ERW and UXO were found on projects that are still in progress.

[1]

The risk posed by residual contamination is also reflected in the area of the Danube near the town of Prahovo. The sunken German Black Sea Fleet is still a potential danger today, so the said section is treated as a risky area from the point of view of navigation safety, which is not in accordance with international standards. (Marinkovic, et al, 2024) The remains of the sunken fleet threaten the waterway, because they narrow it from the prescribed 180 m to 90 m. The following values have been defined for the waterway of the Danube River through Serbia: minimum width of 180 m, with an extension of up to 200 m with bends and at least 100 m on sections of the river with a rocky bottom and rapids. (Waterways Directorate, 1988) In order to reduce the risk of ERW, on the waterway, steps have been taken to safely remove a number of sunken vessels. Taking measures and organizing activities on the tasks of

[1] Official data of the Center for Demining of the Republic of Serbia.

removing sunken vessels requires the engagement of significant logistical forces, which will largely cause a partial change in navigation dynamics (at one point, the interruption of navigation for a certain period of time). Undertaking activities for the preliminary removal of scattered and extraction of remaining ERW and UXO found on vessels may cause an increased risk for: current vessels, underwater flora and fauna, operation of the "Djerdap" hydropower plant, oil terminal and ports, transmission line across the Danube River at rkm 862, water intake for the industrial zone. (Marinkovic, et al, 2024) The aforementioned problems with residual contamination are under the jurisdiction of the state because the Law on Maritime and Inland Navigation defines "the question of ownership of sunken vessels and obligations regarding removal". (Law on Maritime and Inland Navigation, 2000)

4. EFFECTS OF ERW AND RESIDUAL CONTAMINATION ON THE PUBLIC SECURITY

The question of the impact of ERW and residual contamination on the public safety comes to the fore when there is an event of the discovery of residual samples of ERW or residual contamination, or if their activation occurs with fatal consequences. Then this issue becomes actualized and continues until the occurrence of some other event that draws the media's attention in that direction. This situation is not something society can be proud of.

The attention that the issue of ERW and residual contamination deserves can best be described as a never-ending threat. The existence of ERW and residual contamination represents a serious risk in a number of aspects (humanitarian, social, economic and political). (Novik, 2023) Based on this, it is necessary to constantly develop awareness of the potential dangers that ERW and residual contamination pose to the safety of society. Taking steps towards the improvement of society is not possible if safe living and working conditions are not created. Examples that confirm the above are: the project of the Chinese factory "LingLong" in Zrenjanin, the project of the international specialized exhibition "EXPO BELGRADE 2027", the project "Belgrade Waterfront", the construction project of the Science and Technology Park in Nis, the project of reconstruction and modernization of the railway Nis-Brestovac, the project of the construction of a gas pipeline through the Republic of Serbia, etc.

Bearing in mind that mines (anti-personnel, anti-tank and improvised) create the greatest fear among the population, a simple suspicion or the mere thought that there are mines or some other type of ERW in a certain area results in avoiding such an area. If it is an agricultural or wooded climate, there will be no farming. As a result, people who live from the aforementioned activities do not have a source of income. In the event of injury or loss of life, additional problems arise, which are manifested by the loss of the working-age population. In parallel with that, the rest of the population (in that region) is creating fear and mistrust in society because it has not created safe conditions for life and work. Also, the state is at a loss due to the lack of food or raw materials. According to those regions, it is not economically profitable to develop road infrastructure or build facilities for the economy. An additional consequence manifests itself through the avoidance of investors to come to that area and open plants and factories, or they will ask for extremely high guarantees, which raises the question of the feasibility for the state to invest.

It is not possible to bring tourists to territories where there is loss of life due to the presence of ERW or residual contamination. No matter how beautiful or rich (in terms of tourist attractions) the area is, it is not safe. By this alone, the state can have multi-million losses due to non-arrival of tourists. (Novik, 2023)

In an effort to secure large infrastructure projects, it is necessary to engage foreign investors who, due to the security situation, demand high insurance rates or require the release of land with state guarantees.

The contents of ERW and UXO, especially if they are home-made explosives, are a potential source of chemical pollution of the environment, with serious negative effects on ecosystems, the atmosphere, water sources, etc. If they remain in the environment for a long period of time, they inevitably pose a threat to people, animals and the environment through their direct action (explosion and fragments), as well as indirect collateral damage to the environment and subtle environmental pollution, which can lead to toxicological risks. (Wang, 2025)

As a consequence of the existence of danger and people's fear of ERW, it can be seen in the example of the impossibility of access to basic infrastructure and its maintenance. If drainage channels or riverbanks cannot be maintained, due to the suspected existence of ERW, they can be the cause of occasional floods. Similar challenges exist along the waterways on the banks of the rivers, which were involved in combat operations during the hostilities of the warring parties. As a result of floods, a flood wave is created that causes water shocks that lift and transport ERW with their force to uncontrolled distances and areas that were previously cleared of ERW, which results in the creation of new areas with an increased risk of ERW. (Hartl, 2014) The next consequence of floods is the creation of landslides, which can also be carriers of ERW in new locations. Examples from the armed conflict in Ukraine testify to this problem, which is evidenced by a large number of incidents reported from coastal locations such as Odessa, where civilians swimming in the sea were killed by naval mines that washed ashore. (Baselt et al, 2023) Also, Tondo reports that „...the Black Sea is covered with hundreds of mines dropped by both sides during the war in Ukraine, which poses a serious threat to people and the reopening of grain transport routes that have been stopped by the naval blockade.“ (Tondo, 2022) In addition to mines, the presence of unregistered weapons and ammunition, which is perceived as a normal occurrence in the Western Balkans, is a danger. After the war, former soldiers and a number of civilians allegedly kept their arsenals of weapons, ammunition, hand grenades and various anti-tank weapons in their homes. (Baselt et al, 2023) In order to avoid searches, they kept them buried in the ground or threw them into the river. The occurrence of floods and their transport to undefined localities creates new dangers from ERW.

Due to the existence of ERW and residual contamination in rivers, canals, lakes and seas, a great risk arises in the organization of river or sea transport. The increased risk imposes a large increase in the insurance amount for the ship. This leads to an increase in transport costs and the extreme uncompetitiveness of goods (transported by ships) on the market. The existence of ERW and UXO in the water represents an additional danger to the environment. Due to the prolonged stay of ERW and UXO in water, there are real possibilities of leakage and bioaccumulation of toxic ingredients from corrosive munitions that threaten ecosystems, because it is known that some chemicals used in munitions are highly toxic and carcinogenic and have been proven to contaminate living organisms and the surrounding soil and groundwater. (Novik, 2023) Due to the above, one of the proposals is to carry out high-order underwater detonations (ie, an exothermic reaction wave that follows and maintains the supersonic shock front in the explosive). At the same time, the proposals rely on the mentioned method as primary because it is cost-effective, can be used for a wide range of ammunition and does not require sophisticated infrastructure and equipment. (Cottrell & Dupuy, 2021) The main disadvantages of using this method are explosive effects, such as explosion and shock wave, ground shaking and the creation of flying debris. (Naval Explosive Ordnance Disposal Technology Division, 2023) The mentioned procedure is prohibited in some countries due to the consequences that occur on the living world and flora within the aquatic world. (Ministry

of Defense [UK], 2013) Due to the great environmental pressures, proposals have been made for some alternative ERW cleaning techniques, such as the freezing technique, use of robotic equipment, cutting with abrasive water suspensions, photolytic destruction of explosive materials, etc. (Koschinski & Kock, 2015; Verfuss et al., 2019)

An additional danger is the fact that the aging and deterioration of ERW, which manifests itself through the influence of water on the metal parts of the ammunition - eg. shell thickness - due to the metallurgical composition, alloys, condition of the main explosive charge, environmental conditions (temperature, water flow, salinity, etc.) has consequences that allow the leakage of chemicals and the instability of the ERW itself, which prevents safe destruction. (Novik, 2023) Leakage - leaking of chemical substances is a potential source of damage to receptors in the environment and can pose a major environmental threat (such as RDX TNT and its derivatives, known for their toxicity and carcinogenicity and proven to contaminate living organisms, as well as the surrounding soil and groundwater). (Pennington et al., 2008; Talmage et al., 1999; Maser & Strehse, 2020; Novik, 2022; in Novik, 2023)

5. STEPS TO REDUCE THE DANGER FROM ERW AND RESIDUAL CONTAMINATION, THE EXAMPLE OF THE REPUBLIC OF SERBIA

The starting point for reducing the risk of ERW and residual contamination is the available forces engaged in humanitarian demining tasks. In areas for which the Ministry of Defense is responsible, the available capacities of the Ministry of Defense are engaged. Taking into account that the areas that need to be freed are large, situations may arise where it is not possible to meet the given deadlines. In such cases, the available capacities of accredited private companies can be engaged, but through the competent Government agency - Center for Demining of the Republic of Serbia (hereinafter CfD RS).

For other spaces, if ERW or samples of residual contamination are discovered, the authorities of the Ministry of Internal Affairs are responsible for undertaking the necessary activities towards safe destruction. (Law on Disaster Risk Reduction and Emergency Management, 2018)

When engaging in projects, in order to find, identify and remove ERW on a given area according to the corresponding project, accredited private companies and non-governmental organizations are engaged whose engagement is approved, supervised and controlled by CfD RS, i.e. it performs quality assurance and quality control.

In order to achieve the set safe results, legal frameworks have been defined that enable the release of surfaces. Back in 1997, the problem of residual contamination was recognized as a consequence of both world wars, so the Rulebook, which is still in force today, defined that when earthworks are carried out on old war sites or warehouses, it is mandatory to check the existence of unexploded projectiles and other dangerous objects and substances before starting the work. (Regulations on occupational safety during construction works, 1997) The aforementioned had to be recognized and regulated by legal regulations, and the Law on Planning and Construction stipulates that in areas that were exposed to war actions, a check for the existence of residual explosive devices is also carried out, in accordance with the law. (Planning and Building Act, 2023)

By the way, the procedures for protection against UXO, which include activities related to reconnaissance, marking, finding, excavation, security, identification, removal, transport, temporary storage and destruction of UXO, are regulated by the Regulation on Protection against UXO. This Regulation directly refers to humanitarian demining, but as it was adopted in 2013, there is a clear need to amend it or adopt a new by-law or legal act that would harmonize the procedures with the new international standards for mine action that have

appeared in the meantime. The Demining Center tried to bridge the perceived gap by creating 3 new standards, through a project supported by the Norwegian National Aid, when it agreed with an external expert on the draft text for the Standard on Quality Management, Land Release and Vocabulary. (Center for Demining RS, 2025)

The aforementioned steps are driven by the need for constant monitoring of changes that inevitably accompany the discovery of new ERW and residual contamination. The changes are conditioned by the application of modern technological achievements in the field of weapons and their application, as well as changing the customs of warfare. In parallel with the mentioned changes, it is important to point out the changes in the awareness of the population and society as a whole about the need to constantly supplement the issue of ecology, economy and social arrangements in order to improve such societies.

It is important to point out that measures, procedures and activities are being undertaken to meet the solution of the problem. As a prime example, we can point out the situation with the ERW on the Danube River in the Prahova region and the subjugated Black Sea Fleet of Germany. The above example has existed for 80 years, and only in the last 10 or so years have concrete actions been taken to solve this problem. A problem that goes beyond previous knowledge about possible solutions. A problem in which the attention of Europe and the world is focused on solving.

Solving this problem, the Demining Center created the ERW Protection Project during the removal of 21 sunken vessels in the Danube River near Prahovo, number 0314/24, whose goal is to protect people and equipment from ERW and create conditions for the safe removal of the sunken German fleet from rkm 857 to rkm 862, removal of identified anomalies and ERW to the level of the Danube River bottom of 23.22 m above the level of the Adriatic Sea. The contractor is obliged to remove 21 sunken vessels by applying one of the four defined methodologies:

- Underwater cutting of wrecks and raising parts of vessels, which requires significant involvement of divers
- Lifting of the entire wrecks with special ropes and using two heavy cranes with a capacity of 400 tons each, which also requires significant diving work
- Handeling whole vessels or parts of vessels using a large grab and a 400-ton crane, which requires the least amount of diving work
- Digging holes under the wreck and sinking these wrecks deeper into the bed; that is, the practical burial of wrecks

So far, the contractor has removed 4 sunken vessels. A large amount of EOR found on one ship (estimated between 1500 and 3000 pieces of various types of UXO)[2].

The need for the development of the state and society, through capital investments and infrastructure projects, could have been greatly slowed down and probably prevented. The reason lies in the fact that for the last 70 years, not enough attention has been paid to ERW records and the issue of residual contamination. Thanks to the responsible and professional approach of CfD RS, timely steps were taken towards defining priority projects, securing the necessary financial resources (from the Republic of Serbia, the USA, the European Union and the countries of the world) and engaging accredited companies and NGOs that were able to safely and on time realize the assigned projects.

[2] Data base CfD RS

The achieved work results speak best about the attitude towards the assigned tasks:

- Project to reduce the risk of ERW on the route of the gas pipeline on the section Belgrade – Valjevo,
- The project for the cleaning of ERW on the gasification route of Eastern Serbia,
- ERW cleanup project at the "Innovation District" location, Kragujevac,
- ERW cleanup project at the site of the National Stadium, Surcin,
- Project for cleaning surfaces from ERW in the Piece 4 area, on the E-763 Preljina - Pozega highway section,
- Project for cleaning the surface of the expressway - IB row of the state road no. 21, Novi Sad - Ruma "Fruskogorski Corridor",
- The project for the cleaning of ERW at the site for the construction of a bridge over the Danube River as part of the construction of the bypass around Novi Sad and others.

In the desire to develop capacities that would improve the successful resolution of the issue of ERW and residual contamination, CfD RS opened an Innovation-Educational Park for training and testing, where various trainings are carried out in cooperation with instructors from other countries, as well as in cooperation with the Geneva International Center for Humanitarian Demining. In this way, our country expresses its willingness to participate in the community of anti-mine activities as a responsible member who takes steps to create a safer society. In addition to various types of courses (training), a significant contribution was achieved through the integration of all subjects within the Republic of Serbia who are interested in contributing to the improvement of society's capacity to solve ERW and residual contamination issues. It is enough to cite an example of organizing the presentation of innovations of young talents in the field of humanitarian demining, within the „Galaxy cup“.

6. TASKS FOR IMPROVING THE PUBLIC SECURITY REGARDING ERW AND RESIDUAL CONTAMINATION

Defining the tasks that would raise the safety of society in relation to the issue of ERW and residual contamination to a higher level requires a versatile approach. The tasks, through legal regulations, could be grouped as follows:

- Defining the obligations of the public sector,
- Defining the obligations of private companies and NGOs that want to deal with issues of humanitarian demining,
- To more fully and meaningfully define the responsibilities for persons engaged in humanitarian demining operations,
- Taking steps to raise awareness of the responsibility of the entire community (incorporation of certain topics into curricula (from the level of primary education, and conclude with the faculties - civil engineering, agriculture, veterinary)) and apostrophizing the need for proper action in case of encountering ERW or residual contamination,
- Developing awareness of social responsibility regarding humanitarian demining and strengthening national capacities that can be used to help other countries, through the sharing of lessons learned, knowledge and skills. Such an approach would raise the reputation of our country as a responsible member of the world community that exports

security. Also, through the mentioned activities, the persons engaged in humanitarian demining would be interested in further work, as well as the accession of new persons.

One example of raising awareness is the adoption of regulations regarding health and safety in the construction sector, which can be used as a basis for the obligation to carry out education on the risk of explosive remnants of war for construction workers. An example of improving safe behavior can be Germany and the United Kingdom, where assessments related to the existence of ERW and other risks must be carried out before the start of any construction work. (EORE in RCM, 2023)

Tasks aimed at developing capacity for training persons who will be engaged in humanitarian demining tasks according to valid domestic and international standards are aimed at long-term goals. In addition to the aforementioned training, it is important to develop capacities for quality control through the training of persons who will be able to engage in such tasks. The indispensable part that needs to be developed is focused on risk management in the tasks of removing ERW and residual contamination by creating a national methodology for risk assessment based on the national standard SRPS.A.L2.003 Safety and resilience of society - risk assessment[3], Edition 2025.

In accordance with modern experiences, it is necessary to consider the necessity of removal and creation of conditions for safe disposal (until destruction) when making decisions on how to deal with discovered ERW and samples of residual contamination. Priority must not be given to the choice of a particular technique, but attention must be directed to the choice of the safest and most environmentally acceptable option for each individual situation, with constant risk mitigation measures being taken. If the above is ignored, there is a risk that the safest, fastest, least resource-demanding and most environmentally acceptable method will result in an increased social and ecological risk. (Novik, 2023) This measure is particularly pronounced when freeing the space from ERW and samples of residual contamination that are located under the water surface.

The realization of education about the existence of the danger of ERW and residual contamination in primary and secondary schools should be systematically defined. In this way, to a certain extent, positive habits could be developed in the population to refrain from independently finding, moving or destroying ERW. There are various examples of people moving the found cluster bombs from the discovered location to their plot of land with the aim of clearing a part of their property (cultivable land or forest) from vegetation and thus obtaining cultivable land.[4] These examples are not isolated. (EORE in RCM, 2023) The next group with which education should be carried out are persons engaged in collecting various forest fruits. A possible solution to the issue of education could be to innovate the curricula of primary and secondary schools, as well as the contents of various initiatives for health, development or nature conservation.

In accordance with the level of development of social networks, it is necessary to use such an opportunity. There are not a small number of examples of social networks being used for the purpose of faster transmission of appropriate material with messages (contents used for planned and purposeful information and at the same time training). In this way, certain groups could be influenced to avoid unsafe behavior and unauthorized entry to military and police shooting ranges in order to collect metal (most often it is remains - fragments of grains or shells, and in certain cases unexploded parts of missiles) which are then handed over as

[3] See more at: https://iss.rs/sr_Cyrl/project/show/iss:proj:109381

[4] The above example was announced in 2022 by BiHMAC representatives at the annual conference of the Center for Demining of the Republic of Serbia.

secondary raw materials, in order to secure financial benefits. The aforementioned activity is necessary for a more complete understanding of the possibility to minimize the negative consequences on the social and environmental environment..

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