

ENVIRONMENTAL RISKS AND STRATEGIES FOR SUSTAINABLE DEVELOPMENT IN MARTIAL LAW CONDITIONS

The study examines the multifaceted impact of military action on the environment, paying particular attention to the devastating consequences for natural resources, ecosystems and human well-being. War causes significant pollution of the air, land and water resources, as well as the destruction of biodiversity through explosions and the destruction of infrastructure. The study also analyses the difficulties that arise in environmental control and nature conservation in conditions of military conflict, along with possible ways to protect the environment. It emphasises the need to support community initiatives and implement advanced technologies for monitoring the state of the environment.

War is one of the greatest destroyers of the environment, as it causes significant changes to the natural environment, the destruction of infrastructure and the depletion of resources. In wartime, safety and survival become priorities for society, pushing environmental issues into the background. However, even in such difficult circumstances, it is extremely important to think about preserving the environment, as this has a long-term impact on people's well-being and the stability of natural ecosystems.

Armed conflicts lead to soil degradation, water and air pollution, deforestation, and the disruption of biodiversity. The destruction of industrial facilities, fuel depots, and chemical plants often results in toxic emissions and contamination, creating long-term ecological threats that are difficult to eliminate. Military operations can also damage agricultural land, reduce food security, and accelerate climate-related risks.

At the same time, martial law requires the development of special mechanisms for ensuring sustainability. These mechanisms include the rational use of natural resources, the introduction of emergency environmental monitoring systems, and the implementation of effective waste management practices. It is also important to integrate environmental safety into national security strategies, as ecological stability directly affects the health of the population, the resilience of infrastructure, and the prospects for post-war recovery.

Preserving the environment during war is not only a moral obligation but also a practical necessity. Neglecting ecological issues in the short term may lead to irreversible consequences that complicate reconstruction and sustainable development in the post-conflict period. Therefore, even under martial law, environmental protection should remain an integral part of public policy and international cooperation.

Preserving the environment is everyone's responsibility, regardless of our age, where we live or what we do. Environmental challenges affect the quality of our lives and physical well-being, as well as the fate of future generations. Even small efforts by individuals can have a significant impact when they become part of a collective action. Understanding that every action counts helps to foster a responsible attitude towards nature and the world around us.

The war in Ukraine, which has been ongoing since 2014 and gained new momentum in 2022, has not only resulted in the loss of human lives and the destruction of buildings. It has also left a deep mark on the environment. Combat operations, including bombing, artillery shelling and the use of heavy military equipment, have led to a serious deterioration in the environmental situation, including pollution of the air, water resources and soil, as well as the destruction of natural habitats.

Explosions release toxic substances and heavy metals into the atmosphere, which later accumulate in the soil and groundwater. The destruction of industrial plants, oil depots, and energy facilities has caused large-scale contamination, increasing the risk of chemical leaks and long-term poisoning of ecosystems. Rivers and reservoirs are particularly vulnerable, as damage to water infrastructure and the use of weapons near water bodies often result in pollution that threatens both human health and aquatic biodiversity.

In addition, the extensive use of heavy military machinery compacts soil, accelerates erosion, and damages agricultural land, reducing its fertility. Forests and protected areas have also suffered from fires and deforestation caused by shelling and explosions, leading to the loss of unique flora and fauna. This disruption of natural habitats not only undermines biodiversity but also affects the resilience of ecosystems that are essential for climate regulation, clean water supply, and sustainable agriculture.

The environmental consequences of war in Ukraine are not limited to direct destruction. They also include indirect effects such as increased greenhouse gas emissions from fires and explosions, waste accumulation from military operations, and the uncontrolled spread of hazardous materials. Together, these processes create long-term ecological risks that will require years of recovery and significant financial resources to overcome.

Explosions and fires, which go hand in hand with military battles, release excessive amounts of toxic agents into the air. These include heavy metals, radionuclides and chemical compounds. This situation leads to a deterioration in air quality and, as a result, has a negative impact on human health. Contaminated soils lose their suitability for agriculture, which calls into question food security.

Forest fires caused by shelling, as well as large-scale destruction of green spaces, are dealing a devastating blow to Ukraine's flora and fauna. The decline in biodiversity has far-reaching consequences for ecological stability. Nature reserves and national parks, which are refuges for many endangered species, are suffering the most.

The bombing of industrial enterprises and key infrastructure often results in chemicals entering rivers and groundwater. This causes pollution of waterways, which has negative consequences for local flora and fauna and can also

threaten the water supply to the population. For example, accidents at factories or the destruction of sewage networks cause hazardous substances to enter water bodies.

Armed conflicts affect many areas of life, as they lead to environmental disasters, the repercussions of which will be felt for decades and have a significant impact on both society and the state structure. Let us analyse the key aspects of the impact of war and related problems.

1. The impact of war on the environment

War causes multifaceted damage to nature. Military actions lead to the destruction of forests, damage water resources and soil, cause the death of various species of plants and animals, and also worsen air quality due to explosions, fires and the use of harmful substances. In Ukraine, in particular, the situation has been exacerbated by the war, as military operations destroy nature reserves and forests and pollute agricultural land.

Bombing and artillery shelling leave behind contamination with heavy metals and other toxic substances. These substances get into the soil and water, harming not only plants and animals, but also human health. For example, fuel and oil spills from attacks on infrastructure lead to groundwater pollution.

2. Difficulties in preserving the environment during war

Preserving nature during war is complicated by a lack of resources and changes in government priorities. Specialists who usually monitor the environment and implement nature conservation measures often switch to other security-related tasks. In addition, war complicates access to protected areas, making it impossible to monitor their condition.

3. Environmental initiatives in wartime

Even in the difficult circumstances of war, certain measures can be implemented. These include, in particular:

Development of operational response plans: Implementation of emergency environmental response protocols, such as cleaning up hazardous spills or restoring forests and water bodies damaged by military operations.

Support for community initiatives: Volunteer groups can organise litter clean-ups, tree planting and environmental education activities, even in relatively safe areas.

Use of modern technologies: The use of drones and remote monitoring allows for the control of the ecological situation by recording facts of pollution and damage to natural resources.

4. Environmental restoration after the end of the war

Once military operations have ended, it is critically important to begin immediate restoration. This includes clearing explosive remnants, regenerating forests, repopulating flora and fauna, and conducting soil and water analyses to assess the extent of pollution and plan further work. It is also necessary to develop new legislation to ensure environmental protection and compensation for damages.

Environmental protection during wartime is not only a matter of ecology, but also a vital prerequisite for the future of the country and its population. Support for environmental initiatives, both from the state and the public, is a key element in preserving the natural environment in these extremely difficult times.

One of the main priorities should be the integration of environmental considerations into national security and recovery strategies. This involves developing legal frameworks that ensure accountability for environmental damage, creating effective mechanisms for monitoring ecological risks, and promoting international cooperation in addressing war-related environmental consequences. Transparency in reporting environmental losses and risks is also crucial, as it allows both domestic and international stakeholders to understand the scale of the problem and take timely action.

International support also plays a critical role. Collaboration with global environmental organizations and donor institutions can provide Ukraine with technical expertise, financial resources, and advanced technologies for remediation and sustainable reconstruction. Moreover, documenting and publicizing cases of environmental damage caused by military aggression can strengthen the international legal framework and contribute to holding perpetrators accountable.

Finally, it is important to view environmental protection not as a secondary task, but as an investment in long-term security and development. The health of ecosystems directly affects the availability of clean water, food security, energy stability, and public health—all of which are fundamental for the resilience of a nation during and after conflict. By prioritizing sustainability today, Ukraine lays the foundation for a safer, healthier, and more prosperous future for its citizens.