

# *Environmental Warfare – Modern Global Challenge*

<https://doi.org/10.31713/MCIT.2024.103>

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**Abstract** — The article is devoted to the study of ecological wars as one of the main modern global environmental challenges to humanity. Interest in the problem of ecological warfare is due to the significant influence of natural factors on the economic component of states. Analysing ecological warfare through the characteristic features of modern global environmental challenges to humanity, theoretical conclusions are confirmed by practical examples from the world history of South Vietnam, Yugoslavia, Kuwait, Azerbaijan and Ukraine. The author analyses the concept of ‘ecological warfare’ and distinguishes it from other similar concepts. The author’s concept of ecological warfare, which should be understood as a set of actions, measures taken by adversaries in the course of a protracted in time with a certain intensity of armed conflict, the parties of which as the main (or predominant) means use the destruction (significant destruction) of the environment, the consequence of which can become an ecological disaster. Of particular interest is the conclusion that the consequence of environmental warfare is an ecological catastrophe that can jeopardise the existence of humankind.

**Keywords** — environmental warfare; modern global environmental challenges to humanity; environmental crimes; armed conflict.

The term "war" is practically not used in the legal literature; the term "armed conflict" is used. The term war is used to refer to the declaration of a state of war. Recognition of a state of war is an act by which either the government of the country on whose territory an armed conflict takes place recognises that the latter is a war subject to the full range of laws and customs of war, or the government of a third state concludes that this armed conflict is a war in respect of which it intends to take a neutral position (David, 2000). Almost all major wars have had eco- logical consequences (Akhundov, 2024). An effective way to undermine the enemy's economic potential and reduce its combat power was the impact on the biosphere elements or technogenic objects in the course of military operations. Therefore, environmental consequences are not a distinctive feature of environmental warfare (Akhundov, 2024). In order to qualify actions as environmental warfare, it is necessary to analyse the causes, reasons, means, methods, consequences, and consequences of the war.

The programme has been designed to promote the development of a sustainable use of natural resources, natural objects, and the environment as a whole.

Traditionally, the literature identifies several close concepts of "ecological warfare":

purposeful technogenic impact by "non-military" means on certain parts of the biosphere and outer space, which inevitably leads to natural cataclysms, weather and climate changes, ozone holes, as well as destruction of ecosystems, violation of physical and mental health of the population (Krylova, 2001);

deliberate impact on the natural environment in order to create unfavourable conditions for human life - destruction of the habitat of enemy troops, equipment and weapons, undermining the economic potential, psychological, political pressure, etc.;

Damage to the enemy by affecting its environment: pollution or contamination of air, water, soil, destruction of flora and fauna (Akhundov, 2024).

In our opinion, these definitions do not adequately reflect the essence of environmental warfare. For example, a terrorist act may also fall under the content of both definitions. But the commission of a terrorist act of a single character cannot be considered a war.

In our opinion, environmental warfare is a set of actions, measures taken by adversaries in the course of a prolonged in time, with a certain intensity of armed conflict, the parties of which as the main (or predominant) means use the destruction (significant destruction) of the environment, the consequence of which may be an environmental disaster.

Scientists are interested in the problem of ecological warfare because of the significant influence of natural factors on the economic power of states. Ecology has a direct, though not determinant, impact on the development of forms and methods of armed struggle and on the nature of warfare. ‘Active influences on natural processes make it possible to create the simplest and most cost-effective destructive means, which would produce results that would leave all other types of weapons of mass destruction far behind. In addition, natural conditions can be affected remotely, at a considerable distance from the place at which the ‘strike’ is directed, which creates favourable opportunities for covert warfare.

Countries with well-developed technology for active environmental impacts for military purposes can pursue a policy of ‘environmental blackmail’ against States that do not develop such technology and do not establish means of control and counteraction. In the modern

world, there are already methods of active environmental impact for military purposes, which include artificial destruction of the ozone layer, dispersion and formation of clouds and fog, initiation of earthquakes, creation of tidal waves such as tsunamis, impact on tropical cyclones, use of atmospheric currents to transport radioactive and other substances, creation of disturbance zones in the ionosphere.

Each of these methods poses a danger not only to the parties to the armed conflict, but also to other states. For example, characterising such impacts on the natural environment, American scientists have found that a decrease in the average annual temperature in the USA by just one degree, accompanied by an increase in precipitation by 12.5 per cent, would lead to such an increase in the number of diseases among the population that the total economic losses could amount to more than \$100 billion a year. Similar changes will lead to a decrease in wheat yields in the main grain-producing countries (USA, Argentina, Australia, Canada, France) by 15-17%. For Russia these figures will amount to 20-37 % due to its own physiographic and climatic conditions.

There are a number of reasons for classifying environmental warfare as a temporary global environmental challenge to humanity:

the environmental character of the act. Analysing military practice, it is possible to identify a distinctive trend - the environment is considered a direct object of military action, which changes the goals and nature of modern warfare (armed conflicts). The difference between environmental warfare and conventional warfare is the implementation of specially designed programmes (operations) aimed at the total destruction of the natural environment or local destruction of the ecological system on the enemy's territory to facilitate the fulfilment of strategic or operational-tactical tasks to the maximum extent possible. For example, the military-strategic Operation Ranch Hand during the Indochina War is a clear example, where tropical ecological systems, rather than military installations or enemy forces, were targeted. The goal of the operation was to provoke a large-scale man-made ecological catastrophe, achieved by using conventional types of military equipment and specially designed warfare designed exclusively for the destruction of the natural environment;

global manifestation. The consequences of environmental warfare are extremely severe and can affect ecological interests. The United States has a history of targeting the interests of several states. For example, in South Vietnam, during the Second Indochina War (1962-1975), American troops carried out targeted and large-scale extermination of fauna and flora for several years. In the history of military affairs, this war was the first war in which one of the warring parties attempted to completely destroy the environment. According to the data provided by V.V. Dovgusha and M.N. Tikhonov, 50 per cent of the territory of South Vietnam and some areas of Laos and Cambodia were sprayed with toxic chemicals, 43 per cent of crops and 70 per cent of coconut palm groves were destroyed, 44 per cent of the forest area of South

Vietnam and 13,000 km<sup>2</sup> of rice fields were damaged, 2 million inhabitants were killed and maimed, 60,000 American soldiers were poisoned.

Analysing the results of the impact on the environment of Indochina during Operation Ranch Hand, it can be stated that the greatest damage was caused to the ecological systems of the peninsula (agricultural plantations, mango forests, tropical forests (jungle), accelerated degradation of soil ecological systems, laterisation and soil erosion. The fauna of South Vietnam and the whole of Indochina changed. Later, the negative impact of FR on humans was recorded.

According to A.G. Busygin, the ecological war in Kuwait assumed even greater proportions. "In the short days of this war, NATO forces dropped 84,000 to 88,000 bombs on Iraq, and their weight exceeded the tonnage of Allied bombs during the Second World War. Iraq responded by blowing up Kuwait's oil wells and burning oil (destroying four times Kuwait's annual oil production). According to satellite observations, the 100-metre-high heatwaves spewed 50,000 tonnes of sulphur dioxide and 180,000 tonnes of soot and carbon dioxide into the atmosphere every day. The consequences of this environmental war are extremely severe. Seven million barrels of oil flowed into the Persian Gulf, into the drinking groundwater, and soot and carcinogens into all life on the surface. About 30,000 soldiers in the half-million-strong US army were affected by an unknown disease, and their families now have children with pathological deformities and Down syndromes". NATO's Operation Desert Storm caused catastrophic consequences in the form of meteorological cataclysms as far as the North Caucasus and Crimea;

The consequence of ecological warfare is an ecological catastrophe, which threatens human existence. Usually an ecological catastrophe is understood as a natural or human-induced disaster that has a long-term (often irreversible) negative effect on the environment and human beings, spreading over a large enough territory.

Specially generated environmental disasters, which are of particular danger, usually occur as a result of ecological wars (or wars with ecological consequences), terrorist acts with ecological consequences (ecological terrorism). Even the limited use of special means or military equipment against environmentally dangerous technical objects or components of the biosphere can lead to irreversible destruction of the environment over a wide area.

During the conflict with Yugoslavia in 1999, a humanitarian catastrophe unprecedented in modern Europe was triggered, which turned into an environmental disaster. The attack on Yugoslavia used many weapons that are prohibited by international conventions (cluster bombs, depleted uranium munitions, etc.). These weapons were a threat not only to military infrastructure, but also to the lives of citizens and the environment. About 10 tonnes of depleted uranium were dropped on Yugoslavia during the bombing campaign, destroying the natural biogeosystems of Yugoslavia;

is always an intentional act. The means of waging environmental warfare may include: physical extermination of fauna and flora, damage to the environment by various agents of biological, chemical or physical nature, provoking a man-made disaster by means of the development of new technologies. The assessment of warfare is determined by the possibility and availability of means of defeat and tactics of their use. The assessment of ways of warfare is determined by the possibilities and availability of means of defeat and tactics of their application. Environmental warfare uses not only means specially created for the destruction of the environment, but also weapon systems with a different original purpose (weapons of mass destruction, conventional weapons, non-lethal weapons, etc.). The warfare means used are of a complex nature, which increases the effectiveness of their destructive effect on the environment.

For example, during the Second Indochina War, the "carpet bombing" method, the most environmentally destructive method, was used to completely destroy vegetation and animal life on a 65-hectare "carpet" of land by dropping 93 bombs from one aircraft. Thus, 26 per cent of the territory of South Vietnam was destroyed. Since mid-1967, so-called vacuum bombs have been used to clear jungle landing sites for helicopters and aeroplanes. The development of a programme to modify weather conditions in combat areas is also known, the content of which consisted in the creation of artificial showers, which were caused by the use of special chemical reagents in clouds, breaking the mechanism of filtration. There were also attempts to stimulate typhoons and floods in the coastal zone of Vietnam.

During the previously mentioned Operation Ranch Hand ("RH"), mangrove forests were severely damaged. More than 80 per cent of the mangrove forest area was treated with phytotoxic formulations.

This effect was achieved due to the increased sensitivity of mangroves to mountainous preparations (phenoxyherbicides, which are part of most FRs). The subsequent decay of dead trees and erosion of the coastal soil aggravated the ecological situation.

The sharp decline in species diversity and numbers of animals and birds was caused by the use of chemical and explosive weapons against OPS. During Operation RH, the species composition of the affected rainforest fauna was almost completely changed: traditional populations of small mammals were replaced by rodents, while large mammals were virtually eliminated.

According to official data, 30 per cent of South Vietnam has been treated with phytotoxic formulations, with mangrove forests treated once or twice and tropical forests, which are important for climate and ecological system regulation and determine biocapacity, treated up to four times, killing 60 to 100 per cent of the trees. Huge areas of jungle (about 1.6 million hectares) were burned with napalm charges, which is known as the "moonscape" due to the complete absence of shrub vegetation and burnt earth.

As a result of the damage to the most important producers, it became impossible to restore the ecological system. Subsequently, the affected areas became overgrown with low-value bamboo forests or elephant grass, preventing the restoration of the forest ecosystem. The craters created by the intense bombardment of the jungle filled with water and became breeding grounds for malaria mosquitoes and tropical malaria. The use of the Grad system (BM-21 122-mm division 122-mm field multiple rocket launcher system) to shell Tskhinvali resulted in the release of hazardous chemicals - raw materials and intermediates of the weapons used, which led to their concentration in the atmosphere exceeding levels comparable to the use of chemical weapons. A salvo of 40 fragmentation-explosive shells provided for the defeat of openly located troops on an area of 1046 m<sup>2</sup>, and of unarmoured vehicles - on an area of 840 m<sup>2</sup>.

One of the striking examples of the impact of military conflicts on the ecosystem is the aggression of Armenia against Azerbaijan. The occupation of Nagorno-Karabakh has resulted in extensive ecological degradation, which can be described as "ecocide." This situation necessitates the assignment of criminal liability. Armenians perpetrated acts of environmental terrorism on these territories for nearly three decades. The complete eradication of the fauna and flora in the Karabakh region was carried out prior to its transfer to Azerbaijan. The forested regions encompassed a total of 247,352 hectares and are home to over 460 species of wild plants and shrubs. Seventy of these species are endemic, meaning they are not found in any other region of the world. A total of 968 hectares of trees, which are listed on the IUCN Red List, were also deforested and exported from the Kalbajar region. In addition, they torched residences and ignited trees before departing from the area. Water resources were utilized by Armenian officials as a means of exerting political influence. Armenia obstructs the flow of water sources and significantly contaminates them with hazardous substances. Consequently, the utilization of these water sources becomes unfeasible, rendering them unsuitable for both potable consumption and agricultural irrigation (Akhundov, 2024).

Another example of the impact of military conflicts can be given by the example of the conflict between Russia and Ukraine. The Russian incursions into Ukraine have caused extensive devastation to the steppe grasslands, which currently account for a mere 3% of the area in southern and eastern Ukraine. Approximately 20 steppe species, which are rare and endangered, are thought to have vanished as a result of the war. These plants are primarily found in the Black Sea peninsula of Crimea, which is considered the largest area of endemism in Ukraine. There are 44 plant species in this region that are exclusive to this area and cannot be found anywhere else on Earth. Furthermore, it is asserted that Ukraine's protected territories have endured significant damage as a result of the Russian military operations conducted in Ukraine. Lyudmila Denisova, the Ukrainian Parliament Commissioner for Human Rights, highlighted that approximately one-third of Ukraine's nature reserve fund is under risk of destruction. The Luhansk Nature Reserve, Black Sea

Biosphere Reserve, Askania-Nova Biosphere Reserve, National Nature Parks "Azov-Sivasky" and "Dzharilgatsky", arboretum "Trostyanets", and other designated areas have experienced significant levels of damage. According to Afanasyev (2023), the Kherson Hydrobiological Station has incurred significant damage. In eastern Ukraine, the Ministry of Environmental Protection and Natural Resources of Ukraine (2017) documented the impact on 60 protected sites. The conflict had a significant impact on the biodiversity, leading to a decline in the number of uncommon animal and bird species (Akhundov, 2024).

Thus, environmental warfare is one of the major contemporary global environmental challenges to humanity.

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