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THE ENVIRONMENTAL EFFECTS OF WARFARE (EXAMPLES FROM THE SECOND HALF OF THE 20TH CENTURY TO PRESENT)

A HADVISELÉS KÖRNYEZETTERHELŐ HATÁSAI (PÉLDÁK A 20. SZÁZAD MÁSODIK FELÉTŐL NAPJAINKIG)

It is beyond question that the conduct of war has significant effects on the environment, given the main objective of war has always been victory and everything apart from it was irrelevant. Although, recently there are attempts for environmentally conscious thinking, except these are true only for advanced military forces, so far. The article presents a few examples from the middle of the 20th century to show what environmental impacts have been brought on the ecosystem of each regions affected by the wars on larger scale on Earth and what forms of damage were typical of these conflicts. The author discusses issues in a chronological order.

Keywords: war, ecosystem, pollution, biodiversity, natural assets

A háborúk környezetterhelő tevékenységeihez nem fér kétség, hiszen az elsődleges cél mindig is a győzelem megszerzése volt, minden más pedig ennek alárendeltje. Igaz, napjainkra megjelentek a hadviselésben azok a törekvések, melyek a környezettudatosabb gondolkodást tükrözik, bár ez még csak a fejlett haderőkre jellemző. A cikk néhány példán keresztül bemutatja, hogy a XX. század közepétől a Földünkön zajló nagyobb volumenű háborúknak milyen környezetterhelő hatásai voltak az adott régió ökoszisztémájára, és melyek azok a károkozási formák, amik jellemzőek voltak az adott konfliktusban. A szerző időrendben tárgyalja a fennálló kérdéskört.

Kulcsszavak: háború, ökoszisztéma, szennyezés, biológiai sokféleség, természeti érték

INTRODUCTION

There is no doubt about the burden on the environment caused by a war, in other words, it is its consequence. If we look back in history, we can see that this was always the case. On the other hand, damage also grew with the development of technology and with the appearance of new equipment. This way, though it was easier to fight a battle and win it, consequently the environmental damage grew, too. This tendency started with the 1st and the 2nd World War and it extended in the following decades. After having recognized this fact by the 21st century the leaders of the developed military forces started to become environmentally conscious but there was a long way leading to this realization.

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If we look at the 20th century, especially at its second half, the wars fought in the different parts of the world, it can be seen that each one is characterized by the destruction of the environment of a given region and its ecosystem. The aim of this article is to show with some examples in chronological succession, with one exception of illustration of the nuclear attack on Hiroshima and Nagasaki, wars and conflicts of the 2nd half of the 20th century with the emphasis on their influence on the environment. Chart 1 shows the chronological order conflicts to be described.

Date	Conflicts
1945	World War II (Hiroshima and Nagasaki)
1965-1973	Vietnam War
1967- 1975	Cambodian Civil War
1990-1994	Rwandan Civil War
1991	Gulf War
1998-2000	Ethiopian-Eritrean War
1998-2003	Second Congo War
2001-	War in Afghanistan
2003-2011	War of Iraq
2006	Israeli-Lebanese Conflict

Chart 1 Armed conflicts in chronological order (own editing)

HIROSHIMA AND NAGASAKI

In 1945 at the end of the 2nd World War the American military attacked two Japanese cities with nuclear weapons. The first bomb exploded over Hiroshima on the 6th of August 1945, the second one attacked Nagasaki on the 9th of August [1].

In Hiroshima at the moment of the attack 100 000 people died and at the end the number grew to 200.000. In Nagasaki 70 000 people died at the moment of the attack and the final number of the victims was between 70 000 and 150 thousand. [2] These events led to tragic consequences from the environmental point of view. The detonation of an explosion of a bomb of this magnitude causes the release of radioactive elements which pollute each component of the flora and fauna whether it's a land or water based creature. [3] At the moment of explosion, besides human loss, a significant number of plants and animals was also destroyed [2] and survivors were exposed to radiation and suffered from burns [4]. Dust particles resulting from the blast and the fires caused air pollution, the radioactive dust clogged wells that provided potable water and the surface water supplies became polluted [2]. The detonation pulled out trees together with their roots. Their leaves burnt down [4], consequently it did not spare agriculture either since it became destroyed within a 7 mile radius of the blast [2]. Figure 1 illustrates the measure of the destruction.



Figure 1 Nagasaki after the attack [5]

VIETNAM WAR

After the USA entered the war they had to face the fact that if they want to adapt to the circumstances there they need to apply drastic measures. Since the knowledge of the land features, the jungle environment and consequently, the guerilla way of fighting was appropriate for the Viet Cong, which is why cutting out forest trees seemed to be the best solution. This was achieved by using herbicides, leaf destroying materials, heavy machinery and different types of bombs.

Between 1965 and 1973 the USA used about 14.3 million tons of munition in Vietnam. Half of this amount was used by the air force with the blasts of different types of bombs. It is worth mentioning the existence of a 15000- pound B- 82 type bomb. It was characterized by not leaving a crater after the detonation. However, it destroyed everything within the radius of 3 hectares. This is shown in figure 2. Because of bombings there were about 20 million craters in that area, which highly influenced the ecosystem and those living there. [6] For the purpose of forwarding bulldozes were used to build roads and to establish defense stripes. This heavy machinery weighed 20 tons and they were equipped with 20 ton razors [7]. Smaller scale deforestation started in 1966 but starting from 1968 this machinery capable to destroy vast territories of forests was used in large scale. 2% of the entire territory of Vietnam was involved [6]. For plantation pruning the so-called "rainbow colored" herbicides and defoliants were used. The term "rainbow color" comes from the color of the barrels where they were kept. According to their color they were differentiated as Agent Orange, Blue, White, Green, Pink and Purple. As estimation, 72.4 million liters were used on 2.6 million hectares. [6]

The above- mentioned methods of forest pruning caused significant damage involving almost the entire territory of Vietnam. The completely destroyed areas took up 4% of all agricultural lands, that is about 417 000 hectares. As the result of the war the flora and fauna of the Southern mangrove swamps also disappeared. The amount of the damage of the mangrove forests in the south of Vietnam reached 124.000 hectares. Usage of herbicides damaged not only people living there but plants and animals as well, causing illnesses, deaths.



Figure 2 Detonation place of B-82 bomb [8]

CAMBODIAN CIVIL WAR

The war that was fought between the 70s and the 90s can be responsible for the illegal deforestation [9] which was the main environment damaging activity [2]. The main reason for this was that the opponents financed their military spending from tree industry and saw production. [9] During the Pol Pot-led Red Khmer regime 35% of Cambodian forests disappeared. Deforestation also caused severe floods which damaged rice production, so there was shortage of food. [2] Moreover, this activity endangered habitats.

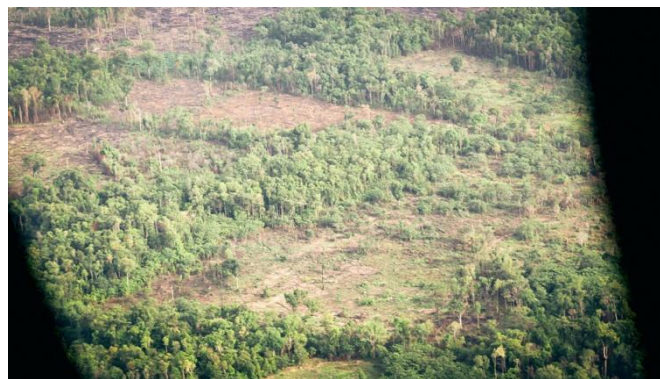


Figure 3 A forest in Cambodia after logging [10]

RWANDAN CIVIL WAR

During the civil war between April and July 1994 more than 2 million people lost their homes and became refugees. The fleeing population found refuge in ecologically sensitive places. The remaining forests in Ruanda provided habitat for protected plants and animals, which became endangered, too. [11] One of such habitats was the Nyungwe National park which hosted 190 types of trees, 275 types of birds and 12 prime mammals. The fleeing people cut trees and hunted animals for survival. In the outskirts of the Virunga National park 720 000 people lived in camps where they also cut trees to survive. [12] By the middle of 1996 these activities involved 105 km² where a 35 km² territory was completely destroyed.



Figure 4 A refugee camp in Rwanda [13]

THE GULF WAR

On the 17th of January 1991 the UN allied forces started an attack against Iraqi forces who occupied Kuwait. As a response, the withdrawing Iraqi troops started to burn Kuwaiti oil wells whose number was 700. As a result the smoke caused by the burning wells hid the sun, which resulted in temperature dropping. The burning oilfields let out about half a billion tons of polluting material into the air [14]. These particles harmed not only human health but the ecosystem of the region as well. The flying carbon deposit covered the desert plantation causing difficulty for them to breathe. The burning oil wells were tried to be put out by sea water which enhanced the amount of salt in the soil. [2]

Besides oil burning, the other significant problem was that millions of oil barrels poured into the Persian Gulf. [15] These affected both the land and the water. A poisonous microlayer developed on the surface of the water, its temperature dropped which was dangerous for its inhabitants. [14] The oil pollution painted the coasts black, more than 25 000 birds died and

even more had to leave their habitat [14] The oil pollution reached the desert affecting 50 thousand km² of its territory. [2]

It is worth mentioning pollutions of smaller volume but no less significant ones which were caused by the war. Bombings – besides letting out pollutants during detonation – destroyed chemical and sewage facilities which polluted sources of potable water, so illnesses developed. Movements of the heavy machinery caused land erosion where moving dunes appeared. [2] The amount of petrol used during the war was enormous.



Figure 5 Burning oil wells in Kuwait [16]

THE ETHIOPIAN-ERITREAN WAR

The war was between 1998 and 2000 and it resulted in the death of millions and caused 75 000 people to become refugees. This war lasted for several decades. [2] During the war the droughts affected both sides, so there was food shortage and it led to a famine. The situation was complicated by the fact that the Eritrean agriculture became a target which caused further quality changes. [2] Mines deployed during the war caused problems for the agriculture and shepherding. [2] In Eritrea the need for wood caused deforestation.

Military vehicles and explosives caused enormous destruction in forests and habitats. This led to serious problems in the ecosystem resulting in worsening of the water quality and food production. The war influenced water pollution, caused land erosion and affected endangered species. [17]

SECOND CONGO WAR

The war lasted from 1998 to 2003 until temporary government took over the power. During the conflict more than 3 million people died and further 2 million became refugees. [2]

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During the war the battles and the millions of refugees destroyed the forests inhabitants and their habitat. These events seriously affected the protected areas. [18]

The protected territories which provided refuge for many endangered species were often used for exploiting resources found there. The population of elephants diminished considerably because of the poachers. Farmers started to use trees in agriculture. Moreover, logging was also practiced by poachers. One of the estimates done by the WWF showed that the population of hippos reached 29 000 30 years ago but by 2005 this number was only 900. [2] The Virunga National park suffered serious losses because of the armed forces and the nearby refugees, since 36 million trees were cut in the park and they hunted for gorillas and other animals. The Garamba National park not far from Sudan was also the place for the attacks of the Sudan soldiers, they also hunted endangered species.

THE WAR IN AFGHANISTAN

In October 2001 the USA attacked Afghanistan. The region of the war suffered serious environmental degradation during the years. It was impossible to get fresh potable water because of water infrastructure destruction, different bacteria and water expropriation. [2] Moreover, this was accompanied by the pollution of the underwater stock, which was caused by the waste yard nearby. [2] During the war Taliban continued illegal logging causing significant loss in forests which was further complicated by the American bombings. Today only 20% of the territory is covered by forests. [2] Bombings were also dangerous for the wildlife of the country. Several big cats found refuge in the mountains but most of their habitat was disposed by the army. [2] The route of the migrant birds leads through Afghanistan, too. Their number diminished during the years. These birds fly towards the watery habitats in the south –east of Kazakhstan. Due to bombings the water the birds use during their migration becomes polluted, so there is a danger that they have to find a new migration route. [19] Because of different explosives polluting agents are released in the air, the soil and the water [2] which is further complicated by cassette bombs, landmines and other ammunition endangering biodiversity and the natural landscape. [19]

THE WAR OF IRAQ

During the war which started in 2003, there was burning of oil wells like in the case of the above- mentioned Gulf war, though in this war it happened in much lesser extent. The released burning components are as dangerous for the organisms as in the previous examples. [14] Moreover, there were other polluting sources here, too. The usage of the white phosphorus was dangerous for all environmental elements. Attacks against chemical establishments were also an ecological risk. There was an example of an Iraqi Sulphur plant burning for two months. [2] Regarding the soil the movements of the heavy machinery cause land compression. The destruction of military and industrial machinery causes metal pollution. [2] There is a danger in the physical impairment of the desert, especially of the layer produced by the millimeter-sized microorganisms which prevent land erosion. [12]

ISRAELI-LEBANESE CONFLICT

The environmental consequences of the conflict, which started in 2006, include water and air pollution and problems caused by forest fires. They affected not only the opponents but several countries of the region. [20] Following an Israeli bombing a power station got damaged in South Beirut where oil containers poured between an estimated 10 000 and 35 000 tons of oil into the sea. [20] According to estimates an area of about 90 km² and 150 km² was involved at the coast. [20] This caused the disappearance of the fish population and endangered the habitat of the green sea tortoises. Besides at the power plant at several places pollution was detected, for example carbohydrate pollution. After the bombing of the ghabrisi cleaning factory a significant amount of chemicals poured into the soil and the water. [20] The conflict caused several other environmental problems, such as handling solid waste, pollution associated with dangerous medical waste, damaged sewage systems, forest fires caused by bomb explosions which involved 3000 hectares of forests in the northern region of Israel. [20]

CONCLUSION

There is no doubt that wars damage the environment. The term “Ecology of warfare” has already dealt with this topic, the present article simply supports this term. The above-mentioned examples highlight the topic, though only certain characteristic cases were discussed from wars of the 20th and 21st century.

Ecological thinking pertaining for developed military forces is a progressive phenomenon which can define the warfare of the future. However, it cannot be a solution for less developed regions. If we have a look at wars in Africa the opponents do not have modern equipment and the question of environment protection was not important at all. The survival of the migrating population caused by the wars was the main priority even if protected ecological areas were involved. In conflicts of such underdeveloped regions as Africa national solidarity, aid shipments, camps providing proper living opportunities and a mediation from outside with the aim of lessening the number of war victims, whether they are human or ecological victims.

BIBLIOGRAPHY

- [1] The Atomic Bombings of Hiroshima and Nagasaki, The Manhattan Engineer District, June 29, 1946; Url: <http://www.atomicarchive.com/Docs/MED/> 2017.03.17.
- [2] S.M ENZLER.: Environmental effects of warfare, The impact of war on the environment and human health, 2006, Lenntech; Url: <http://www.lenntech.com/environmental-effects-war.htm> 2017.04.01.
- [3] KYLIE L.: Environmental effects of the atomic bomb, Sciencing; Url: <http://sciencing.com/environmental-effects-atomic-bomb-8203814.html> 2017.03.17.
- [4] Dr. Mary D.: How nuclear bombs affect the environment, Seattlepi; Url: <http://education.seattlepi.com/nuclear-bombs-affect-environment-6173.html> 2017.03.17.

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- [5] The United States Strategic Bombing Survey, The effects of atomic bombs on Hiroshima and Nagasaki, Chapter III: How the atomic bombs work; Url: <http://www.ibiblio.org/hyperwar/AAF/USSBS/AtomicEffects/AtomicEffects-3.html> 2017.03.17.
- [6] J. R. McNeill, CORINNA R. U.: Environmental Histories of the Cold War. German Historical Institute, Cambridge University Press, 2013, pp.215-218, 227-256
- [7] DONN A. S.: Vietnam Studies, Mounted Combat In Vietnam. Department Of The Army, Washington, D.C. 1989, pp.147-148
- [8] PETER A. L.: The explosive power of a Daisy Cutter; Url: <http://peteralanlloyd.com/the-vietnam-war/the-explosive-power-of-a-daisy-cutter/> 2017.04.10.
- [9] RHETT B.: Cambodia; Url: <http://rainforests.mongabay.com/20cambodia.htm> 2017.04.03.
- [10] ANDREW C.: Elites are threatening Cambodia's Forests, United Nations University; <https://ourworld.unu.edu/en/elites-are-threatening-cambodias-forests> 2017.03.25.
- [11] TARA M.: Ice Case Studies, Rwanda and conflict; Url: <http://www1.american.edu/ted/ice/rwanda.htm#r4> 2017.03.25.
- [12] War and the environment, Worldwatch Institute; Url: <http://www.worldwatch.org/node/5520> 2017.04.04.
- [13] MICHAEL S.: Audiovisual Library of International Law, Statue of the International Criminal Tribunal for Rwanda; Url: <http://legal.un.org/avl/ha/instruments.html> 2017.04.02.
- [14] SPENCER F-G, MICHELLE D.: The environmental consequences of the war on Iraq, A Green Party press office briefing; Url: <https://www.greenparty.org.uk/files/reports/2003/The%20Environmental%20Consequences%20of%20the%20War%20on%20Iraq%202.htm> 2017.04.06.
- [15] TOM H. H.: Ecology of war & piece: Counting costs of conflict, University Press of America, 2000, p.54, ISBN 0-7618-1787-5
- [16] Toxic remnants of war network, What the environmental legacy of the Gulf War should teach us; Url: <http://www.trwn.org/blog-what-the-environmental-legacy-of-the-gulf-war-should-teach-us/> 2017.04.02.
- [17] WUHIBEGER F. B.: Fundamental Consequences of the Ethio-Eritrean War [1998-2000], Journal of conflictology, 2014
- [18] Democratic Republic of Congo; Url: <http://rainforests.mongabay.com/20zaire.htm> 2017.04.02.
- [19] JOSHUA F.: The war of Afghanistan's environment; Url: <http://www.counterpunch.org/2010/01/07/the-war-on-afghanistan-s-environment/> 2017.04.08.
- [20] ANDRIY S.: Environmental Implications of the 2006 Israel-Lebanon Conflict; Url: <http://www1.american.edu/ted/ice/lebanon-war.htm> 2017.04.07.