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The Environmental and Ecological Examination of the Life Cycles of Operations, the Emerging Challenges in International and National Practice²

A hadműveletek életciklusainak környezeti-ökológiai szempontból történő vizsgálata, felmerülő kihívások a nemzetközi és hazai gyakorlatban

Abstract

In the beginning of the 20th and especially in the beginning of the second half of the 20th century, the effect of the military forces on the environment became enormous due to new military technological issues. Subsequently, questions of this area started to be examined and several studies appeared on this matter.

From the point of view of the present article, the international study "The ecology of the warfare" is the definitive one, since following its triple, well distinguishable in time topic area can the military operations (military forces) and the ecological circumstances be examined. The life cycles of the military operations can be placed properly in the timeline of the above- mentioned study's subject matter, so the topic will be discussed in parts mentioned in the division of the study.

Keywords: ecology, environment, military forces, degradation, reconstruction

Absztrakt

A haderők környezetterhelése a XX. század elejére, de főleg a XX. század második felére óriási méreteket öltött, ami köszönhető volt az új haditechnikai megoldásoknak. Ezért elkezdték vizsgálni ennek a kérdéskörét is, amiből már számos tanulmány született.

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Jelen cikk szempontjából a „Hadviselés Ökológiája” elnevezésű nemzetközi tanulmány a mértékadó, hiszen ennek a hármas, időben jól elkülöníthető szakaszos tematikája mentén haladva kerül vizsgálatra a hadműveletek (összességében a haderők) és az ökológiai értelemben vett környezet vizsgálata. A hadműveletek életciklusai időben jól elhelyezhetőek az előbb említett tanulmány időrendi tematikájában, így az abban szereplő felosztás mentén fejezetekre bontva kerül tárgyalásra a téma.

Kulcsszavak: ökológia, környezet, haderő, degradáció, helyreállítás

INTRODUCTION OF THE TOPIC

The defence of our environment from ecological point of view as well as the preservation of our ecosystem and its values, poses a growing challenge in our days. Among the reasons is the ever growing population, matching urbanization, growing industries matching growing needs, inclusion of natural lands into agriculture, negative aspects of the environment change and last but not least, the ever present warfare. In the present case warfare is especially emphasized, because this area in its nature is environmentally destructive and harmful which was emphasized by the explosive growth of the military technology, starting from the 1st and the 2nd World Wars. From the second part of the 20th century more and more sophisticated equipment appeared easing victories in battles, but this was very harmful for the environment.

In the recent years military science and interdisciplinary science areas examine the connection between this area and the natural habitats, ecosystems. An international study named “The ecology of the warfare” is very significant in its explanation of this question. The main point is that the operations are divided into three well defined time periods: the time of war preparation, the war itself, moving into peace, after the war reconstruction. Later there was an examination of what characteristics and volume of environment damage applied to each phase. This division into three parts describes a massed operational life cycle, meaning that the elements of the lifecycle can be placed in this three-part division. The traditional elements of the lifecycle are the following: planning, pre-deployment, deployment, rotation, re-deployment, post-deployment, “lesson learned”.³ (1)

The present examination of the topic, for easier understanding and transparency, will move on the above-mentioned division in three parts, so the separate life cycles will not be examined separately, but the topic will be placed into the proper timeline.

We can examine the forms of environmental burden characteristic for the military forces moving along the above-mentioned division. Among those there are some that are existent at all times, but there are ones that are specific for just a certain period of time. It is obvious

³ Environmental Guidebook For Military Operations, 2008, p.9
https://www.defmin.fi/files/1256/Guidebook_final_printing_version.pdf

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that efforts taken to have a “green” mindset are more and more important in the military. International environmental rules support moving in this direction which help lessen the ecological footprint of the military forces. However, the aim of this article is to show environment harming factors, both in international and domestic relation, that are really characteristic of the above- mentioned times.

BASIC ECOLOGICAL NOTIONS

The ecosystem is “an open ecological system that embodies the relationship between living beings and their inorganic surroundings”.⁴ (2) According to a different notion the ecosystem is nothing else but the grouping of the association (biocenosis) and the place of habitat (biotope).⁵ (3) “Several complexes of ecosystems make up a biome which is a unified extended places of habitat and this is the subunit of the s- called zonobioms defined by climatic zones”. A full series of zonobioms makes up the biosphere⁵ (3) which is part of the earth’s rock cover (lithosphere), water cover (hydrosphere), air cover (atmosphere), where there is life and biological processes take place.”⁵ (3) Natural values are part of nature protection, “they are such geological, hydrological, plantation, animal, scenic and cultural values and habitats, the preservation, maintenance are valuable because they are valuable scientifically, esthetically, economically and they are also valuable due to their rarity or they are threatened to change, disappear or become extinct.”⁶ (4)

PEACETIME AND THE TIME OF THE GENERAL TRAINING AND PREPARATION OF OPERATIONS

ENVIRONMENTAL BURDEN IN THE EVERYDAY OF MILITARY FORCES

In the everyday maintenance of the military forces, including peacetime, there is an enormous flow of material and energy. The use of fossil fuels, the maintenance of the buildings, heating, the satisfaction of energetic needs, weapon testing, military exercises and trainings and the equipment necessary for these activities, they all influence the ecological footprint of the military forces. However, there are environmentally friendly technologies, that show the presence of ecological mindset in the military, but they are still characteristic of countries of developed militaries and significant means like the ones in the USA. Beside the above-mentioned, the question of waste is also a big challenge which exists not only at wartime but in peacetime, too. Waste of the military forces can be connected to:

- weapon development,

⁴ Dr. Bihari Zoltán, Dr. Antal Zsuzsa, Dr. Gyüre Péter: Természetvédelmi ökológia, tankönyvtár, 2008 http://www.tankonyvtar.hu/hu/tartalom/tamop425/0032_okologia/ch04s06.html

⁵ Dr. Godó Zoltán: Agro-ökológia, 2011 http://www.tankonyvtar.hu/hu/tartalom/tamop425/0021_Agro-okologia/ch01s03.html

⁶ Környezetvédelem, Szaktudás Kiadó Ház Zrt., 2008 http://www.tankonyvtar.hu/hu/tartalom/tamop425/0032_kornyeztvedelem/ch17.html

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- trainings and military exercises,
- everyday maintenance of the military forces,
- technical ageing,
- disarmament treaties,
- last but not least, military activities.

A significant part of waste is made up of different types of dangerous waste. A couple of examples of dangerous waste at the military forces:⁷ (5)

- “solvents used for cleaning metal,
- pesticides,
- lubricants,
- different metals,
- liquids for metal work,
- chemical elements for different types of explosives,
- pyrotechnical materials,
- other chemical materials.”⁷ (5)

It is necessary to take care of the secure and regulated storage, handling, safe elimination and disposal. If it is not done, there may be different problems, such as pollution, even an ecological catastrophe. Moreover, some types, radioactive materials, explosion dangerous materials, may pose security risks if they get in the wrong hands. That’s why it is crucial to take care of protection of waste of military origin. The appearing pollution may contaminate the soil, the on- the- ground and the under- the- ground water supplies, the flora and the fauna as well as humans may get harmed. That is why there are strict international and domestic regulations, both for civilians and the military, of how to handle and store waste, especially dangerous waste. The following regulations exist in our country, including the military, for the gathering and temporary storing of waste:

- Transportation routes must be covered with hard paneling.⁸ (6)
- The given collection point needs to be protected with complex property defence devices, such as gates, electronic warning systems, entrance protection.
- The storage of the waste needs to be built on a base, that resists the chemical effects of the waste, have load bearing capacity and to be leakage proof.⁸ (6)
- It is necessary to prevent water from rain to get into the storage and to penetrate into it.⁸ (6)
- When establishing the storage, it is important that packaging material or the damage of the collection device would not get damaged.⁸ (6)

⁷ H. Patricia Hynes: Military hazardous waste sickens land and people, Truthout <http://www.truth-out.org/news/item/2377:military-hazardous-waste-sickens-land-andpeople>

⁸ Környezetvédelmi és Vízügyi Minisztérium, Veszélyes hulladékok gyűjtése, begyűjtése, szelektív gyűjtése és tárolása http://www.kvvm.hu/szakmai/hulladegkazd/hulladegkazdalkodas/hulladegkezeles_gyujt.html

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- The detailed description of the operation and checking of the storage place should be regulated by the operator.⁸ (6)
- There needs to be a plan for the reduction and aversion of possible operation problems or accidents.⁸ (6)
- It is necessary to have a prevention and damage assessment plan to evade the environment damaging effects of possible accidents.⁸ (6)
- The material of the waste collection bin needs to be properly chosen taking into account the storage of different materials side by side, since they may react with each other or with the chemical makeup of the storage vessel.
- The storage vessel needs to have a checking laboratory kept on the settlement, as well as a monitoring system.⁸ (6)
- The producer or the possessor of the waste must keep records.⁹ (7)
- The storage of the waste can be resolved for not more than three years, then the operator of the storage facility needs to take care of the final placing and elimination.⁸ (6)
- Storage can be both in open and closed devices.⁸ (6)

Here are some examples of the waste in the Hungarian Defence Forces:

- “ammunition, explosive and pyrotechnical materials,
- oil remnants,
- organic paints and solvents,
- accumulators,
- inhibitor, insulation, staunching and sticking materials.”¹⁰ (8)
- “oily sludge,
- tires polluted with oil,
- oily sand or absorbents,
- sludge or the oily sludge catcher,
- petrol not proper for flights,
- cloth polluted with dangerous materials,
- air filters,
- residue of storage cleaners”¹¹ (9)

It is necessary to clarify the legal regulations pertaining to dangerous waste which apply for the Hungarian Defence Forces:

- In NATO the environmental questions are asserted through STANAG 7141. STANAGs mean standardization of NATO agreements. NATO STANAGs were

⁹ Közép- Tisza- vidéki Környezetvédelmi és Természetvédelmi Felügyelőség, Hulladékokkal kapcsolatos adatszolgáltatási kötelezettség <http://ktvktvf.zoldhatosag.hu/menu/hataridok/hulladek.htm>

¹⁰ Barta Erik: A veszélyes hulladék kezelés a Magyar Honvédségben, Szakdolgozat, NKE-HHK 2014.

¹¹ Szabó Zsolt: Veszélyes anyagok és hulladékok tárolásának, kezelésének lehetséges biztonságtechnikai megoldásai a katonai repülőtereken, ZMNE BJHMK Repülő és Légvédelmi Intézet http://www.repulestudomany.hu/folyoirat/2011_1/2011_1_Szabo_Zsolt_1.html

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- implemented to the Hungarian Defence Forces when Hungary became a NATO member. There is a special part in the agreement dealing with handling of waste.
- To take the environmental guidelines of the EU as guidelines in our country the 2012 CLXXV. law concerning waste handling is the one that determines the tasks of waste handling.
 - 225/2015 (VII.7) law regulates the detailed handling of dangerous waste.
 - “The 440/2012 (XXI.29) government law includes, pertaining to the military forces, the obligation of the record keeping and data provision of waste and regulates in detail record keeping of the settlement, the obligation of data provision of the waste producer, trader and of waste handler.”¹⁰ (8)
 - The 108/2011 (IX.30) order of the Minister of Defence deals with the regulations pertaining to the waste handling in the military.
 - The 153-157 points of the Service Regulations of the HDF deal with the specifications of environment protection.

We can see that the HDF do everything possible, in the given circumstances, to handle the dangerous waste, according to the regulations. Regarding international scene countries with developed military forces, for example the USA also have strict regulations concerning dangerous waste in the military, which is extended to transportation, handling, disposition, storage and final elimination. In most countries this procedure is similar, so we could see examples only from the point of view of the HDF. Besides the above-mentioned examples concerning the environment risks due to the general maintenance of the military forces, the other threat that is posed comes from trainings and exercises.

THE SITUATION OF TRAINING AREAS FROM THE ECOLOGICAL POINT OF VIEW

The environmental condition of training areas shows a double picture. General public thinks that in these areas the living environment is scarce, the scene is disarranged. So these areas are bleak surrounded by dense craters and fences and the amount of pollution is significant due to the leakage of chemical materials. However, the question is more complex. It is necessary to know that if pollution emerges, it usually covers a smaller territory where the exercise takes place. The wider, really big surrounding areas function as puffer zones.¹² (10) Such extensive areas serve as security areas, because they isolate the civilian population from the training area. Besides, their big advantage is that an ecosystem can develop here which is characteristic for national parks and nature protection areas. The reason is that these puffer zones are under military protection because they are operational

¹² Magdalena Zug (2015): Journal of security and sustainability issues, The influence of protected areas on military training areas in terms of sustainable development
http://jssidoi.org/dok/JOURNAL%20OF%20SECURITY%20AND%20SUSTAINABILITY%20ISSUES/2015%20Vol_5%20No2%20December/Journal%20of%20Security%20and%20Sustainability%20Issues%20Nr_5_2_1.pdf

areas, so they cannot be used for industrial purposes. They have been closed for many years, so they play a vital role in the maintenance of biological diversity, so their biological value may be more significant than that of the surrounding countryside.¹² (10) According to a survey, if we look at the size of the training areas globally, they make up at least 1% of the earth's surface. These areas are in the main ecosystems of the Earth, so they have the potential to improve the amount of the protected areas by 25%.¹² (10)

The main types of degradation found on the exercise areas

First, it is necessary to establish those aspects of the exercises, that this way or another influence the degradation of the ecosystem of that area:

- The detonation of the different types of bombs causes the appearance of craters which spoil the scenery and they invade the usual life of habitats.
- UXOs, battle materials and other chemical materials, like leaking petrol or engine oil cause pollution of the soil.
- Noise that goes together with exercises may disturb the functioning and behavior of the fauna living in the area.
- The armored traffic, especially the tracked vehicles may break the soil or they can cause massing of the soil. As a consequence the quality of the water retention of the soil worsens, there may be leakage.
- With the disappearance of the plantation cover the nutritional circulation may change as well as the process of the soil growth¹³ (11) and the risk of soil erosion and deflation may get higher.
- With the appearance of new roads, with the more intensive use of the existing roads habitats may break up.¹⁴ (12)
- The regular injuring of the soil during exercises and transportation may grow the risk of naturalization of unfamiliar plantation.¹⁴ (12)
- During exercising air pollution may occur.

The above-mentioned massing of the soil and the growth of the soil's bulk, lessening of the generalporosity and the change in the unsatisfying size of the pores (rough pores-fine pores).¹⁵ (13) Consequently, it is more difficult for the water to get into the soil, there may be leakage and there may be problem with the airing of the soil. Erosion of the soil is a process of the perish of the soil when a certain amount of the water (water erosion) or the wind (wind erosion) takes it from one place (eroded territories) to another place (sediment territories), causing harm in both territories.¹⁶ (14)

¹³ Michael Hopkins (2005): Military Excersises 'good for endangered species'

<http://www.nature.com/news/2005/050812/full/news050808-14.html>

¹⁴ Gálhidy László (2015): Természeti értékek és megőrzésük, WWF Magyarország, Természetvédelmi képzés a Táborfalvai Lő- és Gyakorlóteret használó katonai alakulatok számára.

http://turjanvidek.hu/media/statikus/turjan_life_katonai_kepzesi_anyag_1.pdf

¹⁵ Prof. Tamás János: Agrárium és környezetgazdálkodás, Mezőgazda kiadó 2008 p.83

¹⁶ Prof. Tamás János, Agrárium és környezetgazdálkodás, Mezőgazda kiadó 2008 p.66- 67

The role of training areas in the preservation of ecosystems

The training areas do not contribute directly for the preservation of ecosystems, but indirectly, as it was mentioned above, they affect the puffer zones in their vicinity. The main reasons for this are the following:¹³ (11)

- We are talking about protected areas because they are operated by the military.
- Consequently, other industrial activities such as agriculture, forestry can be only limited if performed at all.
- The territory is vast enough for the development of an ecosystem.
- Compared to the circumstances they can provide undisturbed habitat.
- They provide habitat for protected species.
- Biological diversity can grow.¹³ (11)

Role of the military forces in the sustainability of natural values in Europe

In the countries of the European Union there are territories in possession of the military, which have the right to become members of the NATURA 2000 environmental network. There are several examples, for example, the Netherlands where 50% of the territories belonging to the military are parts of the NATURA 2000 but this number in Belgium is 70%, in Denmark is 45%.¹² (10) This kind of partnership is advantageous for both sides. The civilian population can have an insight into the details of the program, it is especially important for the civilians who live in the vicinity of the given areas. The NATURA program can increase the amount of the territories that play an important part in the preservation, so the general opinion about the military will improve, too. In the following part such partnership will be introduced through some examples.

Salisbury Plain is situated in the middle part of the South of England. This area is one of the most extensive limy cotton areas which take up 14000 hectares. It has various kinds of animal and plant life that defines the area. Last but not least, this is one of the biggest exercise areas of Great Britain. Consequently intensive agriculture characteristic of other areas is strongly limited here. But this limitation has its drawbacks which manifest themselves in excessive grazing and the appearance of unfamiliar plantation. The task was to improve the management of the area, so as to improve and keep its value. The remnants of ammunition and weeds were disposed. The life circumstances of the stone curlew (*Burhinus oedipnemus*) and the marshy multicolored butterflies (*Euphydryas aurinia*) were improved. With the introduction of a new shepherding program, a more modern form of pasturing was introduced. Because of the military exercises sheep could graze only on a limited territory, so excessive gazing occurred. This problem was eliminated by being in constant connection concerning the timing of the exercises, so the areas could be explored better, so the problem of excess grazing could be solved. The LIFE project, established on the territory, was a great success. The program brought together those interested in the area, such as environment protection groups, the military and the local community (the farmers) to find solutions to the problems together. The project called the attention of the

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general public and the results could be used in other LIFE programs, as it was described in EU studies dealing with this question.¹⁷ (15)

It became known from a similar study that in Belgium the military has vast territories in the Flemish area. In 1999 with the assignment of the areas of NATURA 2000 an agreement came into life between the regional nature protection organization and the defense forces. The agreement dealt only with the degraded territories. Later the project embodied 12 territories of more than 9400 hectares with mosaic scenic elements, such as: dry grassy lowlands and dunes, dry turf, wet grassy lowlands, moors, swamps and isolated forests. Among the tasks of the project was to work out a strategy and management for the territories, that can be connected to the Geographical Information System, so as the leaders of the military exercises can coordinate the exercises and the nature protection needs. The reconstruction work included mowing of the sensitive areas, lawn cutting, and their burning and extensive grazing. Habitats were established for different endangered species, such as viviparous lizards (*Zotoca vivipara*), apodal lizards (*Anguis fragilis*) and the swampy adderfly (*Leucorrhina pectoralis*).

Besides, a special educational material was worked out for the new recruits in the military supporting their environment awareness.¹⁸ (16)

The role of the HDF in the keeping of the sustainable natural values

We could see from the above international examples, how the civilians and the military cooperate about the sustainability, but the program is present in Hungary as well. In our country the area called Turjánvidék, which lies around Táborfalva-Örkeny-Tatárszentgyörgy-Dabas is "80 km area in length but only some kms in width can be found in a meeting point between Danube and River Tisza in Homokhátság and the Valley of the Danube."¹⁹ (17) Besides being part of the NATURA 2000 network, this area "gives home to the especially protected Nature Protection area of Dabas-Turjános, and it is also used for the firing range and training area of Táborfalva established in 1876".²⁰ (18) The biggest firing range in Hungary can be found here which is used for domestic and international exercises. We talk about a closed area that can preserve its natural values,²⁰ (18) "since we can find here the biggest continuous watery and sandy system of habitats in the Homokhátság situated between the Danube and river Tisza".²¹ (19) With the cooperation of

¹⁷ Salisbury Plain - Improving the management of salisbury plain NATURA 2000 Sites http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=1712

¹⁸ Militaire Gebieden - Integrated restoration of natural habitats on military areas in NATURA 2000 http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=2487&docType=pdf

¹⁹ Turjánvidék, az Alföld rejtett kincse <http://wwf.hu/turjanvidek-az-alfold-rejtett-kincse>

²⁰ Turjánvidék, Fokozottan védett fajok menedéke az aktív katonai lőtér <http://www.wwf.hu/sajtoszoba/5>

²¹ "A kiemelt jelentőségű természeti értékek megőrzése a Turjánvidék NATURA 2000 terület déli részén" LIFE+Projekt

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the LIFE+Nature base, since this area belongs to NATURA 2000, a tender was worked out named "exceptionally important natural value protection of the Turjánvidék NATURA 2000 area in the South". The project will be extended between 1 September, 2011 and 31 December 2017.²⁰ (18) The main objectives of the program:²¹ (19)

- Protection of the especially important habitats, among others that of the rákosi vipera (*Vipera ursinii rakosiensis*).
- Improvement and extension of the Southern areas of the Turjánvidék NATURA 2000.
- Protection of the natural values, the flora and the fauna found on the area of the firing range.
- Tasks of the soil improvement.

Tasks necessary to achieve the above-mentioned aims, according to how they are mentioned in the program:²¹ (19)

- Regulation of the water supply.
- Placement of road signs and crossing gates.
- Organization and management of the educational trail program.
- Information provision for other LIFE program users.
- Changing foreign forests to domestic ones.
- Ammunition disposition on the given areas.
- Comprehensive Introduction of the program for the military leaders.
- Compilation of nature protection material for the military users of the land, its implementation into education.

Tasks of the fire range and exercise area users according to the educational material:¹⁴ (12)

- Keeping away unauthorized persons from the area
- Development of fire protection and fire –fighting
- Elimination of petrol pollution
- Establishment of anti -ammo forest stripes
- Nature protection monitoring

The above showed, that both domestically and internationally everything is done to minimize pollution found at exercise areas. It is unavoidable to have no harm in the ecosystem of these lands but as we have seen from the examples, this can be compensated in different ways.

THE TIME OF WARS AND ARMED CONFLICTS

In this chapter we will look through wars of the second part of the 20th century and the more significant armed conflicts from the point of view of ecological damage. Through the-

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se examples we can see how a war, directly or indirectly, induces changes in the ecosystem of the involved region.

HIROSHIMA AND NAGASAKI

In 1945 at the end of the 2nd World War, the American military attacked two Japanese cities with nuclear weapons. 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.²² (20) 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.²³ (21)

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. This was achieved by using herbicides, leaf destroying materials, heavy machinery and different types of bombs. 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.²⁴ (22) Usage of herbicides damaged not only people living there but plants and animals as well, causing illnesses, deaths.

CAMBODIAN CIVIL WAR

The war that was fought between the 70s and the 90s can be responsible for the illegal deforestation,²⁵ (23) which was the main environment damaging activity.²³ (21) The main reason for this was that the opponents financed their military spending from tree industry and saw production.²⁵ (23) Deforestation also caused severe floods which damaged rice production, so there was shortage of food.²³ (21) Moreover, this activity endangered habitats.

²² Kylie L.: Environmental effects of the atomic bomb, Sciencing;

<http://sciencing.com/environmental-effects-atomic-bomb-8203814.html>

²³ S.M Enzler.: Environmental effects of warfare, The impact of war on the environment and human health, 2006, Lenntech; <http://www.lenntech.com/environmental-effects-war.htm>

²⁴ J. R. McNeill, Corinna R. U.: Environmental Histories of the Cold War.

German Historical Institute, Cambridge University Press, 2013, pp.215-218, 227-256

²⁵ Rhett B.: Cambodia; <http://rainforests.mongabay.com/20cambodia.htm>

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RWANDAN CIVIL WAR

During the civil war between April and July 1994 more than 2 million people lost their homes and became refugees.²³ (21) 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.²⁶ (24) The fleeing people cut trees and hunted animals for survival.

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.²⁷ (25) These particles harmed not only human health but the ecosystem of the region as well.

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. Mines deployed during the war caused problems for the agriculture and shepherding.²³ (21) In Eritrea the need for wood caused deforestation. Military vehicles and explosives caused enormous destruction in forests and habitats. The war influenced water pollution, caused landerosion and affected endangered species.²⁸ (26)

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.²³ (21) Moreover, this was accompanied by the pollution of the underwater stock, which was caused by the waste yard nearby.²³ (21) Bombings werealso dangerous for the wildlife of the country. 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

²⁶ Tara M.: Ice Case Studies, Rwanda and conflict; <http://www1.american.edu/ted/ice/rwanda.htm#r4>

²⁷ Spencer F-G, Michelle D.: The environmental consequences of the war on Iraq, A Green Party press office briefing; <https://www.greenparty.org.uk/files/reports/2003/The%20Environmental%20Consequences%20of%20the%20War%20on%20Iraq%202.htm>

²⁸ Wuhibegezer F. B.: Fundamental Consequences of the Ethio-Eritrean War [1998-2000], Journal of conflictology, 2014 <http://journal-of-conflictology.uoc.edu/joc/en/index.php/journal-of-conflictology/article/view/vol5iss2-bezabih.html>

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.²⁹ (27)

THE PERIOD OF TRANSITION INTO PEACE

It can be described as the time of reconstruction. Damage caused by wars affects a whole nation. Reconstruction starts from foundation including the reconstruction of the environment. It is necessary to show in some examples those damage forms caused by wars, which have to be taken into consideration during reconstruction:

- The pollution effects of the remaining waste that depend on the type of the waste.
- Detonations and their chemical elements that can affect the given area.
- Mines that can still pose threat for human life even in the years following the war.
- The effect of UXOs on the given area.
- Degradation processes of the soil (massing, erosion, deflation, desertification).
- Pollution of the ground and underground water.
- Dilapidation of natural habitats.
- Dilapidation of animals and plants due to pollution.
- Migration of the natural stock of game, appearance of unfamiliar species.
- Logging, deforestation caused by wars.
- Intensive production of minerals and raw materials, caused by wars.
- Elimination of the game stock characteristic of the area.
- Elimination of agricultural territories.
- Due to strategic aims elimination and pollution of public utilities.
- Question of population migration due to wars.

Reconstruction poses great difficulties on the already weak population, not to mention the high costs. Besides, some reconstruction and recultivation processes take a long time, they may last several years or even decades. We need to think about the cleansing of soil or of potable water, the reintroduction of different types of forests, animals and plants, reconstruction of scenery of given regions. It is essential that areas affected by wars and people who live there would get international help.

CONCLUSION

Having read the above it can be established that the topic is very extensive, with lots of literature connected with it. The present article represents only a tiny part of it. However, it shows that the problems are existing and real ones, so there is always a possibility to develop technologies and methods to raise environment awareness. Consequently, it is important to support future research and extension of informational materials, both domestically and internationally.

²⁹ Joshua F.: The war of Afghanistan's environment;
<http://www.counterpunch.org/2010/01/07/the-war-on-afghanistan-s-environment/>

The article concentrated mainly on wars of the second part of the 20th century, less was mentioned about the events of the 21st century. The main idea was to show examples from the times, when the burden on the environment was especially hard and where “green thinking” was not yet an issue, or where the military forces have not applied this mindset yet. In our days the situation is certainly more favorable, but it is necessary to mention again, that it is still the privilege of the militaries of more developed countries, since these “green thinking” technologies and regulations need serious financing and international attention. So in the underdeveloped regions the situation is not likely to improve. Moreover, the effects of a war, no matter how developed and environmentally aware are the technologies used, can never be reduced to a zero, maximum they can be minimized to a certain degree.

BIBLIOGRAPHY

- [1] Environmental Guidebook For Military Operations, 2008, p.9
https://www.defmin.fi/files/1256/Guidebook_final_printing_version.pdf
(Download time: 14.09.2017)
- [2] Dr. Bihari Zoltán, Dr. Antal Zsuzsa, Dr. Gyüre Péter: Természetvédelmi ökológia, tankönyvtár, 2008 http://www.tankonyvtar.hu/hu/tartalom/tamop425/0032_okologia/ch04s06.html
(Download time: 04.07.2017)
- [3] Dr. Godó Zoltán: Agro-ökológia, 2011
http://www.tankonyvtar.hu/hu/tartalom/tamop425/0021_Agro-okologia/ch01s03.html
(Download time: 04.07.2017)
- [4] Környezetvédelem, Szaktudás Kiadó Ház Zrt., 2008
http://www.tankonyvtar.hu/hu/tartalom/tamop425/0032_kornyeztvedelem/ch17.html
(Download time: 04.07.2017)
- [5] H. Patricia Hynes: Military hazardous waste sickens land and people, Truthout
<http://www.truth-out.org/news/item/2377:military-hazardous-waste-sickens-land-andpeople>
(Download time: 28.09.2016)
- [6] Környezetvédelmi és Vízügyi Minisztérium, Veszélyes hulladékok gyűjtése, begyűjtése, szelektív gyűjtése és tárolása
http://www.kvvm.hu/szakmai/hulladeggazd/hulladeggazdalkodas/hulladegkezeles_gyujt.html
(Download time: 29.09.2016)
- [7] Közép- Tisza- vidéki Környezetvédelmi és Természetvédelmi Felügyelőség, Hulladékokkal kapcsolatos adatszolgáltatási kötelezettség
<http://ktvkvtf.zoldhatosag.hu/menu/hataridok/hulladek.htm> (Download time: 29.09.2016)
Barta Erik: A veszélyes hulladék kezelés a Magyar Honvédségben Szakdolgozat, NKE-HHK 2014.(Download time: 24.10.2015)
- [8] Szabó Zsolt: Veszélyes anyagok és hulladékok tárolásának, kezelésének lehetséges biztonságtechnikai megoldásai a katonai repülőtereken, ZMNE BJHMK Repülő és Légvédelmi Intézet
http://www.repulestudomany.hu/folyoirat/2011_1/2011_1_Szabo_Zsolt_1.html

HADTUDOMÁNYI SZEMLE

2017. X. évfolyam 4. szám

- (Download time: 18.05.2016)
- [9] Magdalena Zug (2015): Journal of security and sustainability issues, The influence of protected areas on military training areas in terms of sustainable development
<http://jssidoi.org/dok/JOURNAL%20OF%20SECURITY%20AND%20SUSTAINABILITY%20ISSUES/2015%20Vol.5%20No2%20December/Journal%20of%20Security%20and%20Sustainability%20Nr.5.2.1.pdf> (Download time: 01.04.2016)
- [10] Michael Hopkins (2005): Military Exercises 'good for endangered species'
<http://www.nature.com/news/2005/050812/full/news050808-14.html> (Download time: 01.04.2015)
- [11] Gálhidy László (2015): Természeti értékek és megőrzésük, WWF Magyarország, Természetvédelmi képzés a Táborfalvai Lő- és Gyakorlóteret használó katonai alakulatok számára.
http://turjanvidek.hu/media/statikus/turjan_life_katonai_kepzesi_anyag_1.pdf
 (Download time: 03.04.2016)
- [12] Prof. Tamás János: Agrárium és környezetgazdálkodás, Mezőgazda kiadó 2008 p.83
- [13] Prof. Tamás János: Agrárium és környezetgazdálkodás, Mezőgazda kiadó 2008 p.66- 67
- [14] Salisbury Plain - Improving the management of salisbury plain NATURA 2000 Sites
http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_p.roj_id=1712 (Download time: 01.04.2015)
- [15] Militaire Gebieden - Integrated restoration of natural habitats on military areas in NATURA 2000
http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_p.roj_id=2487&docType=pdf (Download time: 01.04.2015)
 Turjánvidék, az Alföld rejtett kincse <http://wwf.hu/turjanvidek-az-alfold-rejtett-kincse>
 (Download time: 03.04.2016)
- [16] Turjánvidék, Fokozottan védett fajok menedéke az aktív katonai lőtér
<http://www.wwf.hu/sajtoszoba/5> (Download time: 05.04.2015)
- [17] "A kiemelt jelentőségű természeti értékek megőrzése a Turjánvidék NATURA 2000 terület déli részén" LIFE+Projekt
<http://www.kormany.hu/download/3/e0/40000/Honlapon%20Turj%C3%A1n%20honlap%20SI.pdf#/DocumentBrowse> (Download time: 07.04.2016)
- [18] Kylie L.: Environmental effects of the atomic bomb, Sciencing;
<http://sciencing.com/environmental-effects-atomic-bomb-8203814.html> (Download time: 17.03.2017)
 S.M Enzler.: Environmental effects of warfare, The impact of war on the environment and human health, 2006, Lenntech; <http://www.lenntech.com/environmental-effects-war.htm>
 (Download time: 01.04.2017)
- [19] J. R. McNeill, Corinna R. U.: Environmental Histories of the Cold War.
 German Historical Institute, Cambridge University Press, 2013,pp.215-218, 227-256
 Rhett B.: Cambodia; <http://rainforests.mongabay.com/20cambodia.htm> (Download time: 03.04.2017)

HADTUDOMÁNYI SZEMLE

2017. X. évfolyam 4. szám

- [20] Tara M.: Ice Case Studies, Rwanda and conflict;
<http://www1.american.edu/ted/ice/rwanda.htm#r4> (Download time: 25.03.2017)
- [21] Spencer F-G, Michelle D.: The environmental consequences of the war on Iraq, A Green Party press office briefing;
<https://www.greenparty.org.uk/files/reports/2003/The%20Environmental%20Consequences%20of%20the%20War%20on%20Iraq%202.htm> (Download time: 06.04.2017)
- [22] Wuhibegezer F. B.: Fundamental Consequences of the Ethio-Eritrean War [1998-2000], Journal of conflictology, 2014
<http://journal-of-conflictology.uoc.edu/joc/en/index.php/journal-of-conflictology/article/view/vol5iss2-bezabih.html> (Download time: 06.07.2017)
- [23] Joshua F.: The war of Afghanistan's environment;
<http://www.counterpunch.org/2010/01/07/the-war-on-afghanistan-s-environment/>
(Download time: 08.04.2017)