

Some aspects of interaction between military activities and environmental protection on Lithuanian military grounds

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Traditionally, we ideate that military activities and environmentalism are two antagonistic poles. At first sight it looks true. We really have a large number of samples to background this opinion. When the Soviet army left Lithuania in 1993, the inventory of environmental situation showed 2743 sources of actual pollution in the then military lands. Only 14% of all military bases did not contain pollution sources. These are large figures, and they show that in the Soviet period environmental approach was strange for army commanders. Therefore, the specific character of activity, a special status of the strong security on those sites and large territories, especially on military training grounds, supported the formation of specific seminatural and natural habitats with a large number of valuable biodiversity, which expanded to the surrounding regions. Of course, the present Lithuanian army is much more strictly controlled by government and public, therefore environmental problems are currently much more important than before. Certainly, some environmental incidents and problems exist till now, but as part of the NATO forces and of the European Union our military forces should implement all environmental requirements in their activities. Therefore each military base and especially military training grounds had to prepare the base management plan with a focus on environmental problems. This report is intended to present the strides and problems of the Lithuanian army in solving environmental conflicts.

Key words: military activities, environmental pollution, noise, biodiversity, conservation

INTRODUCTION

Ensuring the national security, national defence and the solution of strategic problems require a rapid improvement of military forces and the use of still more sophisticated and more perfect armament. Regular and professional training of soldiers is necessary for its mastering. To achieve this goal, field exercises are obligatory, and during such exercises various military tasks are carried out under the conditions that are maximally approximated to the military ones. Military training grounds and military training territories are designed for carrying out the training activities (Defence..., 1995; Baltrėnas et al., 2001; Baltrėnas et al., 2005).

Military training activities are interrelated with the use of natural resources and impact on the environment. Military pollution is the emergence and spreading of pollutants, resulting from the military industrial activities, transportation of military materials and equipment, testing of arm samples and functioning of military objects (Renner, 1991; Environment..., 1999; Lapinskas, Mačiulaitis, 2005; Oškinis, Kasperovičius, 2005; Ignatavičius et al., 2006).

Military training grounds cover extensive areas with various valuable natural habitats. They are usually formed in the remote,

sparsely inhabited locations, especially limiting the attendance of outside visitors. This seems to favour the existence of separate protected species and habitats. However, on the other hand, specific military activities (shooting, explosions, movement of heavy military vehicles, and construction of engineering facilities) are carried out actively in military training grounds. All these factors exert a strong anthropogenic pressure which is able to directly or indirectly damage the stability of the protected natural habitats in these territories and to cause the vanishing of rare species of flora and fauna (Chruschov, 1995; Rogers, Feis, 1998).

MILITARY TRAINING GROUNDS IN THE REPUBLIC OF LITHUANIA

During the Soviet period, in Lithuania 10 military grounds of the Soviet army were established (Table 1) (Baubinas, Taminskas, 1998). As a rule, they were situated in remote woodlands with a remarkable landscape, with rare and endangered habitats of great environmental value (Damage..., 1998). Unfortunately, as military sites in that period were strictly secret and environmental security wasn't a priority question, no appreciable attention was paid to protection of the environment. The situation radically changed only after the Soviet army withdrawal and formation of the Lithuanian army.

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Table 1. Military training grounds in Lithuania

Location	Soviet period total area, ha	Current total area, ha
Rukla-Gaižiūnai	11523	5213.51
Garliava	-	594.1
Kairiai	3833	3217.46
Kazlų Rūda	6210	3708.57
Pagudonė	602	385.97
Pabradė	16146	8458.99
Rūdinkai	10269	Closed
Pariečė	3778	Closed
Nemirseta	1339	Closed
Kalviai	738	Closed
Total:	54438	21605.6

After the retreat of Russian military units from the territory of the country, the environmental problems caused by Soviet soldiers were inventoried (Inventory..., 1995; Baubinas et al., 1996): military training territories were found to be contaminated, their ecosystems violated, landscape damaged, soil and water polluted, etc. (Fig. 1).

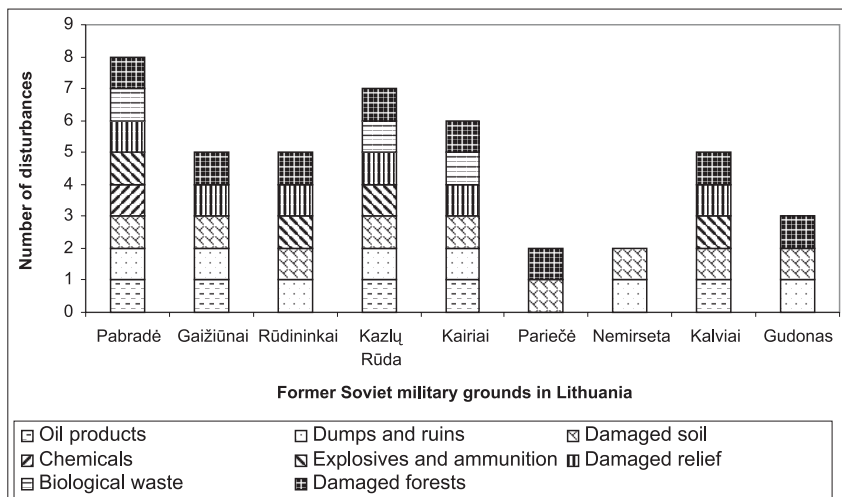


Fig. 1. Characteristic of environmental disturbances on the former Soviet military grounds in Lithuania

No documentary material on the Soviet period environmental problems in military training sites survived. The environmental work in them was ignored almost during the entire period for several reasons: 1 – the seclusion of military units; 2 – the negative approach of their command to environmental protection and the problems of the local population; 3 – unwillingness of environmental protectors to undergo any repressions. Only during the last years of the occupation military ecologists started working; they had to inspect the environmental protection of military units and tackle relevant problems.

With the intensification of the scale of the use of nature, the environmental problems still more often overstepped the limits of the military territories. The local ecological problems quite often turned out to become regional. Therefore the first information about the environmental situation in the military territories is related to the military territories near big cities (Šiauliai, Kėdainiai and Panevėžys aerodromes). Here attention was drawn first of all to the catastrophic contamination of water with oil products (Kalėdienė, 1999). Nature protectors, due to military secrecy, had no information on the radioactive, chemical and

explosive materials stored in the military units. Radioactive materials and chemical pollutants formed during military activities were most often secretly transported from the territories of the units. The amounts of these materials and dumps were never fixed in any documents. Only in around 1989 it was started to demand that radioactive materials from military territories would be discharged into special dumps. The possibility may not be rejected that until 1988 some radioactive waste had been discharged into household waste dumps or buried in the territories of military units and adjacent territories.

Currently, a military training ground is a parcel of land allocated to the Ministry of National Defence under the right of ownership. Here, a fixed fighting training and practical training infrastructure is installed, defence-purpose objects are built, practical trainings of battle firing and heavy military armament and equipment use take place (Vasarevičius, Greičiūtė, 2004).

Military training grounds ensure the qualitative supply of the partial firing and tactical practical trainings of the Lithuanian Army and army units from other countries, planned in the territories of military training areas. Military training grounds provide fighting units with field barracks, territories for

field camps, firing ranges, tactical fields and means necessary for practical training (Zavadskas, Antuchevičienė, 2004). In 2000, the Government of the Republic of Lithuania approved military training grounds and military training territories as well as the regulations for their ownership and use. In 1999–2000, in the Pabradė, Gaižiūnai, and Kairiai military training grounds, firing ranges for shots were installed in compliance with the NATO standards. All the military training areas site the firing ranges for rifle arms, light trench-mortars and hand anti-tank guns. The instructions on the safety of arms make it possible to use heavy machine-guns and 120 mm trench-mortars. In the central military training ground it is also possible to fire from 105 mm howitzers. The safety requirements comply with the standards of the NATO countries. The military training grounds are used for fighting, shooting and practical training of military equipment according to the Lithuanian Army preparation and international cooperation plans and needs.

A military training territory is a parcel of land allocated by the Government of the Republic of Lithuania to the Lithuanian Army for the use without time-limit for the practical training of

soldiers and military units, without changing the purpose of the target use of the land.

The Kairiai Military Training Ground, situated at the Curonian Lagoon, is the only one in Lithuania where simultaneously it is possible to conduct the training of the three elements of military forces – land, air and sea. The infrastructure of this ground is adapted to practical tactical trainings; a site for neutralization of standard explosives left unexploded from the war years was installed. About one million LTL has been already invested in the infrastructure of the military training ground, and the total owned property constitutes about LTL 2.6 million.

The key environmental problems possible on the present Lithuanian military territories are grouped as follows: 1 – the ruined and damaged layer of soil; 2 – technogenically modified soil; 3 – protection of biodiversity; 4 – pollution with chemical substances; 5 – damage of trees in the surrounding forests with bullets and splinters; 6 – waste management; 7 – storage and management of harmful substances; 8 – wastewater management; 9 – noise; 10 – other problems.

In one paper, it is impossible to survey all the environmental problems, therefore we will review some of them.

DAMAGE CAUSED BY BULLETS AND SPLINTERS

In 2005, three comprehensive expeditions were conducted in the Kairiai Military Training Ground, with the participation of scientists, Lithuanian Army Practical Military Training specialists as well as environmental experts. One of the key environmental protection problems of this military training ground is a mixed forest tract where pine-trees, birches and firs prevail, near the first shooting range covering 30 ha in area, which is strongly damaged and partly dead. The forest borders the eastern external part of the shooting range and protects the adjacent territories bordering the military training ground from the casual bullets and noise arising during the shooting practical training. This forest plays a very important environmental role, but its wood becomes no good for use because of bullets and splinters of explosives lodged in it. Despite these problems, protective forests near the shooting ranges are considered throughout the world to be one of the best and most effective means to ensure the safety of the territories bordering military training grounds, guaranteeing the maximum protection of nature and human health.

From the very establishment of a military training ground in the present-day shooting field territory in 1949, at least three shooting ranges for shooting from infantry arms were installed. In this military training ground, training was carried out also on shooting from anti-tank and anti-aircraft ordnance, explosion of grenades and mines. The trends of shooting at the shooting ranges installed and used in the Soviet period do not coincide with the present ones. It was established that very intensive shootings had been carried out in this military training ground. In the two previous shooting ranges, shooting was conducted in the south-eastern direction to the Curonian Lagoon, and bullets from the third shooting range were flying directly to the forest, destroyed and partly perished at present. Bullets damaged trees directly by mistargeted shoots or rebounds from the earth surface or other obstacles. In the Soviet period, in the Kairiai Military Training

Ground not any protective embankments or other engineering facilities designed for collecting bullets that missed the targets or those on the rebound were installed behind the target line. Therefore the territory of the protective forest was being constantly damaged by bullets and other fragments of explosives.

According to injuries inflicted to tree trunks, their size, the angle and direction of tearing and after reviewing bullets stuck in tree trunks, two reasons for injuries of tree trunks and branches were identified: 1 – due to a direct hitting of trees growing behind the target line; 2 – various injuries to trees, resulting from bullets hitting the obstacle on the rebound. The most frequent reason for bullet rebound is their striking against the earth surface in the direction of the rebound which is very difficult to foresee.

Evaluation of the present state of the damaged forest showed that the majority of injuries to the trees had been made from the western side as a consequence of exploiting the former old shooting range, liquidated at present.

In the first shooting range (with electrical targets), no protective embankment where bullets missing the targets could be collected has been made until now. At present, bullets that miss the target fly to the forest which is at a distance of 350–400 metres and cause damage to the trees growing in it.

In the second shooting range (using arms and identification of hit dispersion), a protective embankment 4–4.5 m high was installed, and it protects the forest from direct bullet hitting. However, additional research is necessary into the environmental efficiency of the protective embankment, evaluating the variants when bullets cannot be held back in the presence of leveling mistakes or the rebound.

Bullets penetrate up to 15 metres of a dense mature mixed forest where birches, pine-trees and firs grow. Moving away from the territory of the shooting ranges, the damaged zones of trees increase in height. At a bigger height, bullets fly farther away into the forest, and bullets that were shot with a high trajectory or bullets on the rebound that lost their kinetic energy hit the trees.

With a view of a precise evaluation of the efficiency of the embankment of the second shooting ground and its importance in protecting the adjacent forest, long-term research as well as special control stands installed for that purpose are needed.

NOISE

Effects of “noise” from terrestrial military activities* per se are poorly studied, but many military noises are similar to more widespread civilian noises (Kaulakys, 1999; Pater et al., 1999).

Military noise can be clumped in space as well as in time. For some noise sources such as artillery and firearm practice and stationary electrical generators, noises emanate from nonrandom, often fixed positions, and wildlife with home ranges small in comparison with the installation will experience very different noise intensities depending on the exact geography. In other

* “Noise” is placed in quotes because, although some of the sounds made by military equipment (propeller noise of aircraft, for instance) is an undesired side-effect, other sounds of battle are desired for their value to startle and intimidate the enemy and to habituate one's own personnel during training.



Fig. 2. Sound level measuring points and evaluated sound level during pilot shooting exercises at the Juodkrantė radio locator post.

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58 – the sound level measuring point; above – point number, below – evaluated sound

situations, such as tank maneuvers, noise sources will be more spatially pervasive and less spatially predictable (Fig. 2).

Noise from explosions is the best-investigated kind of impulse noise (Voigt et al., 1980). Exploding projectiles and bombs can be expected to vary in sound depending on their type and height above or below ground at detonation. Sound levels generated by the equivalent of small projectiles (60 g TNT) exploding were 144 dB peak and larger projectiles (20 kg TNT) 163 dB peak, both at a distance of 100 m (Paakkonen, 1991).

When observing visually the territory during a shooting training, an insignificant interference of birds was fixed: waterbirds swimming at the seashore and in the Curonian Lagoon were not scared by the impulse noise caused by shots and even did not react to it. Practical training was conducted during the most active autumnal migration of birds, but no signs of rushing or scaring reaction were observed in the flocks of birds actively migrating over the sea and land.

In spring and autumn, in the environs of Juodkrantė, firing trainings are regularly effected from the RBS-70 overground air space defence system. During these trainings it is allowed to shoot not more than two days with a one-day interval, using up to 5 rockets, into targets in the air with the interval between the shots no less than one hour. Under such conditions, no negative effect was noted on migrating and other birds or on Juodkrantė residents and visitors (Fig. 3).

Noise caused by explosions during shooting exceeds the permissible norms of noise in the territories of residential houses and rest homes within a 500 m radius from the shooting place. It is im-

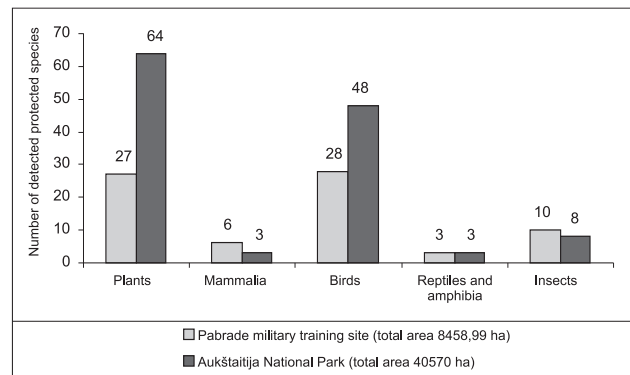


Fig. 3. Comparison of biodiversity in the Pabrada military training site and Aukštaitija National Park

portant to follow the safe behaviour and safety engineering rules and to restrict the access of people to the shooting zone.

No negative impact was noticed on the intensity of the autumnal migration of birds. Noise caused by a bullet cannot have an effect on the condition of birds in their wintering places in the Baltic Sea at the coasts of the Curonian Spit, since the sound of a bullet does not exceed the background rustling of waves and the sea.

At the explosion of a rocket at a height of 1–2 km above the Baltic Sea, very small splinters fall into water and are widely scattered in the water area by the explosion wave. Splinters supposedly cannot injure birds swimming in the water.

Sea depth in this territory reaches up to 200 m, and small particles of the exploded rocket are scattered over a large area. The sinking splinters are drifted by strong water flows at the sea bottom area. Tungsten contained in the rocket aggregate is of low solvency: it is notable for chemical inertness and a conditionally low toxic effect and does not cause any pollution.

Noise propagated during practical training scare the birds breeding not far from the shooting site; therefore, active practical shooting training during the breeding period is not recommended (Busnel, Fletcher, 1978). Upon evaluation of the conformity of the possible shooting sites with the set training goals and environmental requirements, it was established that the most suitable site for training of firing from the RBS-70 overground air space defence system is the protective dune crest.

PROTECTION OF BIOLOGICAL DIVERSITY

Military training grounds are established in remote forest land areas which are often noted for their valuable landscape, rare and vanishing habitats of a high ecological value. A characteristic feature of the major part of the military training grounds of Lithuanian and foreign land forces are extensive open spaces with natural ecosystems disintegrated due to the specific activity carried out here. These territories, in spite of the negative impact of military activities, as a rule are distinguished by a very rich and frequently unique biological diversity (Šaudytė, 2002). Such a situation is characteristic of all major military training grounds where a distinct contrast may be observed between the environmental degradation and rich wild nature.

After withdrawal of the Soviet army from the territories of military training grounds of Lithuania, Lithuanian scientists and environmentalists made an inventory of natural values on those

sites and found 133 Lithuanian Red Data Book species, including 68 species of plants (36.9% of the total list), 4 of mammals (16.6%), 45 bird (65.7%), 4 species of reptiles and amphibians (80%) as well as 12 insect species (7.8%) in the nine territories surveyed (Šaudytė, 2002). This comprises 22.6% of the total Red Data Book list and 38.3% of the enlisted vascular plants, mammals, birds, reptiles and amphibians. There were indications that two bird species, considered already to be extinct in Lithuania, had probably found their last resort in these formerly closed territories: Willow Grouse (*Lagopus lagopus*) in Rūdninkai and Short-toed Eagle (*Circaetus gallicus*) in Pariečė. It was evident that Pabradė at that time was the territory richest in vascular plants, and Kairiai and Rūdninkai were very important for conservation of bird habitats.

In some cases, the biological diversity in these territories as regards its abundance and value equals the abundance of species in large protected territories (Baubinas, Taminskas, 1998). Currently we have succeeded in keeping the former richness of biodiversity on the military training grounds left for national defense aims. Comparing the number of species in the Pabradė Military Training Ground and the nearby Aukštaitija National Park, we see that despite various measures to improve the biological diversity in the national park and its territory being far more extensive, the number of the protected species of mammals and insects is more numerous in the military training ground (Fig. 4). On the Central Military Training Ground of the Lithuanian Army ten habitats of European importance were identified; they are protected by the EU and Lithuanian laws (Oškinis, Ignatavičius, 2001; Baltrėnas et al., 2005). Unfortunately, the environmental system of Lithuania has no means enough to ensure complete protection of biodiversity on the military training site territories used for other purposes.

The principal finding of the long-time survey of military training sites in Lithuania is that in spite of the impact of military activities on the environment (ground contamination, soil and slope erosion, landscape degradation), these areas, due to a limited access for humans, enjoy a very rich biodiversity, and this feature is typical of large (at least few thousand ha) military training grounds. Therefore, these territories are the last large semi-natural areas located close to largest industrial centers and agricultural areas of Lithuania. They form a very important part of the Lithuanian natural framework.

CONCLUSIONS

1. It is characteristic of the major part of military training grounds of the land army that due to military activities extensive open spaces with destroyed natural ecosystems are formed. Primary habitats are newly formed on the damaged sites, and their further development is suspended by permanent military training activities. This circumstance is of special importance for the survival of some valuable habitats as well as flora and fauna species protected at the international level, since the development of natural ecological successions is being suspended.

2. Military training activities in some cases do not inflict a negative effect on the natural values formed in these territories, but rather favour their survival.

3. The properly developed environmental management strategies on military training territories where due attention is paid to the existing natural conditions ensure, without large financial and material investments, protection of valuable natural habitats and species.

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KAI KURIE APLINKOSAUGOS PROBLEMŲ KARINĖSE MOKOMOSIOSE TERITORIJOSE ASPEKTAI

S a n t r a u k a

Karinės mokomosios teritorijos patiria savitą antropogeninės veiklos presą. Tačiau kariniai poligonai yra labai vertingi gamtosaugos požiūriu, nes juose yra natūralių bei pusiau natūralių plotų, pasižyminčių didele biologine įvairove. Todėl jie turi svarbią mokslinę bei pilotinę taimkomąją gamtosauginę vertę. Karinėms teritorijoms būdinga įvairiapusė karinė veikla (įvairios paskirties šaudyklos, taktinio mokymo laukai, apsauginės teritorijos ir pan.), kartu jos labai svarbios vertingų buveinių ar retųjų bei nykstančių rūšių išlikimui. Ūkinės veiklos ribojimas leidžia susiformuoti sąlyginai stabilioms ekosistemų sukcesijoms.

Karinėse teritorijose susiduriama su dviem skirtingais požiūriais į biologinės įvairovės išsaugojimo problemas. Kariškiai prioritetus teikia įvairiapusei karinei mokomajai veiklai. Gamtosaugininkų nuomone, tuose karinių poligonų plotuose, kuriuose aptinkamos europinės svarbos buveinės bei retosios ir nykstančios rūšys, steigtinos griežtos apsaugos gamtosauginės teritorijos, visiškai eliminuojant karinę mokomąją veiklą. Svarbu vengti tarp kariškių ir gamtosaugininkų kylančių konfliktų, prioritetą teikiant optimaliam mokomosios karinės veiklos bei gamtosaugos problemų suderinimui.

Raktažodžiai: karinė veikla, aplinkos tarša, triukšmas, biologinė įvairovė, gamtosauga