

Destruction of Nature through Warfare in (Austrian) Galicia during the First World War

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The First World War, due to its duration, scope, and enormous commitment of human and material resources, was a unique event in the history of armed conflict up to that point which left a strong mark on the social, economic, and political life of European nations.¹ It was not only the millions of soldiers who were affected by the fighting; civilians were forced to flee their homes, suffered from hunger and infectious diseases (typhoid, dysentery, influenza), and experienced violence at the hands of soldiers. Losses caused directly by military action included destroyed or damaged residential buildings, outbuildings, public structures, industrial plants, bridges, railway lines, and roads. Material losses were mainly in industry, trade and agriculture, and transport. The war did not spare monuments, such as churches, palaces, and historical old towns, either. Another consequence of warfare was the devastation of the natural landscape.²

The main combat theatre was the European continent. Three fronts formed on its territory: western (Belgium, north-west France), southern (Serbia, northern Italy) and eastern. The Eastern Front saw the heaviest fighting in East Prussia, the Kingdom of Poland,³ and Galicia.⁴ Through the lands of the Austrian partition, the front line moved twice between 1914 and 1915. In 1914, the

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2 The natural landscape—a component of the Earth’s space that includes land forms, soils, bodies of water, rocks, vegetation, and animals.

3 The Kingdom of Poland was a state established by the provisions of the Congress of Vienna in 1815 as a monarchy in a personal union with Russia. After the fall of the November Uprising in 1831, it lost the status of a separate state and became a constituent part of the Russian Empire and unified with Russia in the following decades. Finally, the separateness of the Kingdom of Poland was abolished after the failure of the January Uprising in the years 1863–64.

4 Galicia is a colloquial, shorthand term for the Kingdom of Galicia and Lodomeria, i.e. the Polish lands which, as a result of the partitions of the Polish-Lithuanian Commonwealth in 1772 and 1795, found themselves within the borders of the Habsburg Monarchy (the Austrian Empire). Galicia was within Austrian borders until 1918.

Russian army occupied a large part of the territory, including its capital, Lviv, and reaching the outskirts of Kraków. The garrison of the fortress at Przemyśl capitulated in March 1915. In the spring of 1915, a counter-offensive by the Central Powers led to the breaking of the front and the liberation of much of Galicia from Russian occupation. In 1916, another offensive by the Tsar's army, this time unsuccessful, took place, which nevertheless led to intensified fighting in eastern Galicia. Much of this territory was under Russian occupation for a shorter (1914–15) or longer (1914–17 and even up to 1918) period of time.

The history of Galicia at the time of the Great War has already been the subject of a number of studies on military operations,⁵ the political situation,⁶ the damage suffered and the rebuilding of the country,⁷ migrants,⁸ and the social situation.⁹ Of lesser interest, although present on the margins of the above studies, were issues of environmental history. This paper is an attempt to synthesize the impact of the war on the natural environment in the Kingdom of Galicia and Lodomeria in the years 1914–18, namely on the soil, orchards and forests, beekeeping, wild animals, and ponds and rivers (fish).

The text is based on different types of sources. Most importantly, these include materials produced by the state institutions set up to assess war losses and their liquidation, headed by the National Headquarters for the Economic Reconstruction of Galicia,¹⁰ and landed estates. Journalistic publications and

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- 5 Juliusz Bator, *Wojna galicyjska: Działania armii austro-węgierskiej na froncie północnym galicyjskim w latach 1914–1915* [The Galician War: Austro-Hungarian Army operations on the northern Galician front 1914–1915] (Kraków: Libron, 2008).
 - 6 Mateusz Drozdowski, *Naczelny Komitet Narodowy 1914–1918: Polityczne i organizacyjne zaplecze Legionów Polskich* [The Supreme National Committee 1914–1918: The political and organizational background of the Polish Legions] (Kraków: Towarzystwo Wydawnicze "Historia Iagellonica", 2017).
 - 7 Tomasz Kargol, *Odbudowa Galicji ze zniszczeń wojennych w latach 1914–1918* [Reconstruction of Galicia from war damage between 1914 and 1918] (Kraków: Towarzystwo Wydawnicze "Historia Iagellonica", 2012).
 - 8 Kamil Ruszała, *Galicyjski eksodus: Uchodźcy z Galicji podczas I wojny światowej w monarchii Habsburgów* [The Galician exodus: Refugees from Galicia during World War I in the Habsburg monarchy] (Kraków: Towarzystwo Autorów i Wydawców Prac Naukowych Universitas [Society of Authors and Publishers of Scientific Works Universitas], 2015).
 - 9 Jerzy Pająk, *Wojna a społeczeństwo Galicji w latach 1914–1918* [War and society in Galicia between 1914 and 1918] (Kielce: Wydawnictwo UJK, 2020).
 - 10 The National Headquarters for the Economic Reconstruction of Galicia (after 1918 known as the National Reconstruction Office), a body of the governorate in Galicia, established in 1916 to assess and liquidate war damage, was divided into three sections: the buildings section, the agriculture and forestry section, and the crafts, industry, and commerce section. It was headed by a special official appointed by the governor, with an advisory body, the members of which were appointed by the National Department and the governor.

the daily and professional press were also used, namely agricultural (*Tygodnik Rolniczy, Rolnik*), forestry (*Sylvan*), fishing (*Okólnik Rybacki*), and beekeeping (*Bartnik Postępowy*) periodicals. The above sources focused on human, material, and economic losses. The destroyed or damaged buildings of various types were enumerated and assessed in detail, the regions and localities affected by the war were documented, and agricultural and industrial losses were analysed. Information on the natural landscape appeared as a component of the analysis of the implications of the war for forestry, agriculture, horticulture, beekeeping and fishing, and hydraulic engineering.

Galicia was an agricultural region, with the vast majority of its population making a living from farming, so the destruction of farmland was crucial from an economic, and therefore environmental, point of view. This issue was closely linked to the economic impact of the war (in terms of food shortages), but it also had its ecological side—soil degradation.

Fields were damaged by the construction of trenches, firing ditches, and field fortifications, as well as by artillery fire. Cannon and howitzer shells, especially those of large calibre, gouged enormous holes in the ground, 2 to 15 m wide and up to 3 m deep. Artillery shelling and firing ditches exposed the barren soil layer, especially on sandy land.¹¹ As a result, arable land became unsuitable for cultivation, soil fertility declined, and weed infestation of fields developed (poppies, cornflowers, couch grass, and other plants became widespread, depriving cultivated plants of water and nutrients).¹² The weed problem is illustrated by a request from Władysław Michałowski, owner of the Połowce estate in the Czortków district of eastern Galicia, who asked the authorities for a mower, “without which the overgrown weeds cannot be removed before ploughing”.¹³

The greatest soil damage was recorded in areas of trench warfare, where thousands of kilometres of firing ditches, trenches, and other earthen fortifications were constructed and heavy artillery was used to break through them, e.g. along the front line in the years 1914–15.¹⁴ This damage decreased the value

11 Paweł Zawilowicz, “Z pobytu Rosjan w Nisku i okolicy” [From the stay of Russians in and around Nisko], *Piast*, no. 31 (1915): 10.

12 Kazimierz Miczyński, “Szkoły w gospodarstwie rolnym przez rowy strzeleckie” [Farm damage by shooting ditches], *Rolnik*, no. 6 (1917): 75.

13 The Central State Historical Archives of Ukraine, city of Lviv, fond 191, description 2, case 685, p. 8, W. Michałowski do Starostwa w Czortkowie, Połowce 28 VIII 1917.

14 Stanisław Biały, “Z Krakowa do Brzozowa” [From Krakow to Brzozów] *Piast*, no. 27 (1915): 3; Marcei Handelsman, ed., *Polska w czasie wielkiej wojny (1914–1918)* [Poland during the Great War (1914–1918)], vol. 3, *Historia ekonomiczna* [Economic history] (Warszawa: Towarzystwo Badania Zagadnień Międzynarodowych, 1936), 9–10.

of the land. For example, in the Tarnów area, in the estates of the Sanguszko family, the firing ditches in the fields were 3 m or 8 m wide. In total, they covered 7780 m² of land. The depreciation of the land was estimated at 87 hellers per 1 m².¹⁵ The management of the estate of the Potocki family of Łańcut estimated that the destruction of meadows by the digging of firing ditches meant a loss of 2–3 years' worth of income.¹⁶ In the district of Cieszanów in north-eastern Galicia, by 1919, uncovered firing ditches measured 458,523 m long, excluding other trenches and entrenchments.¹⁷ In the districts of Myślenice and Nisko, the trenches remained until 1917, as the military authorities opposed their backfilling.¹⁸

From analysis of articles, correspondence from individual districts and other information published in the agronomic press, i.e. the Kraków-based *Tygodnik Rolniczy* and the Lviv-based *Rolnik*, it can be concluded that the deterioration of soil quality nevertheless did not significantly affect crop sowing, harvests, and the general situation of agriculture. The main problems faced were shortages of labour, draft animals, agricultural tools and machinery, natural and artificial fertilisers, and grain for sowing and seed potatoes. In addition, accounts from peasants and landowners at the time emphasized the strong impact of weather conditions on the agricultural situation (droughts, frosts), but these phenomena were not related to the war, although the state of war made it difficult to combat their consequences. In the areas liberated in 1915, the so-called "war fallows" were present in 1915/1916, but by the following year (1916/1917), depending on the region, there were far fewer or none at all. The soil and fields

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- 15 The National Archives in Kraków, Archiwum Sanguszków, signature 255 A, formularz zgłoszenia szkód wojennych na obszarze dworskim Skrzyszów oraz załącznik nr 22 "Wykaz zniszczonych budynków gospodarskich". [Archive of the Sangusko family, signature 255 A, the form for the declaration of war damage in the manor area of Skrzyszów and Annex No. 22 "List of destroyed farm buildings".]
 - 16 The Central Archives of Historical Records, Archiwum Potockich z Łańcuta, signature 998, Zgłoszenie roszczeń z tytułu świadczeń wojennych w gminie Sarzyna [Archive of the Potocki family of Łańcut, signature 998, Notification of claims for war benefits in the municipality of Sarzyna], 361.
 - 17 The National Archives in Kraków, Archiwum Urzędu Wojewódzkiego w Krakowie, signature 48, Odpis pisma oddziału cieszanowskiego Galicyjskiego Towarzystwa Gospodarskiego do Wydziału Rolnego Komisji Rządzącej [Archive of the Provincial Office in Kraków, signature 48, Copy of a letter from the Cieszanowski branch of the Galician Farming Society to the Agricultural Department of the Governing Commission], [Cieszanów 1919].
 - 18 Józef Froń, "Stan rolnictwa w powiecie myślenickim" [State of agriculture in the Myślenice district], *Tygodnik Rolniczy* [Farmers Weekly], no. 32 and 33, (1917): 341; A. Zaremba, "Stan rolnictwa w powiecie niżańskim" [State of agriculture in the Nisko district], *Tygodnik Rolniczy* [Farmers Weekly], no. 34 (1917): 360.

in the eastern districts bordering Russia (Tarnopol, Brody), where the occupation and fighting lasted the longest—until the beginning of 1918—were in the worst condition. According to Oktawia Ożarowska's account, there were uncultivated fields there, criss-crossed by firing ditches, entanglements, dug-outs, telephone poles, and artificial ponds that were created in the meadows in place of the dug-out earth.¹⁹ These areas therefore needed to be recultivated in order to be used for farming again.

The second component of the natural environment, after the soil, that was closely linked to the war economy and thus exposed to damage, was orchards and forests. Information on the extent of damage to gardens and orchards is provided by official statistics. In the summer of 1916, orchard and horticultural inspector Antoni Wróblewski inspected 377 orchards in 53 villages and 3 country estates. Almost half of them were heavily damaged, the others, although not devastated, were heavily neglected.²⁰ In the territory's 37 western districts, the demand for fruit trees was estimated at 425,252, or about 85 fruit trees per morgen (per 0.58 hectare),²¹ and nationwide the demand for fruit trees was calculated at 680,403. The area of ornamental gardens destroyed amounted to 1,578 morgen (about 908.1 hectares), and the value of the destroyed trees and shrubs was estimated at 1,078,938 crowns, or about 683 crowns per morgen (per 0.58 hectare). The demand for ornamental trees and shrubs was calculated at 126,811 units in 37 districts and 202,897 units countrywide.²² The damage affected domestic orchards and gardens, as well as city and palace parks.

From an economic and environmental point of view, the destruction of forests was a much more dangerous practice. Its scale was influenced by the course of the front line and the directions of army movements. Forest damage can be divided into direct and indirect damage. The direct losses arose as a result of the war effort and preparations for it. This consisted of the felling of trees to clear firing lines or for other purposes (e.g. the construction of entanglements); the injury or destruction of trees by artillery shells (the shells broke the trees) and rifle bullets (in the case of older trees, the damage was

19 Oktawia Ożarowska, "Zniszczenia gospodarcze w powiecie brodzkim" [Economic devastation in the Brody district], *Tygodnik Rolniczy* [Farmers Weekly], no. 14 (1917): 186–87.

20 *Sprawozdanie Komitetu c.k. Galicyjskiego Towarzystwa Gospodarskiego we Lwowie za lata 1914, 1915, 1916* [Report of the Committee of the c.k. Galician Farming Society in Lviv for the years 1914, 1915, 1916] (Lwów: Galicyjskie Towarzystwo Gospodarskie [Galician Farming Society], 1917), 60.

21 Statistical sources of the time operated with two units of area, the morgen and the hectare, 1 morgen = 5755 m², or 0.5755 ha.

22 Kazimierz Brzeziński, "Ze statystyki ogrodniczej" [From horticultural statistics], *Ogrodnictwo* [Horticulture], no. 2 (1918): 51–52.

insignificant, while much greater damage occurred in young trees); the felling of timber for the construction of field fortifications and roads; and bark gnawing by military horses.²³ Another breakdown of wartime losses in forests included damage to the stands themselves and soil damage. Damage to forest soil was caused by the digging of firing ditches and dugouts, and the explosions of artillery shells and grenades. Trenching and explosion craters caused trees to topple, exposed tree roots and thus reduced tree growth, and made it difficult to clean up the damaged stands and protect them from theft.²⁴ Fires were a great threat to forests. Their incidence and spread in the summer of 1915 was facilitated by drought and the “scorched earth” tactics used by the Russians retreating from Galicia, which involved the deliberate setting on fire of forests.²⁵

In terms of indirect damage, losses in forestry were exacerbated by the exploitative policy of the occupying Russian authorities and the troops of the Central Powers, as well as the civilian population. The armies of both warring sides used the wood to build field fortifications and barracks, rebuild roads and bridges, and for fuel. Thinner trees from among young specimens were cut down to repair roads, and thicker specimens were used to build bridges, which led to a thinning of tree stands.

The war also interrupted rational forest management. Forest owners were forced to carry out additional work (the clearing of burnt areas, removal of trenches and field fortifications, maintenance or removal of trees damaged by shells, control of forest pests, elimination of soil infestation by weeds) and to change their economic plans and prematurely cut down stands, consequently leading to a shrinking of forest areas and a reduction in the technical quality of the stands.²⁶

In the wake of these developments, Galician forests suffered qualitative (loss of the best trees) and quantitative losses. These losses affected the tree

23 Jan Kosina, “Szkody wojenne w lasach Beskidu” [War damage in the Beskydy forests], *Sylwan*, no. 1–2 (1916): 24.

24 Jan Fijałkowski, “Szkody wojenne w lasach Ordynacji Poturzyckiej” [War damage in the forests of the Poturzyca Ordinance], *Sylwan*, no. 1–6 (1916): 54–56; Stanisław Sokołowski, “Szacowanie świadczeń i szkód wojennych” [Estimation of benefits and war damage], *Sylwan*, no. 7–9 (1916): 122.

25 “Korespondencja Adama Kozłowieckiego z Huty Komorowskiej” [Correspondence of Adam Kozłowski from Huta Komorowska], *Sylwan*, no. 7–12 (1915): 123; Jan Fijałkowski, “Szkody wojenne w lasach Ordynacji Poturzyckiej” [War damage in the forests of the Poturzyca Ordinance], *Sylwan*, no. 1–6 (1916): 56–57.

26 Jan Kosina, “Szkody wojenne w lasach dóbr Miżyniec” [War damage in the forests of the Miżyniec estate], *Sylwan*, no. 1–6 (1916): 42–43; Józef Szymusik, “Lasy krasiczyński kiedyś a dzisiaj” [Krasiczyn forest in the past and today], *Sylwan*, no. 1–3 (1917): 7–10.

stands located in areas directly impacted by warfare the most: the Sandomierz Forest,²⁷ forests between the San and Bug Rivers, Subcarpathian forests, and those in the eastern part of the country.²⁸ In 1916, the area of burnt forests up to 10 years of age in Galicia was estimated at 5,600 ha and for forests between 10 and 30 years of age at 6,000 ha.²⁹ In 1916, Zdzisław Tarnowski, president of the Kraków Agricultural Society, estimated losses in the Sandomierz Forest alone at 35,000 morgen (17,265 hectares).³⁰ In the Nisko district, just short of 20,000 morgen (11,510 hectares) were lost due to warfare and deliberate arson by the Russians.³¹

To illustrate the nature and scale of the damage done to forests, one can cite accounts in the pages of the journal *Sylvan*. The observations of forester Stanisław Winiarski, who described the destruction of forests near the town of Baligród in the Sanok district of the Bieszczady Mountains, are interesting. This area saw several months of local fighting in late 1914 and early 1915. One of the mountains, which was covered with fir, spruce, and beech trees aged 40–90 years old, was occupied by Russian troops and shelled by Austro-Hungarian artillery, which completely devastated a forest several hundred metres long and about 200 m wide. Artillery fire destroyed around 100 yew trees, many of which reached a height of 4 m and had a trunk diameter of 20 cm.³²

As another example, the situation in the forests belonging to the Order of St. Benedict monastery in Staniątki in the Bochnia district can be cited. It had four forest complexes, of which the first forest was the least affected, as no public road ran through it and therefore there were no army movements or stops there. The other three forests suffered from felling, burning, the construction of

27 Sandomierz Forest is a large, dense forest complex located in the Sandomierz Basin, in the fork of the Vistula and San Rivers. In the 19th and 20th centuries, it suffered as a result of human economic activity (cattle grazing, timber industry, heavy industry expansion, pollution by sulphur compounds). Currently, part of the forest is covered by Natura 2000, a nature conservation programme within the territory of the European Union.

28 “Korespondencja Adama Kozłowieckiego z Huty Komorowskiej” [Correspondence of Adam Kozłowski from Huta Komorowska], *Sylvan*, no. 7–12 (1915): 124–25, Stanisław Sokołowski, “Teraźniejszość i przyszłość naszych lasów” [Present and future of our forests], *Sylvan*, no. 7–9 (1916): 86.

29 *Sprawozdanie ck. Namiestnictwa Centrali krajowej dla gospodarczej odbudowy Galicji* [Report of the ck. Governorate of the National Headquarters for the Economic Reconstruction of Galicia] (Kraków: c. k. Namiestnictwo Centrala Krajowa Dla Gospodarczej Odbudowy Galicji [c. k. Governorate Central for the Economic Reconstruction of Galicia], 1917), 128.

30 “Z podróży pp. Ministrów po Galicji” [From the travels of the Ministers in Galicia], *Tygodnik Rolniczy* [Farmers Weekly], no. 8 and 9 (1916): 50.

31 Lasocki Zygmunt, “Z tragicznego trójkąta” [From the tragic triangle], *Piast*, no. 34 (1915): 5. Stanisław Winiarski, “Z Karpat” [From the Carpathians], *Sylvan*, no. 1 (1918): 28–29.

field fortifications, and artillery shelling. The losses were estimated at around 1,500 trees.³³

In the estate of Zarzecze,³⁴ owned by the Dzieduszycki family, 350 morggen (about 201.4 hectares) of forest were cut down and another 265 morggen (about 152.5 hectares) burnt.³⁵ In the Krasiczyn forests³⁶ in the Przemyśl district, 864.21 ha of the total area of 1876.22 ha, or 40%, were felled or destroyed in the three forest sectors³⁷ located in the fortress strip during the battles for the Przemyśl fortress. In the aforementioned sectors, surviving stands lost between 10% and 60% of their canopy through felling. Other sectors, outside the fortress defence line, suffered lesser losses. The most affected was sector no. IV in the municipality of Wapowce (898.17 ha), where 40.94 ha were destroyed and between 10% and 65% of the stands were damaged over an area of 182.75 ha, and the least affected was sector no. II, the furthest from the fortress, where clearings covered 32.45 ha of its total area of 544.44 ha and nowhere exceeded 40% of the original canopy.³⁸

As a result of the exploitative, uncontrolled, and indiscriminate felling carried out by the inhabitants of the Lviv area, urban forests there suffered significant losses. In one village, the losses were estimated at around 300 morggen (about 172.7 hectares), in another village 30-year-old pine and spruce plantations fell victim to civilians, and in another two forest complexes 100 morggen (about 57.6 hectares) of stands were fully cleared.³⁹

The forests between Brody and Zabłotce in the Brody district on the eastern border with Russia⁴⁰ were completely cleared. The two villages are approximately 18 km apart.

33 "Korespondencja Józefa Stronera ze Staniątek" [Correspondence of Józef Stroner of Staniątki], *Sywan*, no. 7–12 (1915): 120–22.

34 Zarzecze is a village in the Jarosław district. It featured a palace complex that belonged to the Dzieduszycki family.

35 Kazimierz Karolczak, *Dzieduszyccy: Dzieje rodu* [The Dzieduszyckis: The history of the family] (Kraków: Wydawnictwo Naukowe Akademii Pedagogicznej, 2000), 205.

36 Krasiczyn forests refers to forests included in the landed estates belonging to the Sapieha family, the capital of these estates was the town of Krasiczyn, which boasted an impressive castle.

37 Forest sector—an area of forest supervised by a forester.

38 Józef Szymusik, "Lasy krasiczyński kiedyś a dzisiaj" [Krasiczyn forest in the past and today], *Sywan*, no. 1–3 (1917): 5–7.

39 "Najnowsze wiadomości ze Lwowa" [Latest news from Lviv], *Gazeta Krakowska*, no. 254 (1915): 2.

40 Oktawia Ożarowska, "Zniszczenie gospodarcze w powiecie brodzkim" [Economic destruction in the Brody district], *Tygodnik Rolniczy* [Farmers Weekly], no. 13 (1918): 171.

One consequence of warfare was the growth of forest pest insect populations. Due to clearing and felling, damage caused by rifle and artillery fire, and fires and natural disasters,⁴¹ enormous amounts of damaged and charred stumps and branches accumulated in the forests, which were not controlled, managed (fallen trees were not debarked), and removed, and thus provided an excellent breeding ground for forest pests, which then attacked healthy trees. In 1916, the area infested by forest pests was estimated at around 208,000 ha of forest, including 12,000 ha completely destroyed, mainly in the San and Bug River basins in northern Galicia and in the Carpathian foothills and the Carpathian Mountains themselves.⁴² Ludwik Sitowski⁴³ estimated the area of the Sandomierz Forest destroyed by the bordered white moth larvae at 1,500 morgen (about 683.3 hectares) of forest in the area of the village of Mokrzyżów alone.⁴⁴ Forests in the Tatra Mountains were attacked by the European spruce bark beetle.⁴⁵ This invasion was not a direct result of military action, as fighting was not taking place in the area, but the state of war indirectly influenced the spread of this pest because adequate countermeasures were not taken due to the lack of qualified foresters, people to do the work, and wagons.⁴⁶ In 1921, it was estimated that the area affected by the bark beetle covered some 30,000 morgen (17,265 hectares), and several hundred forestry workers and an enormous number of carts were needed to effectively control the forest insect

41 In April 1916, a snowstorm (with snow frozen to branches, hanging from them in the shape of grape bunches) and hurricane winds destroyed tens of thousands of cubic metres of trees. In the autumn of 1916 and the winter of 1917, the wind wrought further damage to the forests in the Podhale region.

42 *Sprawozdanie ck. Namiestnictwa* [Report ck. Governance], 128; "W sprawie sanacji zniszczonych wypadkami wojennymi lasów w zachodniej części kraju" [On the sanitation of forests in the western part of the country destroyed by war accidents], *Tygodnik Rolniczy* [Farmers Weekly], no. 9 (1916): 82–83.

43 Ludwik Sitowski (1880–1947)—a Polish researcher, zoologist, entomologist, head of the experimental station for the study of animal pests on plants at the Institute of Zoology of the Jagiellonian University in the years 1916–18, rector of the University of Poznań in the interwar period (1925–26).

44 Ludwik Sitowski, "Walka ze szkodnikami" [Pest control], *Tygodnik Rolniczy* [Farmers Weekly], no. 19 (1917): 182–84; Ludwik Sitowski, *Z biologii poprocha cetyniaka (bupalus piniarius) w Puszczy Sandomierskiej* [From the biology of the cetacean (bupalus piniarius) in the Sandomierska Forest] (Poznań: Drukarnia Uniwersytecka, 1922), 1–8.

45 The European spruce bark beetle (*Ips typographus*) is a species of beetle in the bark beetle family, which lives under the bark of trees where it burrows corridors, a dangerous pest that attacks coniferous forests.

46 "Inwazja kornika w Tatrach" [Bark beetle invasion in the Tatras], *Tygodnik Rolniczy* [Farmers Weekly], no. 20 (1918): 263.

infestation.⁴⁷ It is worth mentioning that during the First World War the spruce bark beetle attacked forest complexes in other regions of the Polish lands, especially in the eastern districts of the Second Republic (the Białystok, Sokółka, Bielsk Podlaski, Szczuczyn, and Suwałki regions).⁴⁸ However, in the district of Nowy Targ, in the years 1917 to 1918, a May beetle infestation appeared,⁴⁹ contributing to the economic impoverishment of the local population, who made their living from agriculture and horticulture. This insect destroyed cereal crops and attacked potatoes and legumes. The May beetle plague in the region can be indirectly linked to the war, as over its course there was a shortage of fertilizers, especially phosphate fertilizers, which reduced the population of this pest. In their place, natural manure was used, which encouraged the pest's growth, especially in dry and sunny soils (there was a drought in Galicia in the summers of 1917 and 1918). Thus adverse economic (war, economic crisis), natural (drought), and natural (plant pest infestation) conditions overlapped.⁵⁰

Currently, one of the key threats to the ecosystem is the decline in bee populations caused by the extensive use of plant protection products in agriculture. During the First World War, bees in the Galician area suffered greatly as a result of the fighting, theft, and economic crisis. The destruction of beekeeping and bees took place in stages. In the years 1914–15, destruction was wrought by masses of soldiers that swept across the country. Further damage to the bee farms was contributed to by the absence of beekeepers who had been drafted into the army, as well as forced evacuations of the population, instances of sacking, disastrous weather conditions, especially in the years 1916–18 (cold and dry springs), and the destruction of beekeeping equipment, especially

47 Karol Kwaśniewski, "W sprawie ochrony lasów tatrzańskich" [On the protection of the Tatra forests], *Sywan*, no. 4–6 (1921): 55–60, "Okólnik okręgowej inspekcji leśnej w Nowym Sączu do właścicieli lasów, zarządów, zarządów lasów, zwierzchności gmin i posterunków policji państwowej" [Circular of the district forest inspectorate in Nowy Sącz to forest owners, boards, forest managements, communal authorities and state police stations], *Sywan*, no. 4–6 (1921): 60–61.

48 Stefan Kałuba, "Monografia kornika-drukarza" [Monograph of the woodworm-printer], *Las Polski* [Polish Forest], no. 5–6 (1921): 199.

49 The May beetle (*Melolontha melolontha*) is a species of beetle that feeds on the leaves of deciduous trees, including fruit trees, whose larvae feed on the roots of herbaceous plants, shrubs, and trees, making the species a threat to fruit farming, horticulture, and forestry.

50 Ludwik Sitowski, "Kłęska chrabąszczy w powiecie nowotarskimi" [A disaster of beetles in the Nowy Targ district], *Tygodnik Rolniczy* [Farmers Weekly], no. 21 (1918): 273–74, "Wieści z kraju. Z ziemi sądeckiej" [News from the country. From the land of Nowy Sącz], *Tygodnik Rolniczy*, no. 32 (1918): 407.

apiaries and bee sugar.⁵¹ Before the war, the number of bee colonies⁵² was estimated to be around 350,000. The war effort destroyed around 200,000 of them. As many as 50,000 were saved in western Galicia, and 100,000 in eastern Galicia. The 1916 statistics for the 37 western districts showed the following losses: 6,143 hives, 2,637 swarms, and 4,009 colonies.⁵³

Data for districts, municipalities, and individual beekeepers is available, and giving these, contrasted with the state of affairs before the start of the war, allows us to underline the extent of the damage done to beekeeping. In the Tarnów district alone, according to calculations by the District Council and municipal offices, 1,367 bee hives were destroyed.⁵⁴ In the 13 municipalities of the Tarnopol district surveyed by beekeeping instructor Józef Biernat in July 1918, there were 5,706 colonies owned by 144 beekeepers at the outbreak of war. As a result of warfare and looting, 4,937 colonies were destroyed, completely ruining 27 farmers who did not own a single colony by 1918. At the time of the inspection, the number of colonies in the municipalities mentioned was 2,881, owned by 117 beekeepers.⁵⁵ The situation of individual beekeepers is illustrated by an account by Mikołaj Boruch from the village of Wygoda in the Pilzno district from April 1916, published in the trade journal *Bartnik Postępowy*. Boruch had been keeping bees for forty years, but on a small scale. In 1914, he owned three hives of his own and looked after his son and daughter-in-law's bee farm, which consisted of eight hives. One hive was destroyed by a Hungarian soldier and the rest buried in the ground in November 1914. In mid-April 1915, Boruch dug them up. Most of the bees had survived, and only one hive did not survive the winter. Other beekeepers protected their bees in a similar way.⁵⁶ Thus, thanks to Mikołaj Boruch and thousands of other beekeepers, Galician beekeeping survived the wartime crisis. Contemporary sources did not report on the threat to agriculture and horticulture caused by the lack of bees, which pollinate plants.

51 *Bartnik Postępowy*, no. 8 (1918): 131, "Kilka uwag wobec spóźnionej wiosny" [Some comments on the late spring], *Tygodnik Rolniczy* [Farmers Weekly], no. 19 (1917): 182, "Posucha a uprawa roli" [Drought and tillage], *Tygodnik Rolniczy* [Farmers Weekly], no. 24 (1917): 244–45.

52 A bee colony includes the hive and the honeycombs.

53 Kazimierz Brzeziński, "Ze statystyki ogrodniczej" [From horticultural statistics], *Ogrodnictwo* [Horticulture], no. 2 (1918): 52.

54 Michał Bartosz, "Plan odbudowy pszczelnictwa" [Beekeeping recovery plan], *Piast*, no. 34 (1917): 11.

55 Józef Biernat, "Sprawozdanie okręgowego instruktora pszczelnictwa" [Report of the district beekeeping instructor], *Bartnik Postępowy* [Progressive Bartnik], no. 10 (1918): 161–63.

56 Mikołaj Boruch, "Więści z pasiek" [News from the apiaries], *Bartnik Postępowy* [Progressive Bartnik], no. 4 (1918): 68–69.

Estate owners and tenants suffered losses in fish farming. These consisted of the destruction of or damage to pond facilities (dikes, weirs, levees), direct damage resulting from the draining of ponds and the harvesting of fish, and indirect damage caused by the lack of stocked fish. It was common practice for Austrian, Hungarian, and Russian soldiers to stun fish with grenades and explosives. In the western part of Galicia (Oświęcim district), ponds were destroyed by the flooding of the Vistula in 1916. It was estimated that it would take 4–6 years to rebuild fish farming in Galicia.⁵⁷ The exploitative harvesting of fish also extended to rivers. The fishing was carried out by soldiers and local people, with no one in control of this practice, as many of the guards of the fishing sectors had been drafted into the army. Large expanses of flowing water were left unattended and unchecked, and thus there was a fear of rivers being left without fish, although this did not happen.⁵⁸

The war had a strong impact on the fauna in Galicia. Above all, poaching, practised by soldiers and civilians alike, became widespread over its duration. This affected roe deer, hares, and partridges. The Russians, having mostly military rifles at their disposal, were more effective at hunting roe deer than other smaller game.⁵⁹ Roe deer and hares also died as a result of attacks by stray dogs and cats, and lack of access to food in the form of winter cereals that were not sown, especially in 1914/1915.

Warfare and illegal hunting contributed to changes in the populations of certain animal species and their migrations. Forests near major cities and railway lines suffered the greatest losses of wildlife. In contrast, in areas where hostilities and Russian occupation lasted for a shorter period, such as in the western part of Galicia (Kraków, Podgórze, and Wieliczka regions), the losses were lower. These geographical differences led to a press polemic in 1915 about the situation of wild animals in the first months of the war. Cezary Kochanowski argued in the pages of the *Österreichische Forst-Zeitung* that the situation of

57 *Rollnik*, no. 6 (1916): 69; “Szkody wyrządzone przez wojnę w gospodarstwach rybnych kraju, tak stawowych jak i rzecznych” [The damage caused by the war to the country’s fish farms, both pond and river], *Tygodnik Rolniczy* [Farmers Weekly], no. 19 and 20 (1916): 151–53.

58 “Gospodarstwa rybne po inwazji” [Fish farms after the invasion], *Czas* [Time], no. 649 (1915): 2–3; “O ochronę naszych ryb” [For the protection of our fish], *Tygodnik Rolniczy* [Farmers Weekly], no. 11 (1915): 101. The State Archive in Rzeszów, Archiwum Zarządu Dóbr Sędziszowskich, signature 275, Odezwa Krajowego Towarzystwa Rybackiego do właścicieli gospodarstw rybnych, Kraków 13 XII 1915, 41–42 [Archive of the Management of the Sędziszów Estate, signature 275, The proclamation of the National Fisheries Society to owners of fish farms, Kraków 13 XII 1915, 41–42].

59 “Zapiski z polowań w sezonie myśliwskim 1915/1916” [Hunting notes for the 1915/1916 hunting season], *Łowiec* [Hunter], no. 9 and 10 (1916): 78.

the animals had not been all that critical, as the general mobilization included many poachers and an order had been given to surrender their weapons, hunting had been forbidden, and casual hunting by soldiers had not been effective as they did not have shotguns. Furthermore, the winter of 1914/1915 was mild. These opinions were disagreed with by the editors of the Galician journal *Łowiec*, who argued that not all poachers had been mobilized and not all had surrendered their weapons, especially “professional poachers”, and that the use of snares, traps, and other poaching equipment, as well as hunts organized by Russian officers and soldiers with the setting up of a chase, the use of machine guns etc., were considered more dangerous. The *Łowiec* gave examples of places where wild animal populations had suffered significant losses (Przemysł region, Lviv, Rozwadów—where deer, roe deer, and pheasants were exterminated, Subcarpathia).⁶⁰ The *Łowiec* reporter estimated that in the region of Radziechów, in north-eastern Galicia, the deer population had decreased to one-third of the pre-war stock. In the Radłów Forest (near Tarnów), the deer population was estimated at 800 before the war, and in October 1916 at only about a few dozen.⁶¹ On the other hand, the correspondents of *Łowiec* cited areas where animal populations had not shrunk as a result of the war. This was primarily in western Galicia, which was not affected by the war, but also areas of eastern Galicia, such as the area of the village of Sianki in the Turčan district, and in southern Galicia near the Hungarian border. Stefan Filipowicz’s correspondence shows that the war did not affect the state of game in the local region. This may have been due to the terrain (mountainous, difficult to access for civilian and military poachers), lower population density, and lower intensity of fighting. The correspondent accurately estimated the population of each species, i.e. deer—“condition as in previous years (average)”; roe deer—“excellent condition”; hares—“condition generally worse than in previous years due to the proliferation of the fox population”; wolves—“appeared in December 1915 but then disappeared”; hazel grouse—“quite numerous”;

60 Cezary Kochanowski, “Wildstand in den vom Feinde gesäuberten Gebieten Galiziens” [State of the game in the areas of Galicia cleared of the enemy], *Österreichische Forst und Jagd Zeitung* [Austrian Forestry and Hunting Newspaper], no. 1708 (1915): 1–2, “Stan zwierzyny w oswoobodzonej Galicji” [The state of game in liberated Galicia], *Łowiec* [Hunter], no. 21 and 22 (1915): 173–75.

61 “Co się dzieje w naszych kniejach?” [What is happening in our forests?], *Łowiec* [Hunter], no. 1 and 2 (1915): 9–10; “Korespondencje” [Correspondences], *Łowiec* [Hunter], no. 9 and 10 (1915): 78–80, “Korespondencje” [Correspondences], *Łowiec* [Hunter], no. 21 and 22 (1915): 175, “Korespondencje”, *Łowiec*, no. 23 and 24 (1915): 190–91, “Korespondencje” [Correspondences], *Łowiec* [Hunter], no. 9 and 10 (1916): 77–78.

woodcock⁶²—a “very weak” population.⁶³ Concluding the theme of wildlife numbers during the war, it should be stated that, in general, during the first two years of the war (1914–16), the population of roe deer and deer decreased, while that of wild boar, fox, and hawk increased. In the succeeding years, the following phenomena were observed in the areas liberated from Russian occupation: a decrease in the stock of small game (hares) as a result of the proliferation of predators (foxes and wolves); the recovery of the roe deer population due to anti-poaching measures and a reduction in hunting; and the continued proliferation of wild boar, which caused considerable damage to farms.⁶⁴ The direct and indirect effects of the war were still being felt in the early 1920s—a decrease in the population of roe deer and deer, and an increase in wild boar. This was later confirmed by correspondence from various areas of former Galicia (Niska, Nadwórna, Gródek, Skole region).⁶⁵

The war was linked to the phenomenon of the distribution change for fauna—the departure and arrival of certain game animals in the areas where there had been fighting or army movements. The sound of fighting forced game to change location, e.g. during the fighting in the Carpathian Mountains, deer moved to areas where they had not been seen before the war, while wolves appeared to follow the turmoil to areas where there were dead horses, waste from field slaughterhouses and kitchens, and battlefields. The hunting press, based on correspondence from hunters, reported that wild boar, foxes, and wolves had appeared near human settlements, and the arrival dates of storks had changed. Observations of animal and bird behaviour in Galicia coincided with the situation on the Western Front, where in the autumn of 1914, during violent fighting, flocks of migratory birds left Belgium and, unable to fly over France, took refuge in England.⁶⁶ In 1916, a plague of striped field mice appeared in some areas of Galicia, posing a threat to crops. In October 1916, a regulation was issued to collect information on these pests. The campaign

62 The woodcock, or common woodcock, is a species of medium-sized bird from the Scolopacidae family.

63 “Korespondencja” [Correspondence], *Łowiec* [Hunter], no. 5 and 6 (1916): 44.

64 “Korespondencje” [Correspondences], *Łowiec* [Hunter], no. 19 and 20 (1916): 157, “Z notatek myśliwskich” [From the hunter’s notes], *Łowiec* [Hunter], no. 11 and 12 (1917): 92, “Zwierzyna a wojna” [Game and war], *Łowiec* [Hunter], no. 19 and 20 (1917): 155, “Korespondencje”, *Łowiec*, no. 5 and 6 (1918): 41, “Z notatek myśliwskich”, *Łowiec* [Hunter], no. 9 and 10 (1918): 76.

65 “Korespondencje” [Correspondences], *Łowiec* [Hunter], (1921), no. 2: 6, no. 3: 6, no. 5: 6.

66 “Kronika” [Chronicles], *Łowiec* [Hunter], no. 3 and 4 (1915): 31–32; “Korespondencje” [Correspondences], *Łowiec* [Hunter], no. 5 and 6 (1915): 47–48, “Kronika” [Chronicles], *Łowiec* [Hunter], no. 1 and 2 (1916): 14.

to eradicate them, was postponed until spring 1917 due to a lack of poisonous agents.⁶⁷ This was unsuccessful, as field mice attacked crops again that year.⁶⁸

Another consequence of warfare was the destruction of environmental engineering infrastructure. Damage to drainage was divided into four categories. The first comprised losses caused by direct military operations, such as the construction of fortifications. The second type was indirect damage, i.e. caused by siltation, pollution, and lack of maintenance. The third category included land reclamation works started before the war but not completed as a result of the fighting. The last consisted of those drainage facilities that would require modifications after the war and work that would be carried out under changed conditions (e.g. shortage of labour, increased cost of works).⁶⁹

Artillery shelling and trench lines damaged drained and meliorated areas. Indeed, the network of canals and drainage ditches and road ditches was wrecked. Work to regulate river and stream beds was neglected. A few months into the war, the hydrological projects from the last few pre-war years were ruined. The warfare caused damage to the dykes on the Vistula and its tributaries, especially on the Dunajec, Wisłoka and San Rivers, and on the tributaries of the Dniester, especially on the Gniła Lipa (Hnyla Lypa) and Złota Lipa (Zolota Lypa), along which the front line ran in 1915. The embankments were cut up by firing ditches and shelters for officers and soldiers. Dikes and other water and drainage facilities were not blown up during the war, so there was no flooding or inundation caused by this. In the spring of 1916, however, there were floods in the Vistula and Dunajec River basins caused by heavy rains. During the war, no work was carried out on river embankments, with the exception of a section of the Vistula near Kraków, and the repair of damaged structures, primarily the embankments of the Vistula, the Dunajec, the Wisłoka, and the Gniła Lipa and Złota Lipa.⁷⁰

67 *Sprawozdanie ck Namiestnictwa* [Report of the ck governorate], 126.

68 Odo Bujwid, "Grożba myszy polnych" [The threat of field mice], *Tygodnik Rolniczy* [Farmers Weekly], no. 44 and 45 (1917): 458–59.

69 The National Archives in Kraków, Archiwum Dzikowskie Tarnowskich, signature 757, Protokół z Sesji Rady przyboocznej Sekcji II. odbytej dnia 10-go maja 1917 [Archives of the Tarnowski family from Dzików, signature 757, Minutes of the Session of the Adjourning Council of Sec. II. held on 10 May 1917], 612–13.

70 Andrzej Kędzior, "Naprawa wałów ochronnych nad Wisłą i dopływami" [Repairing the dykes over the Vistula and tributaries], *Piast*, no. 31 (1915): 11; "Regulacja rzek a powódzie" [River regulation vs. floods], *Tygodnik Rolniczy* [Farmers Weekly], no. 21 (1916): 168; Andrzej Kędzior, *Roboty wodne i melioracyjne w południowej Małopolsce wykonane z inicjatywy Sejmu i Wydziału Krajowego, część I. Ogólna* [Water and drainage works in southern Małopolska carried out on the initiative of the Sejm and the National Department, Part I.

In summary, wartime operations had a significant impact on the economic and natural situation of Galicia (southern Poland after the collapse of the Habsburg Monarchy in 1918). The effects of several years of war carried over into intensive farming (lack of natural and artificial fertilizers, fallow land, weedy fields), into soil erosion, and thus reduced crop yields. There were enormous losses in forest stands; yew trees became endangered, and the planting of conifers, pine and spruce was promoted in place of the destroyed forests. The war brought a sudden imbalance of the organic world in the forests and changes in animal populations. In the aftermath of the warfare, populations of pests (mice) and predators (foxes, wolves) and wild boar, increased, while roe deer and deer populations fell dramatically. Smaller game (hare) and fowl populations were not affected. The war created, either directly or indirectly, favourable conditions for the development of insects harmful to trees and plants, especially in the Sandomierz Forest, where they appeared in 1916 and were still destroying forests in the 1920s. The above phenomena had long-lasting effects, which were evident throughout the interwar period. The situation in Galicia was no different from that in other districts in the Polish lands. The same problems were observed in the Kingdom of Poland and the western governorates of the Russian state, where enormous losses of forests were recorded, especially in the Białowieża Forest, and the extermination of the European bison became a tragic symbol of the consequences of the war on fauna.⁷¹

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71 For more, see Łukasz Faszczka, “Eksploracja i ochrona. Lasy ziem polskich pod niemieckim zarządem okupacyjnym w latach 1914–1919” [Exploitation and Protection. Forests of the Polish lands under German occupation administration 1914–1919] (PhD diss., University of Warsaw, 2022).

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