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Modernization by the State and its Ecological Consequences in East-Central Europe

VIKTOR PÁL

Pál, Viktor: Modernization by the State and its Ecological Consequences in East-Central Europe

During the nineteenth-, and twentieth centuries urbanization and industrialization altered the environment in a dramatic fashion throughout Europe. Much of this change in East-Central Europe (ECE) was instigated, facilitated and coordinated by the state. The economic-, and technological intervention by the state and its interconnectedness with capitalism, and science have had tremendous ecological consequences. Although there have been substantial studies related to the complex interconnectedness of state-intervention, capitalism, and anthropogenic environmental change, the scientific community still knows little about the environmental aspects of specific modernization attempts in many parts of the world, including East-Central Europe. To cover this gap, this special issue investigates some of the key historical problems of modernization and subsequent ecological decline in modern ECE via a handful of relevant case studies. This introductory essay summarizes the main theoretical-, and methodological challenges related to the modern environmental history of East-Central Europe and the role of the state, as well as provides an overview of the case studies included in this special issue.

Key Words *Modernization; Environmental History; East-Central Europe; 19th Century; 20th Century*

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Contact *Ostravská univerzita; viktor.pal@osu.cz*

During the nineteenth-, and twentieth centuries urbanization and industrialization altered the environment in a dramatic fashion throughout Europe. These environmental changes have often been attributed to new technologies that spread in manufacturing and transportation, as well as accompanied with the extensive use of fossil energy sources. For example, in England easily accessible coal-, and iron ore deposits created the background for new business opportunities and enhanced industrial-, and commercial activities with a growing toll on the environment. Coal, iron, steel, and railways also meant new markets, and the emergence of new industries to supply these markets. New steel making technologies, for example the Bessemer converter, and a wide array of inventions in the chemical industry, as well as the birth of new industries such as electro-engineering, increased the stress on the environment and created a widening stream of waste.¹

Industrial changes did not only transform the way things were produced, they also radically reshaped how people lived. For example, Manchester grew from a small-scale

¹ PÁL, Viktor: *Technology and the Environment in State-socialist Hungary: An Economic History*. London – New York 2017, pp. 15–31.

town to a bustling metropolis in seventy years. More cities meant more resources consumed. In Britain, coal use boomed from ten million tons in 1800 to 189 million tons by 1914. Although industry was an important source of smoke pollution, it was domestic coal-fuelled heating and cooking that polluted the air in large cities. Air pollution problems worsened in winter months and environmental problems accompanied with health issues.²

The economic-, technological-, and environmental changes that unfolded in Britain in the nineteenth century soon spread around Europe. In Germany, for example, industrialists adopted already existing production technologies in the coal-, iron-, and steel producing sectors and gradually took over Belgian-, and British firms in the volume of production. New industries were born, for example by the late nineteenth century Hoechst, Bayer, and BASF took world leading positions in chemical production.³

Transportation infrastructure, such as railways also grew exponentially in the European continent. For example, in Germany, the construction of the first railway line in 1833 was followed by a rapid expansion, and the rail network boomed from 6,500 km in 1852 to 61,000 kilometers by 1910. German urbanization quickly followed. Between 1850 and 1910, Berlin grew from a city of 412,000 to a metropolis of over two million inhabitants.⁴

Perhaps the key aspect that set the nineteenth century British-, and continental European patterns of industrialization apart was the role of the state. For example, in Britain the deregulated market and the leading role of the private initiative dominated, whereas in Germany industrialization included strong state intervention. Nevertheless, the environmental impacts of German industrialization were similar to the British, regardless of different organization methods. Nineteenth century Germans couldn't help noticing the rapidly growing pollution caused by booming industries. For example, industrial-, and urban air-, and water pollution grew from being perceived as a nuisance into sources of a systematic public debate in coal mining, iron-, and steel manufacturing areas.⁵

For example in the Ruhr, one of the largest mining-, and manufacturing areas in the world, industries-, and urban population produced water pollution to such an extent that it endangered water supply for industry and cities by the second half of the nineteenth century. To find solutions to ecological problems German industrialists and the German state established eight water associations in the Ruhr area between 1904 and 1958. For example, the Emscher Association, established in 1899, was responsible for the management of the Emscher River that flows through the heart of the Ruhr. Eventually, the Emscher Association commissioned planning-, and construction projects which re-engineered the Emscher River into a steep-, and cemented wastewater canal. Some of the grandest state-induced environmental interventions were commissioned when water shortages became extremely pressing in the Ruhr. In 1899 the Ruhr Reservoirs Association was set up to commission the construction of mighty dams and water reservoirs.

² MOSLEY, Stephen: *The Chimney of the World : A history of Smoke Pollution in Victorian and Edwardian Manchester*. London – New York 2008, pp. 2, 72.

³ BLACKBOURN, David: *Fontana History of Germany, 1780–1918 : the Long Nineteenth Century*. London 1997, p. 185.

⁴ Ibidem, pp. 178–180, 362–370.

⁵ Idem: *The Conquest of Nature, Water, Landscape, and the Making of Modern Germany*. New York – London 2007, p. 180.

Between 1899 and 1965 six mega-dams were constructed in Rhineland-Westphalia with a total capacity of 469 million cubic meters.⁶

One of the most influential books criticizing state intervention and its environmental impact is James C. Scott's *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*.⁶ Scott contends that bureaucratic regimes aim to organize their societies according to the technocratic principles of "high modernism", failing to take local knowledge into account. Scott maintains that both capitalism and state-dominated societies fail to produce their desired results via uniformity, grids, homogeneity, and megaprojects.⁷

Scott's thesis has a particular relevance to the history of East-Central European states especially during the past two centuries, since the birth of large state reclamation-, and landscape engineering projects. One of the main themes Scott focused on was communism. Eastern European socialist regimes produced troubled environmental legacies that attracted particular scientific attention. Most works in this vein connected environmental degradation with the promethean ideologies of state-socialist regimes.⁷

That status quo has been contested recently by a handful of works, which attributed environmental mitigation and a flourishing scientific-, as well as social discussion to negotiate between the accelerated state-sponsored modernization of socialism and rising environmental concerns.⁸

Although there have been some studies published related to the East-Central European specificities of anthropogenic environmental change, the scientific community still knows little about the complex interconnectedness of state intervention, capitalism, and anthropogenic environmental change in ECE. Papers in this special issue aim to fill this gap in the scientific knowledge, at least in part, by analyzing the role of the state with modernization attempts. Authors pay special attention to the environmental impact of state intervention and the case studies included often overarch historical periods, thus providing opportunities to compare the environmental legacy of subsequent modernization attempts.

The first research paper in this special issue by Piotr Boroń and Jakub Grudniewski investigates the influence of state policy on the development of industry in Upper Silesia via the case study of the zinc smelter in Katowice-Szopienice (*Wilhelminehütte*) by focusing on the ecological consequences of the production of non-ferrous metals in the

⁶ CIOC, Mark: *The Rhine: an eco-biography, 1815–2000*. Seattle 2002, p. 89.

⁷ LAAKKONEN, Simo – PÁL, Viktor – TUCKER, Richard: *The Cold War and environmental history: complementary fields* 16, 2016. no. 4, pp. 1–18; PÁL, Viktor: Orbán's View on Nature: The State and the Environment in Modern Hungary. In: MÖRNER, Nina (ed.): *Ecological Concerns in Transition: A Comparative Study on Responses to Waste and Environmental Destruction in the Region*. Stockholm 2023, pp. 144–151; Idem: Illiberal Environmentalism?: The Case of Contemporary Hungary. *Environmental History* 27, 2022, no 4, pp. 649–656; PAVLINEK, Petr – PICKLES, John: *Environmental Transitions, Transformation and Ecological Defense in Central and Eastern Europe*. New York 2000; WEINER, Douglas R.: *Models of Nature: Ecology, Conservation, and Cultural Revolution in Soviet Russia*. Bloomington 1988; Idem: *A Little Corner of Freedom: Russian Nature Protection from Stalin to Gorbachev*. Berkeley – London 1999.

⁸ BRAIN, Stephen: *Song of the Forest. Russian Forestry and Stalinist Environmentalism, 1905–1953*. Pittsburgh 2011; BRAIN, Stephen – PÁL, Viktor (eds.): *Environmentalism under Authoritarian Regimes: Myth, Propaganda, Reality*. New York 2019; PÁL, Viktor: Like Industrious Bees: Paper Waste and Recycling in Communist Hungary, 1950–1990. *Environmental History* 28, 2023, no. 2, pp. 335–360; PÁL, Viktor – PEREZ, Leonardo Valenzuela: Environmental Protection under Authoritarian Regimes in Cold War Chile and Hungary. *Global Environment* 14, 2021, no. 2, pp. 310–334; PÁL, Viktor: Toward Socialist Environmentalism? Scientists and Environmental Change in Modern Hungary. *Environment and History* 29, 2023, no. 2, pp. 239–259.

region. Boroń and Grudniewski argue that the deeper involvement of the state accelerated industrial growth and subsequent public health, as well as environmental issues in the Prussian part of Silesia. The Prussian example of industrial development was followed by the successive governments within the German-, and the Polish states with devastating public health-, and environmental consequences. Boroń and Grudniewski point out that the state also aimed to mitigate health-, and environmental problems related to industrialization, however they note that most of these attempts failed at least partially. Nevertheless, this study concludes that the critical role of state intervention triggered long-lasting pollution, that caused severe environmental-, and health concerns, which in return gave birth to rather complex environmental mitigation policies-, and technologies in and around Szopienice in the past two centuries.

The following paper by Róbert Balogh and Péter Homor investigates the role of the state, via forest laws and forestry education in Hungary. Similarly to Prussia, and other European states, the forest economy was viewed by the political elite of nineteenth century Hungary as a key resource to support nationalist modernization, a vision which gained prominence in the first half of the nineteenth century. After the Compromise of 1867 the Hungarian speaking political elite had the opportunity to realize the earlier envisioned nationalist modernization-, as well as forest conservation goals simultaneously. Authors argue that this process, on the one hand, led to opportunities for a more effective and systematic exploitation of forests. On the other it fostered developing Hungarian-language higher education for scientific forestry as well as creating more effective forest regulations to promote the nationalist modernist goals of the Hungarian elite. In that regard, Balogh and Homor proposes that the Hungarian example is an important case representing the role of the state as well as forestry professionals in the context of nationalist modernizations and their ecological consequences with particular focus on the ECE region.

In the third research paper Marta Rendla and Janja Sedlaček investigate the environmental impact of industrialization and urbanization in Slovenia after the Second World War. Authors argue that following the Yugoslav–Soviet split in 1948, Yugoslavia began to build its own type of socio-economic system that included features both from the capitalist-, as well as centrally planned systems. However, the lack of a robust heavy industry did not spare Slovenia from severe pollution problems. One of the specificities of the Slovenian economic policies was the widespread use of low-quality-, and highly polluting lignite for domestic heating, and industrial power generation. The use of lignite combined with regional geographical-, and ecological features led to a very high concentration of pollutants in the air, especially SO_2 , that affected the quality of human-, and non-human health, and the environment particularly in and around urban-, and industrial centers. Authors argue that in response to the worsening pollution problem a rich and multifaceted expert discourse evolved, followed by complex, and attentive Slovenian environmental policies. However, Rendla and Sedlaček make a compelling argument that the effective use of legal tools to protect the environment were put into practice only in the 1980s when an environmental movement began to challenge the key role of the state to discuss and disseminate environmental issues.

In the following paper by Ferenc Jankó and Priscilla Hafenscher analyze the long term political ecology of environmental conflicts in Hungary overarching historical periods in the past two centuries, by focusing on the work and legacy of two of the leading environmental scientists in the ECE region: Antal Réthly and Emil Mosonyi. In their study

Jankó and Hafenscher argue that adopting a biographical approach and focusing on the impact-, and controversies around Réthly and Mosonyi contributes to a more nuanced analysis of key environmental issues in and around Hungary during the past two centuries. Authors trace nationalist modernization-, and conservation approaches of the nineteenth-, and early twentieth century, as well as state-socialist technocratic modernization attempts, and compare key issues, tendencies, power relations and arguments, many of which overarched historical periods. Following a long-duration approach enables Jankó and Hafenscher to ask important questions about who has the right to use and transform nature, and to protect the quality of the environment? To answer these important questions, authors of this study examine the agency of individuals within environmental institutions, as well as the interaction between science, state institutions, and society.

In the last paper Andrija Filipović analyzes the modernization processes of the Sava River with a focus on the section in and around Belgrade, the Serbian capital. Filipović argues that Belgrade went through a double modernization process in which individual beings, habitats, and entire environments have been turned into non-being. To illustrate these dramatic environmental changes, the author compares state-socialist and postsocialist developments on both sides of the Sava River, via focusing on the state-socialist development of Novi Beograd (New Belgrade) and the controversial contemporary construction project of the Belgrade Waterfront. Filipović argues that the role of the state facilitating and enabling *meontopolitics*, that is the introduction of non-being into the existing relationality through territorial fragmentation, the production of conflict zones and the intensification of space use, is pivotal. As a result of *meontopolitics* local non-human environments have been created, with distinct similarities and differences between state-socialist-, and socialist *necroecologies*, that is an environmental condition inimical to some human and non-human actors as the defining feature of the environmental condition of both socialist-, and contemporary Belgrade.

Albeit, essays in this special issue follow different methodological approaches and focus on different historical periods during the past two centuries, they combined uncover new-, and important aspects of the environmental history of ECE, especially with regard to the role of the state. Hopefully, that new scientific knowledge will inspire further research in the growing field of East-Central European environmental history in the near future.

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Summary

Modernization by the State and its Ecological Consequences in East-Central Europe

During the nineteenth and twentieth centuries urbanization and industrialization altered the environment in a dramatic fashion throughout Europe. Much of this change in East-Central Europe (ECE) was instigated, facilitated and coordinated by the state. The economic and technological intervention by the state and its interconnectedness with capitalism and science have had tremendous ecological consequences since the eighteenth century. According to James Scott, one of the most well-known critics of the modern state and its ecological impact, bureaucratic regimes' aim to organize their societies according to the technocratic principles of "high modernism" that has been devastating to the environment. Scott maintains that the centralized modernization attempts often failed to take local knowledge into account and amplified the forces of homogenization, uniformity, grids, and heroic simplification. Although there have been substantial studies related to the complex interconnectedness of state-intervention, capitalism, and anthropogenic environmental change, the scientific community still knows little about the complexities and environmental aspects of specific modernization attempts in many parts of the world, including East-Central Europe. To cover this gap this special issue will investigate some of the key issues of modernization and subsequent ecological decline in the ECE.

The Influence of State Policy on the Development of Zinc-, and Lead Metallurgy in the Szopienice settlement (With a Particular Emphasis on the Environmental Impact of the Industry)

PIOTR BOROŃ – JAKUB GRUDNIEWSKI

Boroń, Piotr – Grudniewski, Jakub: The Influence of State Policy on the Development of Zinc-, and Lead Metallurgy in the Szopienice settlement (With a Particular Emphasis on the Environmental Impact of the Industry)

The article deals with the interrelationship between state policy and the development of metallurgy in the Szopienice settlement and the impact of industry on the environment. The Szopienice settlement was part of the Habsburg monarchy from 1526. In 1742 it was annexed to the Kingdom of Prussia, and in 1922 to the Second Polish Republic. Back in the Habsburg times, the state granted Georg von Giesche a monopoly to exploit calamine deposits in Upper Silesia (1702). Calamine was initially used to produce brass, but in the late 18th century, zinc production using calamine began in Upper Silesia. Expanding its road and rail infrastructure, the Prussian state contributed to establishing new smelters by private capital in the 19th century. The “Wilhelmine” zinc smelter was established in 1834 by the Giesche concern in Szopienice. In the 1860s, a lead smelter was also established next to the zinc smelter. Both smelters had a disastrous impact on the environment and residents’ health, which went hand in hand with the dramatic housing-, and hygiene standards. At the beginning of the 20th century, a metallurgical hospital was established at the initiative of the Giesche concern. However, the recording of lead poisoning cases did not begin until the 1920s. After World War II, the problem of environmental impact was attempted to be publicized in the 1970s through studies of children who had contracted the disease. The population was resettled from the most endangered zone, and children were treated during months-long stays in sanatoriums.

Key Words Szopienice; Upper Silesia; Georg von Giesche’s Erben Company; Zinc Smelter; Lead Smelter

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Contact *Uniwersytet Śląski w Katowicach*; piotr.boron@us.edu.pl – jakub.grudniewski@us.edu.pl

This article focuses on the influence of the state-, and private capital on economic development and subsequent environmental impact in Szopienice, a district of the city of Katowice, located in the heavily industrialized Upper Silesia region in Poland. Szopienice has been a smelting-, and manufacturing center as part of the Habsburg monarchy from 1526, and became an important industrial center as part of the Kingdom of Prussia from 1740 to 1918. Since then, it has been part of Poland (the Second Polish Republic, the Polish People’s Republic, and the Third Polish Republic).

Because of its long-term industrial history, the non-ferrous metal smelter in Szopienice has been in the center of scholarly investigations especially with regard to the history of technology. A monograph by Emanuel Wilczok, who used the available archival sources concerning the history of the plant from its establishment in the 19th century to the 1980s was published in 1984.¹ An account for the earlier development of industry in Szopienice was carried out in the work of Ludwik Musioł.² Besides historical studies, literary documents such as a poem by Walenty Rożdżeński from the early 17th century,³ and the memoirs of Anton Oskar Klausmann from the 19th century⁴ signified the importance of Szopienice in the history of technology and the environment. Despite substantial scholarly-, and literary accounts, the scientific community still knows little about the environmental circumstances and ecological change associated with the industrial activities of the Szopienice metallurgical mills.

This paper aims to fill that gap in the scientific knowledge by examining the pre-emptive actions of states: the Habsburg Monarchy, the Kingdom of Prussia, and Poland regarding the protection of the environment and the health of the population in the area degraded by industry in and around Szopienice, to shed light on the degradation of the environment and subsequent measures to save the health of industrial workers and their families as well as the local environment.

With regard to East-Central Europe a significant proportion of environmental history scholarship focuses on the state-socialist period, and when not, it is often confined to discuss environmental issues of particular political historical eras. However, it has been suggested by Pál that when connecting the environmental histories of consecutive political history periods new insights could be discovered, especially with regard to the role of the state.⁵ We adopt that frame by observing and analyzing how nature has been paternalistically overseen and controlled by the state for nearly two centuries to generate profit and to serve what had been perceived by different governments as the “needs of the nation”. These tendencies have been overarching historical periods up to the present day, and the paternalistic-, and controlling state have been pursuing goals in Szopienice, similarly to other states in East-Central Europe since the beginning of the 19th century. By doing so we aim to contest the earlier status quo about the environmental history of East-Central Europe, and join the cohort of new scholarship and recent lively scientific discourse over East-Central-, and Eastern European environmental history that aims to re-interpret and identify environmental continuities overarching traditional historical periods.⁶

¹ WILCZOK, Emanuel: *150 lat hutnictwa metali nieżelaznych w Szopienicach : Dzieje Huty Metali Nieżelaznych “Szopienice” i jej zalogi*. Katowice 1984.

² MUSIOŁ, Ludwik: *Szopienice : monografia historyczna gminy*. Manuscript, Silesian Library, signature: R 1035 III.

³ ROZDZIĘŃSKI, Walenty: *Officina ferraria abo huta i warstat z kuźniami szlachetnego dzieła żelaznego : Poemat z roku 1612*. Wrocław 2013.

⁴ KLAUSMANN, Anton Oskar: *Górny Śląsk przed laty*. Katowice 1997.

⁵ PÁL, Viktor: Orbán's View on Nature. The State and the Environment in Modern Hungary. In: MÖRNER, Nina (ed.): *CBEES Annual Report 2022*. Stockholm 2023, pp. 88–95.

⁶ BRAIN, Stephen: *The Song of the Forest : Russian Forestry and Stalinist Environmentalism, 1905–1953*. Pittsburgh 2011, p. 2; BRUNO, Andy: *The Nature of Soviet Power : An Arctic Environmental History*. Cambridge 2016, p. 198; GILLE, Zsuzsa: *From the Cult of Waste to the Trash Heap of History : The Politics of Waste in Socialist and Postsocialist Hungary*. Bloomington 2007, pp. 1–3; PÁL, Viktor: Toward Socialist Environmentalism? Scientists and Environmental Change in Modern Hungary. *Environment and History* 29, 2023, no. 2, pp. 239–259.

Proto-industrial Traditions in Szopienice and Roździeń in the Modern Era

Szopienice is a village located almost on the very border of Upper Silesia and Lesser Poland. It appears in sources together with the adjacent settlement – Roździeń – in 1360 on the occasion of the boundary of the property associated with the town of Mysłówice, set aside by Prince Nicholas of Racibórz for knight Otto of Pilcza. The towns listed there were: Mysłówice, Bogucice, Szopienice, and Roździeń were supposed to have been founded under German law for some time already.⁷

Metallurgy in Upper Silesia in the Middle Ages developed in two ways. The mining and processing of silver and lead can be seen throughout the Silesian-Lesser Poland borderland, where crushed-bearing dolomites were present.⁸ At the same time, iron was extracted from local turf ores. From the 13th century, forges (hammer mills) began to appear, facilitating iron processing with hammers driven by water wheels. Small settlements were established around the forges, and with the development of industry and technology, towns appeared on their site, an example being nearby Katowice. The forges played economic-, and socio-cultural roles.⁹

The presence of iron ore, forests from which charcoal was extracted, and watercourses that allowed industrial plants to be set up meant that numerous forges were established in the region. Because of the scarcity of written sources and their random nature, it is impossible to indicate the time of their establishment. In Roździeń, which is now part of the Szopienice municipality, a forge was established by Stanisław Salomon in 1546, but whether it was the first or a subsequent venture remains unknown.¹⁰ According to a document from 1640, there were four forges on the Rawa River – in Załęże, Bogucice, Roździeń, and Szopienice (all are currently districts of Katowice).¹¹

Both forges: Szopienice and Roździeń, did not survive into the era of industrialization. However, it can be said that they became part of the tradition that started the development of the industry there. The forge in Szopienice operated until the 1830s. The last time it appears in sources is in 1734, while on Johann Wolfgang Wieland's map of 1736, it no longer appears.¹²

The settlement of the village of Szopienice should also be mentioned at this point. At the time of the establishment of the Mysłówice state in the 16th century, Szopienice was described as an “empty village”. It was populated in the second half of the 16th century, but wars and epidemics prevented the population from developing. According to the

⁷ MUSIOŁ, Ludwik: *Materjały do Dziejów Wielkich Katowic (1299–1799) z 5 planami i 13 rycinami*. Katowice 1936, p. 35.

⁸ BOROŃ, Piotr: Zanim powstał wielki przemysł – górnictwo i hutnictwo srebra i ołowiu na terenie Górnego Śląska i zachodniej Małopolski do połowy XVIII wieku. In: PAWLAK, Zbigniew – CHRÓST, Leszek – BOROŃ, Piotr et al. (ed.): *Badania i analizy warunków pracy zawodów przemysłowych*, Tom1: *Poszukiwanie śladów dawnego wydobycia i przetwórstwa kopalni użytecznych*. Gliwice 2021, pp. 86–111.

⁹ PLEWAKO, Andrzej: *Działalność Kuźnicy Boguckiej w Katowicach*. Katowice 1985, p. 5.

¹⁰ TOFILSKA, Joanna: Kuźnice żelaza w wiekach XIV–XVIII. In: BARCIAK, Antoni – CHOJECKA, Ewa – FERTACZ, Sylwester (eds.): *Katowice : Środowisko, dzieje, kultura, język i społeczeństwo*. Katowice 2012, p. 213.

¹¹ WUTTKE, Karl (Hg.): *Codex Diplomaticus Silesiae* : Band 21: *Schlesiens Bergbau und Hüttenwesen. Urkunden und Akten (1529–1740)*. Breslau 1901, No. 876, p. 192.

¹² TOFILSKA, J.: Kuźnice żelaza, pp. 213–214. On Wieland's map, however, there is a “Szabelnia” (“Sabelhütte”) in this area – at the mouth of the Rawa River to the Brynica River. “Szabelnia” was established around 1720, the first master-sabblers in it was Stanisław Mikulovsky. Sabelhütte was immobilized back in the 18th century.

Carolingian cadaster censused in 1725, the two settlements that gave rise to the later municipality of Szopienice had eight homesteaders and nine cottagers (including one empty), while Roździeń had 15 peasant homesteads (including three empty) and 11 cottagers. Almost each owned one cow, a few pigs, and a small acreage for sowing. All of them probably worked on manors belonging to the Myslowice state.¹³

The number of inhabitants did not begin to grow rapidly until the middle of the 18th century, and its peak was during the time of the Myslowice count Józef Mierszowski (1755–1768). Mainly poor peasants were brought in, who established ten cottage farms (27 in total).¹⁴ As a result of the reforms of the 19th century, the process of the enfranchisement of the peasant population began. In Szopienice, the beginning of enfranchisement dates back to 1827.¹⁵

Influence of the Habsburg-, and Prussian States on the Development of Industry via the Examples of the Giesche Company and “Wilhelminehütte” in Szopienice

The von Giesche (Giza, Giese) family had been in Poland's bourgeois and noble circles since the 15th century. One of its most prominent representatives was Georg Giese, a merchant and royal clerk in Gdańsk, whose image is known from a portrait by Hans Holbein. The Polish king granted the Giesche family a privilege of nobility in 1536. One of its members, Adam Giesche, was a military officer in the imperial service for more than a dozen years. After completing his military service, he acquired an estate near Breslau. His son Georg was initially involved in the cloth trade in Breslau and, from the end of the 17th century, proceeded to exploit calamine in Upper Silesia at the Bobrek estate, then owned by Kasper von Pelchrzim. The calamine from the Bobrek estate was used to melt it with copper to obtain brass, as the technique of smelting zinc from calamine was not yet known at the time. The contemporary understanding of calamine viewed it as if it was a plant, because it could regenerate itself underground. The consequence of this was a recognition that the extraction of that mineral did not violate previous mining privileges.¹⁶ However, the mining of calamine stirred up resentment from large landowners, such as Count Henckel von Donnersmarck of Świerklaniec. Georg von Giesche, wishing to avoid disputes with landowners, applied for an imperial monopoly on calamine mining in Silesia, which he obtained in 1702 initially for 20 years.¹⁷ Giesche's lending to the emperor undoubtedly influenced this decision. Incidentally, Giesche obtained the approval of the nobility in 1712. The monopoly on calamine mining was also extended when almost all of Silesia belonged to Prussia from 1742 until 1802.¹⁸

¹³ OBETKON, Rafał: *Mieszkańcy pszczyńskiego wolnego państwa stanowego i ich dochody w świetle katastru karolińskiego z lat 1722–1727*. Pszczyna 2021, pp. 240–241, 274–275.

¹⁴ GOŁASZEWSKI, Janusz: Uwłaszczenie chłopów. In: BARCIAK, A. – CHOJECKA, E. – FERTACZ, S. (eds.): Katowice, pp. 255–256.

¹⁵ Ibidem.

¹⁶ JAROS, Jerzy: *Tajemnice górnośląskich koncernów*. Katowice 1988, pp. 144–145.

¹⁷ WENDT, Heinrich: *Geschichte der Bergwerksgesellschaft Georg v. Giesche's Erben : Festschrift zum 200jährigen Jubiläum der Gesellschaft am 22. November 1904*, Band 2: *Verfassungs- und Verwaltungsgeschichte der Gesellschaft*. Breslau 1904, pp. 3–34.

¹⁸ After the death of Georg's son Friedrich Wilhelm von Giesche in 1754, the estate was inherited by his sister Christiane Eleonore von Pogrell and nieces Marianne Elisabeth von Teichmann and Johanne Gottliebe Amelie von Walther und Croneck. JAROS, J.: *Tajemnice*, p. 146.

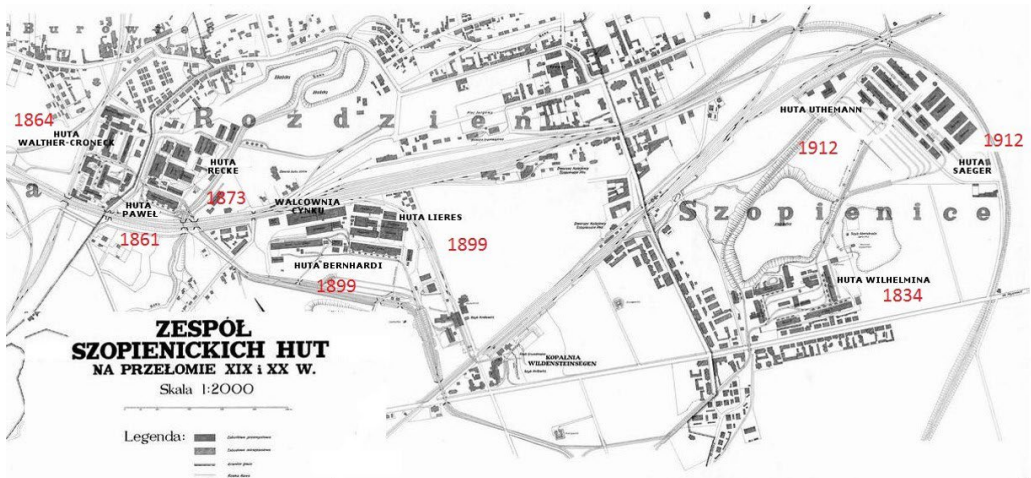


Figure 1: Complex of smelters in Szopienice. (<https://szopienice.pl/2012/08/24/o-szopienickim-hutnictwie-slow-kilka/> with additions P.B.)

The loss of the monopoly coincided with the development of a new method of smelting zinc from calamine around 1798. The inventor was Johann Christian Ruhberg – an employee of a glasswork in nearby Wesoła, owned by the count of Pszczyna. The secrets of the technology were learned by an employee there – Antoni Ziobro, who ran away from the prince of Pszczyna and found employment at the Royal Glassworks (Today it is Chorzow). He revealed the secrets of Ruhberg’s technology for an appropriate remuneration to Prussian officials. Prussian authorities knew about the development of the new method of zinc production.¹⁹ However, it was only after Ruhberg’s death in 1807 and after A. Ziobro was hired as a tin master that larger quantities of metallic zinc began to be produced. Ziobro received appropriate remuneration and a commission on each centum weight of smelted metal.²⁰

Ruhberg’s invention must also have come to the attention of Georg von Giesche’s Erben Company. For the latter, which was at the forefront of calamine mining in Upper Silesia, the discovery of zinc production was a gift of fortune. In 1809, the company established its first zinc smelter in Szarlej near Bytom; its second zinc smelter was opened four years later. At that time, it switched from brass production to the production of zinc from calamine.²¹

However, as it soon turned out, smelting zinc from calamine, although yielding profits, also required large amounts of energy. At that time, coal began to be widely used in metallurgy, replacing the increasingly expensive charcoal. However, the managers of

¹⁹ This is according to an 1805 report by Karl Johann Bernhard Karsten. JAROS, Jerzy: *Polscy inżynierowie górniczy i hutniczy w służbie pruskiej w I połowie XIX wieku*. *Kwartalnik Historii Nauki i Techniki* 16/1, 1971, p. 111.

²⁰ PIERNIKARCZYK, Józef: *Historia górnictwa i hutnictwa na Górnym Śląsku*, 2. Katowice 1936, pp. 51–52; JAROS, J.: *Polscy inżynierowie*, pp. 109–113.

²¹ JAROS, J.: *Tajemnice*, p. 148.

Georg von Giesche's Erben Company faced a dilemma – whether to bring hard coal to the vicinity of the calamine mine or to bring calamine to the site of coal mining. Initially, coal was delivered to the Szarlej area, but this was not very profitable. It was more profitable to build a zinc smelter near the coal mine than to haul fuel over roads that were in poor condition. As early as 1818, the zinc smelter near Bytom's Szarlej was decommissioned, and in its place, the "Georg" smelter was built in Michałkowice, right next to the "Fanny" coal mine. The best location for the company's flagship smelter in the following years was sought. In 1825, the "Lieres" smelter in the Bytom Forest was purchased, and the "David" smelter was built in Chropaczów next to the existing "König Saul" coal mine. In 1831 the smelter "Francis" next to Katowice was leased.²²

The Prussian authorities met this search for a suitable site with a program to build new roads. In 1816, an 18 km "Coal Road" (Kohlenstrasse) leading from the Royal Steelworks to Tarnowskie Góry was completed, and in 1830 work was completed on the "Road of the Heir to the Throne" (Kronprinzenstrasse), which connected the Royal Steelworks, Zabrze and Gliwice. Work was also undertaken on the road leading to the borders of the Kingdom of Prussia to Mysłowice. This road followed a new route, bypassing the old route, which originated in the Middle Ages, running through Rozdzień and Szopienice. The construction of this road, which ran near a coal mine, brought Szopienice to the attention of Georg von Giesche's company management. The land that was purchased lay along the royal railroad. The company had already bought shares in local mines, and in 1834 zinc production began at the newly established zinc smelter "Wilhelmine".

Another element of the state's influence on industrial development in the Szopienice area was its support for the construction of an iron railroad. In 1842–1846, a railroad was built from Breslau to Mysłowice, which later gained a connection to Berlin and the entire railroad network in Prussia. Although the construction of the railroad was a private venture led by the Upper Silesian Railway Company (Oberschlesische Eisenbahn AG), it was headed by the president of the governmental district of Opole (Regierungsbezirk Oppeln). The Upper Silesian Railway project was designed to connect with the planned Warsaw-Vienna and Kraków railroad in the future.²³

Unfortunately, the first draft of the railroad did not plan direct connections to industrial plants, which raised transportation costs. This shortcoming began to be rectified in the 1850s. Between 1857 and 1868, the Tarnowskie Góry-Katowice-Czechowice-Dziedzice railroad line was built, thanks to which Georg von Giesche's Erben concern was able to use rail transportation between the galvanic mines in the Tarnowskie Góry-, and Bytom areas and the "Wilhelmine" smelter in Szopienice.

The "Wilhelmine" smelter thus found itself, thanks to the modernizing policy of state authorities, in an excellent position to transport raw material (calamine) and finished products throughout Europe. In the 1850s, it was decided to concentrate the industrial production of Georg von Giesche's Erben concern precisely in the vicinity of the "Wilhelmine" smelter. In 1861, the existing zinc smelter in the area of Dąbrówka Mała was taken over,²⁴ and two years later, construction began on a lead smelter, which was named

²² Ibidem, pp. 148–150.

²³ FREMDLING, Rainer: *Eisenbahnen und deutsches Wirtschaftswachstum 1840–1879 : Ein Beitrag zur Entwicklungstheorie und zur Theorie der Infrastruktur*. Dortmund 1985; PIĄTKOWSKI, Andrzej: Etapy pruskiej polityki kolejowej w XIX wieku. *Zapiski Historyczne* 66/4, 2001, pp. 111–129.

²⁴ WILCZOK, E.: 150 lat hutnictwa, p. 42.

“Walther Croneck”.²⁵ The latter played an infamous role in the next century due to the poisoning of the area.

Nevertheless, in addition to the construction of the lead smelter and the concentration of industry in a small area, the housing and living conditions of the smelter’s employees also played a role, which left much to be desired. The first housing for workers of the “Wilhelmine” smelter began to be built in Szopienice only in the 1840s. Workers’ apartments still did not meet today’s housing standards for a long time after that. They consisted of one room and a chamber and had an area of 32 square meters. Only houses built since the 1850s had cellars and outbuildings (pigsties).²⁶

Mostly private rental houses were built in the area, with apartments rented by workers. The Giesche Heir’s concern carried out its housing construction on an ad hoc basis at various times. Many workers from distant localities lived in one of the six so-called “Schlafhaus” or dormitories.²⁷

The Impact of the Upper Silesian Metallurgy on the Environment in the 19th Century and in the first half of the 20th Century

Air poisoning was known already in ancient times.²⁸ The territory of Upper Silesia is located in the so-called “sulfuric triangle”, a triangle whose vertices are marked by Dresden, Prague, and Kraków. In Upper Silesia, the first blast furnace was built in Gliwice in 1796, which became the symbolic beginning of the region’s industrialization.²⁹ Comparisons of the region with the Ruhr, which in 1900 was the most significant industrial area in Europe and probably the one with the most polluted air come to mind.³⁰

In Szopienice, the first residential houses were built near the smelter. Even before it was implemented, people were aware of its harmful effects on human health. In 1833, when permission was given for the construction of the smelter, it was officially stated that *all existing and forthcoming police-industrial regulations regarding zinc smelters are to be followed as closely as possible*.³¹ The 1845 ordinance meant that Georg von Giesche’s Erben concern had to reckon with claims from its neighbors due to the damage that zinc production was causing. Company director Friedrich Bernhardt responded to a neighbor’s complaint, stating that nothing grew in the area while the old furnaces were operating at the smelter.³² Also, in other industrial centers of Europe – for example, in Britain in the second half of the 19th century we have the first legal regulations on environmental poisoning. However, these rules were quite primitive and could not be effective for this reason.³³

²⁵ Ibidem, p. 53.

²⁶ Ibidem, p. 32.

²⁷ Ibidem, p. 70.

²⁸ McNEILL, J. R. : *Something new under the sun : An environmental history of the twentieth-century world*. New York – London 2000, pp. 55–56.

²⁹ Ibidem, p. 89.

³⁰ Ibidem, p. 87.

³¹ WILCZOK, E.: 150 lat hutnictwa, p. 33.

³² Ibidem.

³³ PÁL, Viktor: *Technology and the Environment in State-Socialist Hungary : An Economic History*. London 2017, pp. 17–18.

The project to build a new lead smelter on the road from Roździeń to Katowice – was protested in 1864 by the director of the “Louisenglück” mine, Kremsky, as an undertaking that would endanger the health of the miners living nearby. The authorities criticized that Kremsky was concerned with his own orchard and consulted the district of Cologne. The district doctor (Kreisphysicus), taking into account the length of the underground channel for catching dust (117 meters) and the height of the smoke stack (61 meters), concluded that the investment would not harm the health of the residents.³⁴

Steel mills were a distinctive feature of the Upper Silesian landscape in the second half of the 19th century. As recalled by Anton Oskar Klausmann, who knew the “Wilhelmine” smelter very well because his father worked as a railroad official at the Szopienice smelter: *To one who grew up amid the Upper Silesian zinc smelters, no cloud of smoke or dust – phenomena that give trouble to the sensitive eyes and lungs of the unadapted – seemed unusual. However, such a complex of smelters working at full steam presented an impressive sight.*³⁵ Hugo Solger, was the district manager (Landrat) of Bytom in 1860–1873, when the Bytom district included the area of today’s Katowice, described the working conditions at the smelter in detail. When the atmospheric low came, the pollution from the smelters constituted *one gray cloud, enveloping everything around it in a gloomy fog*, with occasional flashes of fire from the smelting furnaces appearing. The rooms of the smelters had ventilation due to the lack of glass in the windows and open windows, *all the blustery winds huffing freely throughout the interior, bringing dangerous fresh gusts to the people huddled around the furnaces in the monstrous heat and itch*. Nature in the vicinity of the smelters has completely died down, according to Solger’s description – *the trunks of the needle-laden pines and spruces in the nearby forest mournfully surround the area where greedy human activity has chased away the beautiful greenery of animated nature.*³⁶ As Klausmann adds, in the winter, the smelters attracted many homeless vagabonds who, to stay warm, often became victims of poisonous gasses or suffered extensive body burns. Interviews with a house doctor at the time, who worked at the zinc smelter for some time, show that almost every second smelter worker had falsified information on his death certificate regarding the cause of death, as the doctor still refused to enter “metal poisoning”.³⁷

In 1905, regulations were introduced to improve working conditions at the Giesche concern’s steel mills, for all workers in contact with lead fumes were given half a liter of milk daily. The milk allowance was available to 70 people, however, these preventive measures have proven to be ineffective; the number of lead infections from 1896–1906 reached 30 % of the workforce.³⁸

In the 19th century, the negative impact of work in the steel industry on workers’ health was noticed. A hospital was established at the “Wilhelmine” steelworks as early as 1840. A qualitative change was the establishment of a modern metallurgical hospital in Roździeń in 1906–1908, on the 200th anniversary of the Giesche company. This hospital had 110 beds.³⁹

³⁴ WILCZOK, E.: 150 lat hutnictwa, p. 43.

³⁵ KLAUSMANN Anton Oskar: *Górny Śląsk przed laty*. Katowice 1997, p. 127.

³⁶ Ibidem, pp. 128–129.

³⁷ Ibidem, p. 130.

³⁸ WILCZOK, E.: 150 lat hutnictwa, p. 98.

³⁹ Ibidem, p. 63.



Figure 2: Scharley mine about 1869. (Free licence <https://polska-org.pl/> from Les grandes usines de Turgan, Paris 1888.)

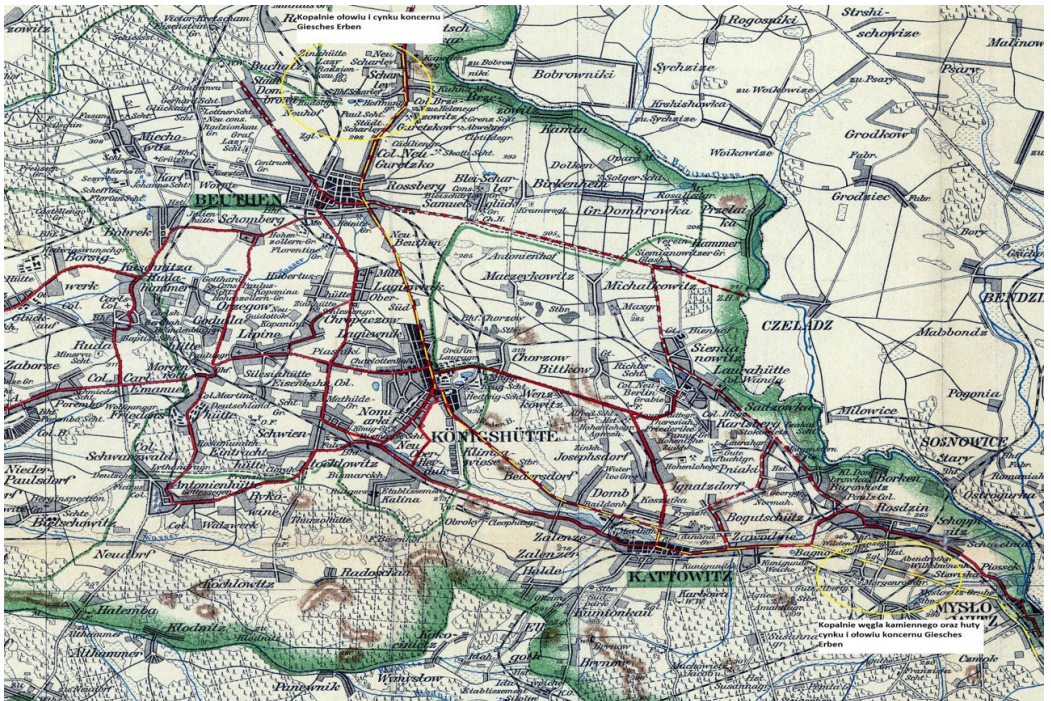


Figure 3: Road to the zinc smelter in Szopienice. Fragment of Übersichtkarte der Kreise Tarnowitz, Beuthen, Zabrze und Kattowitz. (Free licence with additions P.B.)

After the division of Upper Silesia in 1922, four-fifths of the plants belonging to the Giesche concern suddenly found themselves within the borders of Poland. This necessitated the establishment of a new company, Giesche SA, headquartered in Katowice, but with the “old” management. In 1926, the company was almost entirely taken over by an American firm. A few years later, as a result of the Great Depression, hygienic-, and sanitary conditions at work deteriorated, as can be seen in the sudden increase in lead disease. In the 1920s, the number of lead cases remained at an average of 34 people per annum; in 1930 it reached 102 people.⁴⁰

Table 1: Lead cases treated at the metallurgical hospital in Roździeń in 1922–1932

	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Number of lead cases	47	44	41	28	26	25	41	53	102	81	29

Source: WILCZOK, E.: 150 lat hutnictwa, p. 145.

It was not until 1931 that mandatory record-keeping of lead cases was introduced with disastrous results for the company, as it revealed that the vast majority of the workforce suffered from the disease. Because of the statistics, the company was threatened with liquidation due to poor working conditions, forcing it to reorganize its occupational safety service in 1934. Unfortunately, this did not help. Although a new bathhouse and a modern lead oxide plant were built, production was reduced several times, and 190 workers were subsequently laid off. At the end of the 1930s, compulsory rest periods for steelworkers began to be organized to improve the health of employees⁴¹. However, the steelworkers were forced to partially finance these holidays, which meant they could not take advantage of the treatment offered or the meals prepared.⁴¹

In 1936 and 1938, two strikes halted production. Workers protested the dire working conditions. On 13 October 1939, all industrial plants in Upper Silesia, including Giesche SA, were placed under the receivership of the Main Trustee Office for the East (Haupttreuhandstelle Ost). Dr. Albrecht Jung was the commissioner plenipotentiary. On 14 April 1942, the Giesche Company Ltd. (Gieschebetriebe GmbH) was established, a merger of Giesche’s assets under one management.

Polish People’s Republic – Caring for the Environment and Workers or the Propaganda of Success?

Undoubtedly, an important date determining the Szopienice plant’s future was 3 January 1946, when its nationalization occurred. More precisely, a decree of the National Council on the state takeover of the primary branches of the national economy was issued at that time.⁴² The scenario of a state takeover of the economy was, moreover, also implemented in other countries under the political-, and military influence of the Soviet Union. In Czechoslovakia, the nationalization of the economy took place at the same time.⁴³

⁴⁰ Ibidem, p. 145.

⁴¹ Ibidem, p. 161.

⁴² Ibidem.

⁴³ PÁL, V.: Technology and the Environment, p. 63.

Communism, through its ideology, was to focus on the human being. Life in a communist state was, in theory, to be about better working-, and living conditions than in capitalism, and related to that, the natural environment was supposed to have a positive-, and healthy effect on citizens.⁴⁴ However, social-, and environmental issues were subordinated to extensive economic policies for many years.

At the time, it was impossible to hide the problem with the Szopienice industrial plant's impact on workers' lives and health. In 1950, there were 593 occupational accidents and four lead poisoning cases. With an increase in lead poisoning in the following years reaching 84 cases in 1955. Propagandists tried to explain the situation with the economic 6-year plan, which was to employ new industrial workers who had previously lived in rural conditions.⁴⁵

Ministerial authorities launched a preventive action. In 1950 a reduction in the 4-shift work system was introduced. In 1956 working hours at the lead mill and cadmium plant were reduced. In 1953 records-, and a strict control of accidents and illnesses were introduced. Workers at risk of lead poisoning were transferred to other departments, and compulsory medical examinations were carried out. From 1952 employees at risk of lead poisoning, about 300 workers per annum, were sent to sanatorium treatment in Łądek-Zdrój, and later to the Świnoujście-, and Szczawno-Zdrój sanatoriums. In 1954 a preventive semi-sanatorium was opened for employees at risk of lead poisoning, and 25 employees of the smelter stayed per treatment period lasting for three weeks. In 1958 the function of the semi-sanatorium was taken over by a newly built clinic with a hospital ward. A new bathhouse was opened during the same year. In 1955 another remedial measure by the authorities was the introduction of free high-calorie lunches for lead smelter workers to prevent lead toxicity. On 1 September 1981, in connection with the designation of the Non-Ferrous Metals Plant "Szopienice" as a particularly onerous-, and harmful plant, the use of regenerative meals was extended to all workers at the smelter. Additional health leave was also introduced for all employees.⁴⁶

Naturally adverse changes in the natural environment had to occur. Moreover, this is what the authorities of the People's Republic of Poland, to whom the smelter was subordinated, wanted to remedy. During the 1950s, 9.2 million zlotys worth of dust extraction equipment was built in the lead smelter, in the tin roasting plant, and in the zinc smelter. During the 1960s, further intensified activities to protect the environment took place. Shaft furnaces were decommissioned and the galena roasting plants were equipped with converters. Boiler plants were decommissioned in favor of combined heat-, and power plants with a scrubber. The lead-, cadmium-, and zinc electrolysis departments were equipped with scrubbers. The roasting department was equipped with an electrostatic precipitator.⁴⁷

According to official propaganda data, in 12 years dust emissions into the atmosphere decreased 20-fold. In 1970, the smelter emitted 7124 tons of dust, including 1415 tons of lead and 1098 tons of zinc. In 1982, dust emissions were only 378 tons of dust, including 5 tons of lead and 25 tons of zinc.⁴⁸

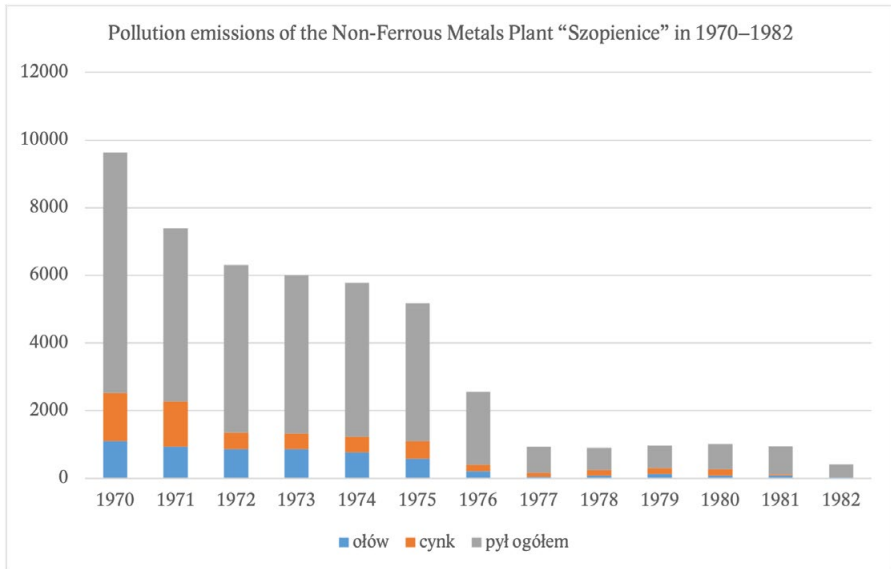
⁴⁴ Ibidem, p. 2.

⁴⁵ WILCZOK, E.: 150 lat hutnictwa, p. 224.

⁴⁶ Ibidem, pp. 225–226.

⁴⁷ Ibidem, pp. 227–228.

⁴⁸ Ibidem, p. 229.



Source: WILCZOK, E.: 150 lat hutnictwa, p. 180.

In the 1970s, a copper processing department was built where modern technologies were used, and the smelter was equipped with dust collection equipment and a wastewater treatment plant. At the same time, several old departments that were troublesome to the environment were eliminated. All this resulted in a sharp reduction in dust-, and gas emissions and the volume of industrial wastewater.⁴⁹ Such activities were part of a broader European context of a greater awareness of air pollution since the early 1970s. In the German Democratic Republic, the Ministry of Environmental Protection and Water Management was established in 1972.⁵⁰ Similar environmental efforts took place in the Federal Republic of Germany, through issuing relevant laws and ordinances. In 1972 the Ministry of Land Management and Environmental Protection was established in the People’s Republic of Poland. However, similar measures in East Germany regarding the reduction of sulfur dioxide emissions into the atmosphere were ineffective due to technological backwardness.⁵¹

According to authorities in Poland, multidirectional measures were to replace existing equipment with new technologies, modern filters, dust removal plants, and treatment plants. In 1970–1974, the complete gasification of the Szopienice plant was carried out. In 1975–1980 steam locomotives were eliminated from rail transportation at the steel plant. In 1970–1982 all heaps around the steel plant that occupied 20 hectares were eliminated.⁵²

⁴⁹ Ibidem, p. 228.

⁵⁰ DUPUY, Michel: Retention of sulfur dioxide emission in the GDR : Between technology, economics, diplomacy and public opinion. In: BRAIN, Stephen – PÁL, Viktor (eds.): *Environmentalism under authoritarian regimes : Myth, propaganda, reality*. London – New York 2019, p. 166.

⁵¹ DUPUY, M.: Retention of sulfur dioxide emission, p. 175.

⁵² WILCZOK, E.: 150 lat hutnictwa, p. 229.

In 1983–1985 pro-environmental projects were implemented to restore ecological conditions in the vicinity of the smelter via land reclamation. In addition the liquidation of detention facilities, micro-leveling and resurfacing of agricultural land took place in 30 hectares.⁵³ These actions to improve the industry’s environmental impact can be compared to similar actions that happened in connection with the “environmental shift” in Hungary, which was appropriately presented by communist propaganda. It should be added that the deteriorating economic conditions in the socialist bloc during the 1980s caused a further crisis of environmental degradation.⁵⁴

In addition, public pressure helped to publicize mass lead poisoning, especially of children. The provincial consultant in pediatrics, Prof. Bożena Hager-Małecka, together with the doctor of the local clinic, Jolanta Wadowska-Król, discovered cases of lead poisoning among children living in the area of the Szopienice smelter in 1974. Symptoms of the disease included a sweetish taste in the mouth, headaches, and lack of appetite. This was later compounded by torpor, a drop in blood pressure, and a lowered body temperature. Other symptoms included yellowish-gray skin and a black border on the gums, the sign of the lead seam. Poisoned children were characterized by inactivity and reduced concentration. Another symptom was peripheral neuropathy. Chronic lead poisoning could lead to kidney damage and, eventually, to death. The disease was sporadic outside of industrial zones because children could be exposed to it through exposure to lead in the air, water, contaminated soil, and food. Prof. Hager-Małecka immediately associated Szopienice children’s symptoms with lead poisoning because she had coincidentally been at a scientific conference in Bern, Switzerland a few weeks earlier, where, among other things, the topic was discussed.⁵⁵

As it soon turned out, when the extent of the disease was investigated, the most severe cases were close to the smelter. In the autumn of 1974 the doctors met with the head of the government administration (Voivode) of Katowice, General Jerzy Ziętek, who, on the one hand, understood the seriousness of the situation, on the other hand, was displeased because the matter would have led to a confrontation with the First Secretary of the Provincial Committee of the Polish United Workers’ Party in Katowice, Zdzisław Grudzień.⁵⁶ It was expected that the latter would take advantage of the difficult situation in Szopienice to carry out personnel changes involving the removal of colleagues inconvenient to him. At this meeting, it was decided not to publicize the matter but to take care of the sick children by sending them to sanatoriums in Rabka and Kubalonka.⁵⁷

A relocation plan was also formulated at the governor’s office, i.e., resettling the children with their families as far away from the smelter as possible. This goal was to be carried out by Szopienice Nonferrous Metals Plant itself. At the meeting between J. Wadowska-Król and the director of the smelter, Ryszard Motyl, as well as Romuald

⁵³ Ibidem.

⁵⁴ PÁL, V.: *Technology and the Environment*, pp. 6–7.

⁵⁵ JĘDRYKA, Michał: *Ołowiane dzieci : Zapomniana epidemia*. Warszawa 2020, pp. 43–44.

⁵⁶ The entire letter to Voivode J. Ziętek is published by A. Dziurok. DZIUROK, Adam: *Ołowiane dzieci. Czasypismo o historii Górnego Śląska* 2014, no. 2(6), pp. 94–98 as well as Idem: *Lead Children. Totalitarianism in the Borderland : Ethnicity, Politics, and Culture in the Industrial Area of Upper Silesia (1933–1989)*. *Special Issue of Czasypismo*. Katowice – Warszawa 2019, pp. 264–270.

⁵⁷ JĘDRYKA, M.: *Ołowiane dzieci*, pp. 85–88; *Tajna lista ołowików. Uratowała tysiące chorych na ołowicę*. – *Historia (wprost.pl)*, cited 1 November 2022.

Mycka, who was responsible in the plant for the social-, and living affairs, demolishing the old colony of workers' houses near the smelter and the creation of a protective zone around it was discussed. The first secretary wished to keep the issue a secret. The smelter was to be a monument to socialism, so there could not be doubts regarding its ill effects on health and the lives of nearby residents.⁵⁸

The senior Voivode of Katowice, Gen. Jerzy Ziętek, stepped down from his post on 31 May 1975. The matter of the “lead children” and new housing for their families was henceforth depended on the will of the First Secretary of the Central Committee of the Polish United Workers' Party, Zdzisław Grudzień. The latter, however, was widely distrusted and feared to be petty and spiteful, so Hager-Małecka turned directly to Poland's First Secretary of the PZPR Central Committee, Edward Gierek. Thanks to her professional connections (she knew Gierek's wife, who was also a doctor), she managed to gain access to the first secretary of the Central Committee during his economic visit to Silesia. During the brief meeting, she handed him a letter in which she described the Szopienice affair. During another meeting with Deputy Industry Minister Gerard Kroczyk, Hager-Małecka learned that Gierek had given a favorable opinion on her request to deal with the housing issue in Szopienice.⁵⁹

Thus, it seemed that the issue of lead poisoning of children by the smelter had finally been dealt with positively with the help of the state. However, this did not end the environmental poisoning itself.⁶⁰ Communist propaganda announced that emissions radically decreased in 1976, when the lead refining technique was changed, and zinc production in distillation furnaces ceased. The beginning of the era of capitalism, however, brought the collapse of the smelter. The result was a nightmare because of unemployment, which was the price to stop polluting the environment.

Although the smelter was already decommissioned at the beginning of the 21st century, scientists from the University of Warsaw's Department of Biology found that the area near the Szopienice zinc smelter in Katowice was heavily contaminated with poisonous thallium. The amount of this chemical element exceeded acceptable standards by several hundred times. Nearby, a dangerous zinc sludge was stored in earth-settling ponds. In 2007, tests were carried out for cadmium-, and lead content in the soil at Szopienice playgrounds, near kindergartens, and at housing estates. It turned out that the presence of these heavy metal elements still exceeded environmental standards several times.⁶¹

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⁵⁸ JĘDRYKA, M.: Ołowiane dzieci, pp. 104–107.

⁵⁹ Ibidem, pp. 175–178.

⁶⁰ Taking the whole world into account, lead air poisoning increased sevenfold between 1900 and 1990. McNEILL, J. R.: Something new under the sun, table 3.3.

⁶¹ *Co pozostato po hucie w Szopienicach | Życie na bezhuciu – Polityka.pl*, cited 1. 11. 2022.

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Summary

The Influence of State Policy on the Development of Zinc-, and Lead Metallurgy in the Szopienice settlement (With a Particular Emphasis on the Environmental Impact of the Industry)

The Habsburg-, and Prussian states were undoubtedly stimulators of industrial development. It was thanks to the fact that Georg von Giesche was granted a monopoly by Emperor Leopold I of Habsburg on the mining of calamine, from which brass could be produced, that a considerable fortune began to accumulate in the hands of the former, which his descendants invested in the further development of the industry. This policy, which dovetailed with cameralism and intended to increase state revenues through exporting industrial products, continued in the 18th and 19th centuries when Szopienice, as well as most of Upper Silesia, was annexed to the Prussian state. The Prussian rulers saw industry and the taxes flowing from its development as an important source to extend their power. The state initially tried to invest in the industry itself, but after the Napoleonic wars, due to lack of funds, the Prussian state supported the industry in private hands. The Giesche concern took advantage of this opportunity, facilitated by the social relations prevailing in Prussia. The abolition of the peasants' attachment to the countryside in 1807, linked to concerns about the transfer of revolutionary relations from the West, freed up many human resources. At the same time, it was decided not to give all groups of peasants land at once for ownership; homesteaders and cottagers were to obtain it at the latest and tie themselves to industry. Upper Silesian workers were paid less than workers for analogous work in Western European industrial districts. Their living conditions were also much worse. Housing in poor sanitary conditions and, above all, the lack of control over the poisoning of the environment made working in the Szopienice steelworks very dangerous to their health. Awareness of this fact existed on the part of state authorities and industrial owners, but the latter lacked the technical means to limit the emission of poisonous fumes. Another aspect of state stimulation was a program to expand beaten roads and railroads, from which Szopienice, located in a convenient border location from an industrial point of view, benefited greatly.

The health of steelworkers and their families was attempted to be saved in the steelworkers' hospital that existed nearby. However, this problem was embarrassing until after World War II. Also, the socialist economy tried to push this problem under the rug. It was only in the 1970s, by reaching out to the highest party authorities in the region and the state, the problem was publicized through a policy of treating children in sanatoriums and resettling residents from the most endangered areas. The losses, however, were irreversible.

By presenting industrial development in a small town on the border of Silesia and Lesser Poland helps us to expand our horizon of describing history to several centuries, overarching historical periods. It is apparent how the state(s) influenced the transformation of the village into an industrial settlement and the construction of new industrial plants that gave work and livelihood to thousands of people. The price for this was high: the destruction of the environment and the poisoning of generations of industrial workers. On the other hand, the state and the Giesche concern itself primarily reaped profits from the industry.

Professionalization, State-building and the Language Question in Forestry: The Case of the 19th Century Kingdom of Hungary

RÓBERT BALOGH – PÉTER HOMOR

Balogh, Róbert – Homor, Péter: Professionalization, State-building and the Language Question in Forestry: The Case of the 19th Century Kingdom of Hungary

Due to its role in transforming landscapes, and because of its knowledge production that took place in a transnational space, forestry is a salient aspect of environmental history globally. Yet, the way forestry management practices evolved in the eastern part of Austria-Hungary has a meagre presence in the literature of environmental history or in the study of empires. This paper begins with outlining routes of circulation of knowledge of forestry within the Habsburg Empire. It emphasises the role of the Academy (later College) of Forestry and Mining at Banská Štiavnica (Selmechánya in Hungarian) but does not ignore the role of other actors outside that education institution. Then, the paper turns to how the history of professionalization of forestry and the nascent legal notions related to land contributed to the changes of the landscape in the Kingdom of Hungary in the last decades of the 19th century. The third section discusses the importance of the effort by the community of Hungarian foresters to create a Hungarian professional language.

Key Words *Forest Management; Professionalisation; History of Professional Training; State-Building; Nationalism; National Language*

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Contact *University of Public Service (Budapest) – Széchenyi István University (Győr); balogh.robert@uni-nke.hu – homor.peter.sze.hu*

The purpose of this paper is to situate the history of the professionalization of forest management in the Kingdom of Hungary within the larger context of global and regional developments. In his grand work on the global history of the 19th century, Jürgen Osterhammel posited that deforestation was one of the important changes between 1850 and 1920 on four continents. Osterhammel emphasised that the rate and extent of deforestation accelerated during those seven decades and exceeded the total forest area lost between 1700 and 1850. He highlighted the role of empires and capitalism in bringing about these changes contemporaneously.¹ At the same time, Osterhammel added that despite global connectedness through the phenomenon of ghost acres (trees felled in one region due to demand in a distant region or continent), historians would be wrong to project a single story line everywhere and that conservation ideas had an impact during the same period. It is worth studying the specific local and regional histories of forest management: the existence of global histories and connectedness does not mean that

¹ OSTERHAMMEL, Jürgen: *The Transformation of the World : A Global History of the Nineteenth Century*. Princeton 2014, p. 376.

there was a course of developments that can be applied to all cases.² In his recent works, Wolfgang Göderle has attempted to bring the Austro-Hungarian Monarchy as an empire within this global history while highlighting its special character. Göderle presented that Austria-Hungary had the capacity to act as a high-modernist state in the field of resource extraction and its innovative bureaucrats developed tools of representation to facilitate this process. Göderle showed that forestry administration was one of the branches that carried out planned interventions to biological niches, such as introducing mongooses to islands supposedly infested with snakes.³ When studying 19th century empires, forestry policies emerged to have an important role in state building through resource extraction and ideas of conservation.⁴ Importantly, for our research questions, Viktor Pál has recently argued that high modernist forest management in the territory of the 19th century Kingdom of Hungary was to control mountainous areas where non-Hungarians lived.⁵ Pál discussed major state projects of water management and forest conservation as two sides of the same coin: nationalising nature.

When discussing the history of knowledge, Osterhammel pointed out the role of the German language throughout the 18th and 19th centuries in literature and science and that it gained even more prestige with the founding of a unified Germany, and in the evolution of the university as a form of knowledge production, training and socialisation. Osterhammel also points out that German universities were the ones that instituted the model of research universities that also had a wide impact on training and knowledge production in Central Europe.⁶ In fact, the role of research rapidly increased at the Academy of Banská Štiavnica (Selmechánya in Hungarian) in the late 19th century. However, for placing Central Europe in the global circulation of knowledge and its institutions, it is important to give nuance to this picture. The case of the Kingdom of Hungary shows that German was not the only language used in administration and science. Jan Surman has pointed at the importance of language politics of nationalism, including translation, in the emergence of positivist science in Central Europe, with particular attention to Polish and Czech speaking territories.⁷ Our paper also contributes to reappraising the interaction between the global nature of scientific knowledge, legislation as well as nationalism.

We argue that the 19th century Kingdom of Hungary was a hub for developments of forestry practices especially with respect to the politics behind the use of language, legislation and higher education. Hungarian professional forestry emerged in the second half

² Ibidem, p. 381.

³ GÖDERLE, Wolfgang: The Habsburg Anthropocene : Vipers and Mongooses in Late Habsburg Southern Dalmatia. *Südost-Forschungen* 79, 2020, no. 1, pp. 215–240. DOI: <https://doi.org/10.1515/sofo-2020-790112>.

⁴ SIVARAMKRISHNAN, Kalyanakrishnan: *Modern Forests : Statemaking and Environmental Change in Colonial Eastern India*. Stanford 1999; OOSTHOEK, Jan K. – HÖLZL, Richard (eds.): *Managing Northern Europe's Forests : Histories from the Age of Improvement to the Age of Ecology*. Oxford 2018.

⁵ PÁL, Viktor: The “Second Hungarian Conquest of the Carpathian Basin” : High Modernism and the Ecological Crisis in the Eastern Half of the Habsburg Empire during the Nineteenth Century. *Agricultural History* 98, 2024, no. 1, forthcoming.

⁶ OSTERHAMMEL, J.: The Transformation, p. 782.

⁷ SURMAN, Jan: Translating Positivism : Framing Positivism in Book Series in Czech and Polish. In: Idem – SUMILLERA, Rocio G. – KUHN, Katharina (eds.): *Translation in Knowledge, Knowledge in Translation*. Amsterdam 2020, pp. 145–168; SURMAN, Jan: Science and its Publics : Internationality and National Languages in Central Europe. In: ASH, Mitchell G. – SURMAN, Jan (eds.): *The Nationalization of Scientific Knowledge in the Habsburg Empire, 1848–1918*. Basingstoke 2012, pp. 30–56.

of the 19th century, within the political framework of the Austro-Hungarian Empire. The question emerges however, what was specific about this situation?

The Compromise of 1867 marked the birth of a new political arrangement where the elites of Hungary recognized the right of the Habsburg dynasty to rule, and Franz Joseph I recognized the right of the Hungarian elite to form and run separate state organs and legislation of the Kingdom of Hungary. After 1867, autonomous central ministries and county administrations came into being or gained a new level of competence. At the same time, Hungarian nationalism fed on the memory of the 1848–1849 War of Independence from the Habsburg Empire and on the fear of competing nationalisms, both of which were cornerstones of the Hungarian-speaking political establishment and elite behaviour.⁸ The professionalisation of forestry was one of the areas where ideas about the common good, state and nation interacted with each other.

In turn, these interactions shaped the connection between human communities and the landscape that they were a part of. On the one hand, 19th century liberal economics and forest management were focusing on practices related to creating wealth, such as standards and methods for calculating the value of forest stands, that foresters applied in Hungary as well. In the past two decades, forest history research revealed that the German-speaking professionals were important nodes in the global circuits of knowledge production and transmission. Johann Christian Karl Gayer's (1822–1907) textbook written in German and the German-born Wilhelm Philipp Daniel Schlich's (1840–1925) English language textbooks became standard reference points worldwide. The latter's career in England and in British India highlights the colonies' importance in the development of forestry standards.⁹ Another similar example is Dietrich Brandis (1824–1907), who had a key role in establishing what tasks forest rangers proposed to share between the land use practices of indigenous peoples and professional forestry practices globally in the second half of the 19th century.¹⁰ On the other hand, the Hungarian National Association of Forestry, that brought state-, and privately employed foresters and private forest owners under one umbrella, became an important actor in creating a respectable professional society that enabled foresters to contribute to the nation-building project of the Hungarian elite.

Both of these circumstances had an impact on what the idea of the state and the “Hungarian Empire” within the Habsburg Empire meant for foresters and how this concept manifested on the ground from the 1860s.

Firstly, foresters had to engage with the peripheral position of forested regions, the Carpathians within the Kingdom of Hungary. These forested regions on the fringes of the country were mostly home to ethnic groups with their own national movements: Slovaks, Romanians, and Ruthenians. This put foresters in a special role: they were representatives of the Hungarian state administration in areas where few other branches of administration reached.

⁸ PALLÓ, Gábor: Scientific Nationalism : A Historical Approach to Nature in Late Nineteenth-century Hungary. In: ASH, M. G. – SURMAN, J. (eds.): *The Nationalization*, pp. 102–112.

⁹ DARGAVEL, John – JOHANN, Elizabeth: *Science and Hope*. London 2013, pp. 30–61.

¹⁰ WOHLERS, David C.: Prome, Burma : How a Village in Colonial Burma Became the Global Epicenter of Scientific Forestry and Impacted the Founding of the United States Forest Service. *Journal of Forestry* 117, 2019, no. 5, pp. 515–524. DOI: 10.1093/jofore/fvz045.

Secondly, global developments of the field prompted the implementation of standardised practices of forest management. Rational management of forests and management plans were not only about preserving forests but also about transforming them. By dividing forests into classes of age groups, tree plantation campaigns and by preferring certain species to others, a “second nature” emerged. Indeed, management plans have been the key tool in the hands of professional forestry since the 1860s. Management plans are documents that were approved by the central administration and aimed to realise a specific anthropogenic landscape. The goal of forest management plans was to achieve a so-called ideal situation that referred to a scenario when the age and species distribution within a given forest stand was sustainable enough to survive the number of years that the plan envisages for them, and, at least as importantly, the process stays financially profitable. The professional toolbox of 19th century forestry included infrastructure for transporting timber consisting of narrow gauge railways, slipways and engineering works that facilitated the process of floating timber downstream along rivers. Methods of classifying soils, measuring areas, assessing volume and value as well as representing this information on maps were also among the practices of forestry that together triggered landscape change. Forestry needed regulation – legislative and customary – that would guarantee a cheap and available labour force. There was also a need for a network of tree nurseries to provide young trees to be planted in clearings.¹¹ The state also financed and initiated afforestation at local levels. Even if these forests might have survived for decades, they were susceptible to new invasive insects, weather anomalies and diseases due to the decreased number of species present and the spatial concentration of age groups. The forests that emerged because of all these management activities differed from natural ones. At the same time, they were also unlike the forest stands where communities applied traditional knowledge and practices. This was largely due to the ban on grazing in areas classified as forests. In fact, professional foresters believed that grazing was a major threat to the management plan. This conviction led to a perpetual conflict with local inhabitants. Moreover, the state became the most important actor in organising large-scale land-reclamation that stamped out traditional forestry in the floodplains.¹²

Re-regulating landownership and land titles including the right to access forests especially after 1848 caused a major change in the agrarian system. Allocating plots to individuals and dividing the land of former landlords from those of the individuals of the village ended the practices of using pastures and forests in common. In many villages, a large number of village inhabitants were left without rights to access pastures and forests. Moreover, the rights over forest use were the most contested aspects of the partition and triggered court procedures that would often last for decades.¹³

¹¹ OROSZI, Sándor: *A magyar erdőgazdálkodás képes története 1867–1918*. Budapest 2016, pp. 270–285.

¹² DEMETER, Gábor – SZILÁGYI, Zsolt – PINKE, Zsolt: Sártenger és búzatenger : Mérlegen a vízszabályozások és az alföldi gabonakonjunktúra rövid és hosszútávú következményei. In: DEMETER, Gábor et al.: *Holdfogyatkozás : Agrár- és társadalomtörténeti tanulmányok*. Budapest – Debrecen 2022, pp. 56–92. See also: VÁRI, András: *Vízszabályozások, tulajdonjogok és gazdálkodás Magyarországon az 1820-as és az 1870-es évek vége között*. In: HALMOS, Károly et al.: *A felhalmozás míve : Történeti tanulmányok Kövér György tiszteletére*. Budapest 2009, pp. 329–339.

¹³ For the impact of the end of seigneurial system in Austria see: GINGRICH, Simone – GÜLDNER, Dino – SCHMID, Martin: Eine sozial-ökologische Interpretation der “Forest Transition” in den österreichischen Alpenländern des 19. Jahrhunderts. In: SCHANBACHER, Ansgar (ed.): *Ressourcen in historischer Perspektive : Landschaft, Literatur und Nachhaltigkeit*. Göttingen 2020, pp. 117–146.

Thanks to these measures, forestry administration became one of the organs of promoting profit-oriented agriculture and defining its programme. Moreover, by the turn of the 19th and 20th centuries, concern for the national economy as such were part of the arguments and discourse behind the legal reordering of the landscape. The sections that follow discuss the processes behind these developments.

Forms and Sites of Knowledge Transfer before 1867: Policy, Institutions and Individuals

By historicizing how forest management practices that developed in German territories made their way to Hungarian professional forestry, we may gain insight into the links between the place of the Habsburg Empire in the global circulation of knowledge and the nature of professionalization of forestry in the Kingdom of Hungary.

Before turning to that issue, it is important to make some qualifications. First, one needs to recall that the history of forest management is not the same as the history of professional forestry and its tools and methods. Indeed, recent research has revealed much about the history of intentional and organised human activity in the forests of mediaeval Hungary. Based on written sources, it is certain that in the early modern era, at the time when the Habsburg dynasty began their rule in Hungary, economy included forestry as a regular activity in the vicinity of the mining towns of what was then Lower Hungary (in today's Slovakia) and around the villages and towns of the Szekler autonomous *székek* (seats).¹⁴ Secondly, despite a historiographic tradition arguing for the contrary, the 16th and 17th century Ottoman rule and wars did not deplete forests beyond measure.¹⁵ Péter Szabó, using multidisciplinary methods, estimated the proportion of forest cover at 34.5 % for the mid-18th century.¹⁶

Károly Tagányi's late 19th century collection of sources on forestry policy show that the state in Hungary became active in the field of forest management by the mid-18th century. New policies were responses to the degradation of the water management system, and to the ensuing environmental crisis caused by late 17th and early 18th century wars in vast interior areas of Hungary.¹⁷ Forest landscapes came under the protection of the state not only as value for the treasury but also for the 'common good'. It was shortly before the mid-18th century when the idea of setting up a forestry authority within the traditional boundaries of the Kingdom of Hungary first appeared out of defence policy concerns. The area concerned was the Banat region, a special zone outside the control of Hungarian authorities, where the presence of a regiment dominated legal and ownership patterns. The forest management authority established in 1742 was to ensure that forests fulfilled two purposes: they posed an obstacle for potential enemies trying to advance, and they provided material for the construction of defence infrastructure as well as fire-

¹⁴ For forest management practices of the Szeklerland see: IMREH, István: *Törvény és rend a székely faluközösségben*. Sepsiszentgyörgy 2019.

¹⁵ VADAS, András – SZABÓ, Péter: Not Seeing the Forest for the Trees? : Ottoman-Hungarian Wars and Forest Resources. *Hungarian Historical Review* 7, 2018, no. 3, pp. 477–509.

¹⁶ SZABÓ, Péter: Changes in Woodland Cover in the Carpathian Basin. In: Idem – HÉDL, Radim: *Human Nature : Studies in Historical Ecology and Environmental History*. Brno 2008, p. 113.

¹⁷ TAGÁNYI, Károly (ed.): *Magyar erdészeti oklevéltár, II : 1743–1807*. Budapest 1896.

wood. Moreover, later in the same century, it was also in the Banat area that the issue of desertification and, thus, the possibility of afforestation occurred.¹⁸

However, forest management practices in the Banat area were an exception. The lack of cartographic surveys halted the spread of engineering approaches to forests. Moreover, traditional land use practices were not based on projections of straight lines, thus making it more difficult to apply an engineering approach.¹⁹

Changes promoting the engineering minded approach to forest management came through the policies that the increasingly centralised administration of the Habsburg Empire and the practices that crown estates introduced.²⁰ However, the resistance to new measures and policies in forestry formed a part of the general opposition to Joseph II's politics in the Kingdom of Hungary.²¹ As a result, following the death of the king, anti-Josephine feelings led to the destruction of most of the maps drawn up by the cadastral survey initiated by the late emperor.²² Therefore, surveying, mapping and designating plots for clearing was limited to areas that belonged to the treasury and to the forests of free cities. It is worth noting that some towns, such as Debrecen, planned to incorporate traditional practices of managing forests.

Educational institutions made a decisive change when it came to the engineering types of forest management. For example, the Forestry School founded in Banská Štiavnica was a state-run public institution. It received two kinds of inputs. On the one hand, by the time the Forestry School came into being in 1808, Banská Štiavnica had been a centre of applied science for decades thanks to the mining engineering and applied science school that opened there in the 1730s. Giovanni Antonio Scopoli (1723–1788), one of the most internationally renowned and recognized scientists of the Habsburg Empire taught at Banská Štiavnica for eight years.²³ On the other hand, institutions in German-speaking territories could serve as models. However, it is worth noting that the forestry school in Hungary was among the first ones in Central Europe. By the late 18th century, in provincial centres of the German lands and in areas under Habsburg domination west of Hungary it was not rare that an outstanding professional figure had a circle of students around him. These were the so-called *praktikant* schools or master's schools. Some of these became official schools recognized by state authorities.²⁴ Passing the exam after having completed the courses that these schools offered was a precondition to taking up state offices.²⁵ Authorities believed that nominating practising state officials to become exam officials was the best way of ensuring that students had the desired level and type of knowledge about forest management. In fact, there was one such *praktikant* school in one of the royal estates of Hungary, Liptovský Hrádok (in Hungarian Lipótújvár) north of

¹⁸ TAGÁNYI, Károly: Bevezetés. In: Idem (ed.): Magyar erdészeti oklevéltár, pp. 22–25.

¹⁹ MAGYAR, Eszter: Az erdész szakemberek képzése a hivatalos szakoktatási intézmények megjelenése előtt. *Erdészettörténeti Közlemények* 32, 1997, pp. 7–9.

²⁰ Ead: A Festetics-hitbizomány erdőgazdálkodása a Georgicon megalakításának az idején. *Erdészettörténeti Közlemények* 60, 2003, pp. 6–8.

²¹ Joseph II lived between 1741 and 1790. He was emperor 1765–1790, and King of Hungary 1780–1790.

²² ZOLTÁN, Dávid: Magyarország első kataszteri felmérése (1786–1789). *Történeti Statisztikai Évkönyv* 1, 1960, pp. 33–58.

²³ LESENYI, Ferenc: *A selmecbányai Erdészeti Tanintézet története (1808–1846)*. Sopron 1959, pp. 9–13.

²⁴ MAGYAR, E.: *Az erdész szakemberek képzése*, p. 20.

²⁵ Ead: A Keszthelyi Georgicon erdésziskolájának szakmai megalapozása. *Századok* 139, 2005, no. 5, p. 1234.

Banská Štiavnica. We know of three masters teaching there starting in 1768, successively.²⁶ However, this school waned when the public school at Banská Štiavnica started functioning in 1808. One of the imperial mining schools operated also in Banská Štiavnica, its primary purpose was to train forestry officials capable of ensuring that the forests around mines supplied sufficient amounts of timber and that timber production remained sustainable. In fact, the two institutions in Banská Štiavnica merged in 1846 and became the Mining and Forestry Academy. In Hungary, it remained the only school with such a scope and purpose, while, starting from 1813, students from the western areas of the empire might opt to study at the forestry school of Mariabrunn.²⁷

Heinrich David Wilckens (1763–1832), the first master forester to hold professorship at Banská Štiavnica, studied various subjects at the University of Göttingen and at the mining school of Freiburg. He only began to immerse himself into forestry as an area of knowledge when he joined Johann Mattheus Bechstein's (1757–1822) private school. He was a member of Bechstein's foresters' and hunters' club between 1796 and 1799. Wilckens published his lectures and other papers in forestry and hunting, and this was what earned him his post at Banská Štiavnica.

Although the Forestry School at Banská Štiavnica enjoyed a privileged status, it was not the only institution that had a role in transmitting ideas and practices of forestry. In fact, private estates had a key role in this regard. Typically, private estates employed foresters who completed their training in other parts of the empire. The Festetics estate in the south of the Trans-Danubian region was an exception to this. Here, the head of the institute was a young local, Antal Lakoszil. He enjoyed the support of the landlord, György Festetics (1755–1819), for eight years during which he visited the most important master schools and educational institutions of the German lands, the Austrian provinces as well as Bohemia. In some of these schools, he spent years. Eventually, he completed his study trip in Liptovský Hrádok (in Hungarian Liptóújvár) including a visit to the Esterházy estate near the town of Tata that was an important entity in the timber market at the time.²⁸

Another important case of knowledge transmission and transformation was that of Józef Decrett (1774–1841), who was a key forestry official of the royal estate of Banská Bystrica (in Hungarian Besztercebánya) between 1807 and 1837. In Decrett's case, we do not have any information about trips abroad or formal education within Hungary. His first biographer, Károly Kaán, who became the top forestry official in the post-World War I period, found that Decrett could learn much from contemporary foresters who had been trained in land surveying methods and that Decrett based his work on imagining a future map of forest stands. This method gained key importance in scientific forestry in Hungary in the 1860s. Thus, Decrett's outstanding capacity to revive the forested areas that had by his time become depleted due to the hunger of mines for charcoal as well as a consequence of overgrazing, had much to do with knowledge transfer even in the lack of direct contact with foreign experts. Decrett's main achievements were the innovation in motivating and organising the labour force for charcoal production and, even more importantly, the detailed sets of written rules for managing forests.²⁹

²⁶ Ead: *Az erdész szakemberek képzése*, pp. 12–19.

²⁷ Ibidem.

²⁸ Ead: *A Keszthelyi Georgikon*, pp. 1233–1259.

²⁹ KAÁN, Károly: *Decrett József élete és erdőgazdasági tevékenysége (1774–1841)*. Budapest 1912.

The knowledge transmitted at the School of Forestry was neither homogeneous nor unchallenged. When Wilckens retired in 1831, Georg Lang, one of the practising foresters of royal estates overtook teaching. Lang proved to be ambitious and proposed a comprehensive reform regarding the content and duration of education at the academy of Banská Štiavnica. Moreover, he believed there was a need to open a new institution for training professionals in forestry and agriculture.³⁰ However, Lang's proposal did not receive political backing and Rudolf Feistmantel, a new forestry professor, replaced him in 1835. Feistmantel graduated from the Forestry School of Mariabrunn. Based on his four-volume work published in 1835, his main goal was to apply the state-of-the-art practices of forest management to the actual condition in the empire. Unlike Wilckens, he was aware of the differences within the areas of the Kingdom of Hungary and Transylvania and took an effort to become familiar with regulations and customs in place, too.³¹ Indeed, Feistmantel's thoughts shaped the role of the state within forestry for decades to come. After he had returned to administration, he became the head of the department that drafted the Forest Law of 1852. Feistmantel was convinced that forestry as an independent field of economic activity practised according to its own rules would eventually produce more timber than when forestry had been treated as a subsidiary aspect of mining.³²

The consequences of the revolutions and armed conflict of 1848 and 1849 impacted the long-term perspectives of forestry training within the Kingdom of Hungary. Although in the spring of 1848 students stood together, clashes between students with different ethnic backgrounds surfaced by May 1848. In that month, 130 students of mining who originated from Austrian and Bohemian regions left Banská Štiavnica and they continued their studies elsewhere starting from the autumn of 1849.³³ It was also in 1849 that some of the courses at the Forestry School changed the language of instruction to Hungarian instead of German. However, after the war for independence had ended, German language returned as the medium of instruction and this situation lasted until 1867. The Forestry School of Banská Štiavnica experienced a prolonged crisis during first half of the 1860s. Many teachers were arrested for their revolutionary activities and had their professional career terminated or halted for decades. In 1861, the length of the forestry course decreased to two years. Moreover, the idea that the former Georgikon, a higher school teaching rational agricultural economics and related subjects founded by an aristocrat, Count György Festetics, should reopen and include a forestry school in Keszthely, had political support both from the governorate in Buda and from the Hungarian public. Although agricultural training in Keszthely's Georgikon revived in 1865, the programme for training foresters did not materialise at that time.³⁴

Following the Compromise of 1867, and the introduction of the Hungarian language

³⁰ VADAS, Jenő: *A selmezbányai M. Kir. Erdőakadémia története és ismertetője*. Budapest 1896, p. 31.

³¹ FEISTMANTEL, Rudolf: *Die Forstwissenschaft nach ihrem ganzen Umfange und mit Berücksichtigung auf die österreichischen Staaten*. Wien 1835.

³² HILLER, István: Ökológiai ismeretek és ökológiai szemlélet a Selmezbányai Erdészeti Akadémián. In: VÁRKONYI, Ágnes R. – KÓSA, László (eds.): *Európa híres kertje : történeti ökológia tanulmányok Magyarországról*. Budapest 1993, pp. 192–193.

³³ ZSÁMBOKI, László: A selmeci akadémia és ifjúsága 1848/49-ben. *Bányászati És Kohászati Lapok* 131, 1998, no. 7–8, pp. 239–241.

³⁴ CSISZÁR, Imre: A magyar agrár felsőoktatás története a neoabszolutizmus időszakától az első világháborúig. In: KAVECSÁNSZKI, Márton – SZÁSZFALVI, Márta (eds.): *Tanulmányok Ujváry Zoltán 80. születésnapja alkalmából*. Debrecen 2012, pp. 43–44.

as the medium of instruction, the School of Banská Štiavnica lost its imperial character. At the same time, the newly founded research and experimental station made it possible for Hungarian foresters to enter the European-, and global scientific arena. The quality of education also improved: as soon as Károly Wagner gained professorship, the board of the school raised the duration of the training from two to three years, as it had been the practice before 1861. A new department *Erdőhasználat* (Methods of Forest Exploitation) was also added to the existing two units. With the new department, the teaching of mechanics and chemistry had a pronounced place in the curricula. We have to note, however, that Wagner followed the curricula of Mariabrunn and stated that there was no major deviation from the ideas and material taught at the German-speaking imperial institutions.³⁵

The State: Legislation, Regulation and Administration

Studying the history of professional training allows us to place Hungary within the circulation and institutionalisation of knowledge about forest management. Looking at the way legislation intertwined with the history of professionalisation gives us insight into the changing forms of anthropogenic landscape change.

The 1852 forest law of the Habsburg Empire, often referred to as the “Austrian” forest law, came into force in Hungary in 1858 and deeply impacted the subsequent 1879 Hungarian forest law. For example, the 1852 regulation aimed to prevent soil erosion and described the cases of violations, which was adopted by the law of 1879. However, there were differences, too. While the key drive for the Austrian Forest Law was to resolve issues arising from the end of serfdom, this concern hardly surfaced in the draft law that the Hungarian Parliament eventually voted on.³⁶ The draft law of 1879 simply demanded that if there were any entitlements remaining from the previous land regime, these should have been clearly stated in the management plan. The reason behind the lack of paragraphs about the rights to timber resources after the partitioning of land was that it was the task of special courts to deal with partition agreements throughout the 1850s and 1860s and that a separate piece of legislation regulated outstanding issues in 1871.

The National Forestry Association (Országos Erdészeti Egyesület, OEE) and the National Agricultural Association of Hungary (Országos Magyar Gazdasági Egyesület, OMGE) had a major role in drafting the law of 1879. The fundamental goal of OEE was to realise its ideal of good economic governance that would grant larger space for the body of professional Hungarian foresters, a group of professionals that was in the making. OMGE was a key organisation promoting agrarian interests in Hungary. Thus, the draft of the law that the two associations first put forward in 1866 and submitted to the Parliament two years later was a compromise between different interests. The text held three axioms. Firstly, it posited that there were forests under which the soil was suitable for agricultural activities but in certain areas forests must have been maintained in order to preserve the soil. In other words, in the latter category of areas, forestry was the most fruitful type of economic activity. The OEE believed that without proper regulation,

³⁵ VADAS, J.: A selmeczbanjai M. Kir. Erdőakadémia, p. 117.

³⁶ For the background of the law of 1852 see: WEISS, Gerhard: Mountain Forest Policy in Austria : A Historical Policy Analysis on Regulating a Natural Resource. *Environment and History* 7, 2001, no. 3, pp. 335–355.

locals would destroy even those forests that were to be protected and kept intact in order to preserve the soil. In other words, they would cause damage to capital. This belief takes us to the second principle, according to which a forested area consists of capital i.e. soil and timber and these produce a certain interest on a yearly basis if managed properly.³⁷ The third principle held that forests that were part of private estates were best left without government interference because the owners would do everything possible not to undermine their own interests. This was the reason why the Forest Law compelled legal persons to submit a forest management plan spanning decades for official approval and to follow it thoroughly by employing trained personnel who had obtained their qualification via a state exam, while these requirements did not apply to private owners.

The debate on the draft of the 1879 Law XXXI was concentrating on the relationship between forestry administration and the constitutional setup of the post-1867 Kingdom of Hungary, as well as the broader environmental and ecological importance of forests. The interaction between constitutional changes and the introduction of a new agrarian system were the key reasons why it took more than a decade for the draft of the bill to turn into a legislative act. This was an extraordinarily long process, especially if we consider that there were no substantial changes between the initially formulated text and the law taking effect.³⁸ Journal articles dealing with the issue of forestry policy published between 1860 and 1878 invariably urged the legislation and enactment of the forestry law as soon as possible, pointing out that this was one of the recurring demands by members of the National Forestry Association. However, the obstacles to be overcome were serious ones. Firstly, there was the issue of partitioning the formerly common lands that was an especially complicated matter regarding forest rights. Imposing the new rules on unsettled conditions would not have made sense. Moreover, partitioning was a much slower process in Transylvania than in other parts of Hungary. Transylvania was one of the most forested areas of Hungary and it only reunited with the Kingdom of Hungary in 1867. It took decades to apply land related legislation in Transylvania because the common land ownership had historically specific forms and strong roots due to special rights of the Szeklers (in Hungarian Székelyek), a subgroup of Hungarian speakers in Transylvania.

Another question was that at the heart of the constitutional profile of the Kingdom of Hungary the competence of county administrations versus central ministries was considered.³⁹ During the debates in the journal of the OMGE, *Gazdasági Lapok* (Economic Pages), opposing voices appeared against establishing the offices of the Forest Superintendents in 1871, and also during the deliberations in Parliament in 1878–1879. Those who wished to remove the Superintendents' Office from the draft law, made a claim that counties were suitable to manage forest administration and that it would be wrong to adopt the new custom of state interference rooted in the allegedly unconstitutional period between 1849 and 1867.⁴⁰

³⁷ See the works of Lajos Fekete, for example: FEKETE, Lajos: *Erdőértékszámítástan*. Selmechánya 1892.

³⁸ In the Parliament, a fifteen-member committee discussed the draft starting from 23 January 1878. The committee submitted its report and the draft to the lower chamber called the House of Representatives on 28 February 1879. *Képviselőházi napló, 1878–1881, vol 6, 1879, május 7 – május 27*. The upper chamber, the House of Magnates, discussed the draft law in the second half of May and early June. *Főrendiházi napló, 1878–1881, vol 1*.

³⁹ MIRU, György: The Compromise and the Potentials of the Constitutional Politics in Hungary. In: GYÁNI, Gábor (ed.): *The Creation of the Austro-Hungarian Monarchy: A Hungarian Perspective*. New York 2021, pp. 200–225.

⁴⁰ *Képviselőházi napló, vol 6, 118. országos ülés, 1879, május 7, pp. 19–22*.

On the other hand, Baron Zsigmond Perényi (1843–1915), rapporteur of the law in the House of Representatives, argued that the draft forest law should be situated in the broader context of environmental thinking. First, Perényi posited that forests had an importance for the national economy both from the point of view of monetary gains as well as public health. This view reflected the concern for the environmental crisis in Hungary within the Habsburg Empire that began in the 1740s. Secondly, Perényi reminded members of the Parliament of the importance of protecting forests from overexploitation that had been a pattern since the 1850s due to the improvement of traffic and trade in the country.⁴¹ Perényi's concerns show that the validity of local level bans on treating timber as commodity was waning quickly. Thirdly, the rapporteur stated that clear cut forests threatened low lying areas with devastating floods and erosion sedimented on the plains, causing even more damaging floods.⁴² This latter point takes us to environmental context of the Forest Law of 1879, because the drought of 1863–1864 led to the debate about the potential of an afforestation programme in the Great Plains, as well as discussions focused on the devastating floods occurring in Miskolc in late August 1878 and in Szeged on 12 March 1879.⁴³

The Forest Law of 1879 divided non-state owned forests into two major legal categories: those owned by legal entities and private forests. The former category included woodland carved out from landland partitioned between former serfs and landlords, as well as forests in the hands of municipalities, public and private foundations and the Church. Legal entities had the obligation to manage their forests based on a forest management plan approved by forestry administration.

Regarding the sharp distinction between private and communal forms of ownership, we should take into account that from the perspective of large estates the role of forests as assets changed several times in the 19th century. Moreover, contradictory trends existed simultaneously. In the first half of the 19th century a push for increasing the area of arable land as well as for keeping large herds of sheep due to demand for wool came at the expense of forested areas and wetlands. The post-1850 period looked markedly different. According to Zoltán Kaposi's estimate, after the partition of land, large estates lost half of their landholdings, thus, areas that could be rented out or produce profit from cereals gained importance.⁴⁴ With a large economic shock coming towards the end of the century with the fall in cereal prices and the collapse of the demand for wool from Hungary, cattle and the milk economy became more important. For the latter, forests were a valuable source of fodder and grazing sites that were worth keeping. At the same time, one of the fields where new venture capital poured into was the production of sleepers for railway construction, which required large forest stands that would eventually be clear cut.⁴⁵ Thus, the technologies for maintaining yields sustainably gained importance,

⁴¹ PÁL, V: The "Second Hungarian Conquest of the Carpathian Basin", pp. 2–3.

⁴² *Képviselőházi napló*, vol 6, 1879, május 7, pp. 13–14.

⁴³ For the drought see: BOA, Krisztina: Az 1863–1864. évi aszály és inség Békés megyében. *Fons* 19, 2012, no. 2, pp. 161–199. For the debate on afforestation, see: JANKÓ, Ferenc: Elfeledett viták az alföldi erdősítés és vízrendezés éghajlati hatásairól. *Földrajzi Közlemények* 137, 2013, no. 1, pp. 51–63.

⁴⁴ KAPOSI, Zoltán: A nagybirtok és az agrárszegénység kapcsolata Magyarországon. In: GYARMATI, György et al. (eds.): *Bűnbak minden időben : Bűnbakok a magyar és az egyetemes történelemben*. Pécs – Budapest 2013, pp. 264–284; and KAPOSI, Zoltán: A magyarországi uradalmi rendszer változásai a XVIII–XX. században. *Agrártörténeti Szemle* 43, 2001, no. 1–2, pp. 239–260.

⁴⁵ Idem: A nagybirtok és az agrárszegénység, p. 280.

which contributed to the rising importance of forest management plans, a central concept in the Forest Law of 1879.

By the beginning of the 20th century, it became quite clear for leaders of the forestry administration that privately-owned forests were not in a better shape than the ones under more significant state control. Instead of managing their private forests to generate long-term profit and sustainable yields, many sold forest stands to dealers who most often clear cut purchased forests.⁴⁶ Even with the obligation to replant clear-cut areas, this meant a drastic change for habitats and produced more homogenous, therefore biologically less resistant stands. There were less trained foresters active in privately owned forests than in publicly owned forests which also contributed to the degradation of privately owned forests. Private owners kept employing personnel without official qualification in order to reduce the costs of production. This meant that privately owned forests management practices paid less attention to forest stand resistance and sustainable economic gains. Besides the way institutions of professional training evolved within the global and regional circuit of knowledge, economic ideas manifesting in legislative efforts were also major factors influencing the way forests changed in the territory of the Kingdom of Hungary in the 19th century.

The Link Between Nationalism and Professional Language in Forest Management

Working within the framework of the so-called New Imperial History, Pieter Judson and Tara Zahra argue that ethnic conflicts had much less importance for contemporary everyman than we might assume based on current nationalisms in the East-Central European region.⁴⁷ However, Nándor Bárdi, one of the leading figures of research on the history of post-World War I Hungarian minorities, began one of his key monographs by stating that discrimination was part of realpolitik in both the pre-1918 and post-1918 epoch. He posits that: *To a certain degree, we may talk of cooperation, but national-, and ethnic cleavages overwrite this when it comes to the struggle for positions of any importance: simply because it is about power [...] ‘us’ and ‘them’ exist in an unequal power relation. This is why being an ethnic minority is a situation that social historians should study.*⁴⁸

Regarding one region of the empire, the Karst in Croatia, Veronika Eszik highlighted a very direct link between anthropogenic landscape change and nationalist politics.⁴⁹ Hungarian state authorities saw the reforestation of the area as a civilising mission. Yet, the link between anthropogenic change and political ideology was rarely so obvious. One of the most important sources for studying the history of forestry and forests between 1880 and 1895 in Hungary is Albert Bedő's (1839–1918) multi-volume work called *A magyar állam erdőségeinek gazdasági és kereskedelmi leírása* (The Economic and Trade Description of the Forests of the State of Hungary). The eventual 1896 edition of this work was the culmination of a 20-year effort to provide accounts that are ever more

⁴⁶ HORVÁTH, Sándor: *Az erdőkről szóló 1917-es törvényjavaslat előadói indoklása*. Budapest 1917.

⁴⁷ See for example: COLE, Laurence: *Differentiation or Indifference?: Changing Perspectives on National Identification in the Austrian Half of the Habsburg Monarchy*. In: VAN GINDERACHTER, Maarten – BEYEN, Marix (eds.): *Nationhood from Below: Europe in the Long Nineteenth Century*. London 2012, pp. 96–119.

⁴⁸ BÁRDI, Nándor: *Észrevételek. Regio* 26, 2018, no. 2, pp. 156–157.

⁴⁹ ESZIK, Veronika: *A horvát-magyar Tenger mellék mint nemzetiesített táj: Adalék az intézményesülő földrajztudomány és a nemzetépítés kapcsolatához. Korall* 62, 2015, pp. 75–95.

comprehensive including the format of representing data. Bedő was the chief of forestry administration in the first decade after the introduction of the Forest Law. Thus, he had the right to ask for statistical information and access to data that the Ministry of Agriculture collected. Bedő believed that economic interest was the synonym of the interest of the national economy. For forestry, it meant that preserving the capacity of soils to produce valuable products and serving the interests of the Hungarian state were tasks of equal importance. Bedő used the term ‘Hungarian state’ and ‘Hungarian empire’ interchangeably but for him it did not imply the vision of an ethnically homogenous Carpathian Basin. To the contrary, he argued that the interests of the Kingdom of Hungary are best served if the number of bridges between non-Hungarian nationalities and the state increases. Bedő concluded that, due to their presence in regions that would otherwise look like peripheries, foresters were in key positions in this regard. Indeed, some of the key sites of forestry administration, management and timber extraction were not central places in the Kingdom of Hungary.

Court cases, contemporary interpretations of what counted as violation of the law and documentary evidence about how authorities treated the accused are among the preferred sources of social historians. Bedő published a county level table about the number of violations between 1885 and 1894. Unfortunately, only about half of the counties are listed and we do not have data series that would provide at least partial information about smaller administrative units. Based on the census data from 1910, Hungarians formed the majority community in sixteen out of the 32 counties that Bedő listed and consisted of 30–50 % of the population in six others. However, there is no coincidence between ethnic proportions and the number of cases reported. The number of cases grew between 1885 and 1894 in all but one county while the total number of cases varied largely across counties, however the data is inconclusive. Closer analysis of individual cases from various counties would be useful should archival traces of them have survived in sufficient numbers.

In the last decades of the 19th century, one of the most salient aspects was mass emigration in terms of regional patterns of social change. Recently, Éva Bodovics’s study focusing on the north-eastern counties of the Kingdom of Hungary pointed out that weather anomalies – particularly cold and exceeding precipitation – could have been the last straw in the decision for emigration even if we are to avoid simple push-pull models.⁵⁰ The Forest Law comes to this picture through the question of silvopasture. For many communities and families, loss of area available for grazing due to the implementation of the law as well as for the partition of lands between former serfs and landlords was a major issue especially in times of crop failure. Shortly before the turn of the century, the discourse about mass emigration reached the dimension of moral panic and the OEE came under pressure, too.⁵¹ It responded by launching a debate about the feasibility of a land use system that would preserve soil but also open some space for pasturing. Interestingly, the outcome of this discussion became one of the avenues for Hungarian forestry to represent itself at the global stage: the first management plan for the silvopasture system was one of the items displayed at the Paris World Exhibition in 1900.⁵² There, the

⁵⁰ BODOVICS, Éva: Weather Anomalies and Their Economic Consequences : Penury in Northeastern Hungary in the Late 1870s. *Hungarian Historical Review* 9, 2020, no. 2, pp. 179–212.

⁵¹ See: Egyesületi közlemények. *Erdészeti Lapok* 41, 1902, no.1, pp. 73–88.

⁵² OROSZI, Sándor: Az erdélyi Mezőség fásítása és egyéb közérdekű erdőtelepítések. *Erdészettörténeti Közlemények* 65, 2005, footnote no. 275, p. 154.

Hungarian state as well as the Habsburg Empire presented new ways to control nature and extract benefits from the landscape understood as a resource.⁵³

Describing and classifying landscapes as resources is a crucial step towards commodification. In the second half of the 19th century, foresters wished to “domesticate” forests along principles of rationality and the state. This view allowed them to represent legible-, and predictable landscapes that they were able to change following specific plans. Bedő mainly relied on tables showing and quantifying the tree species he believed to be most relevant, such as beech, pine and oak (without further specifying subspecies and varieties), the ways of management as established by contemporary standards (even aged forest with long rotational cycle, even aged forest with short rotational cycle, uneven aged forest) as well as legal categories of ownership. Thus, Bedő’s monumental work was at the juncture of nation-building and commodification within the Habsburg Empire. To be sure, efforts to classify, quantify and represent forest stands as well as timber products did not come to a complete stop after the *A magyar állam erdőségeinek gazdasági és kereskedelmi leírása* had appeared. The pocketbook series called *Erdészeti Zsebnaptár* that the OEE published between 1882 and 1919 responded to the changing market for certain timber products and made tables about the expected growth of the volume of timber widely accessible. Moreover, it was to keep forests up to date about legislation and personnel. Contemporary regional and professional journals were also indispensable media outlets to facilitate commodification: they reported on occasions when forest stands were auctioned and informed about market prices that greatly varied according to how far a location was from means of transport, mainly waterways and, most importantly, railways.

Indeed, one of the main aspects of the professionalization of forestry was the drive to create a Hungarian terminology. On the one hand, the OEE’s efforts to provide Hungarian terminology reflected that the leaders of the Association at least, wished to join the main political project of the time: nation-building coupled with state building. On the other hand, these efforts were also about creating a niche for Hungarian professional foresters that only they could fill. The language aspect was at the juncture of professionalization, its social implications and nationalism. The process of collecting “popular terms” allows us an insight into imagined hierarchies.

Károly Wagner (1830–1879), the first professor of forestry at Banská Štiavnica after 1867 played a key role both in making Hungarian the medium of instruction at the Forestry School and in making the issues of a professional language one of the main causes that the National Association of Forestry stood for. The first German-Hungarian dictionary for foresters appeared in 1879 and this was the joint effort of Wagner and Adolf Divald (1821–1891), another forester who had played a decisive role in creating and running the journal called *Erdészeti Lapok* (Journal of Forestry) starting in 1862. This forum gradually became the major channel of communication for the OEE. The efforts around the dictionary did not end with the first comprehensive volume. In 1882, the OEE launched a campaign for collecting terms and set up a committee that met regularly for two decades. The planned dictionary had a double purpose: it wished to develop the work of Wagner and Divald and give precise translation of German terminology that was itself

⁵³ ESZIK, V: A horvát-magyar Tengeremellék, p. 77; and GÖDERLE, Wolfgang: Materializing Imperial Rule? : Nature, Environment, and the Middle Class in Habsburg Central Europe. *Hungarian Historical Review* 11, 2022, no. 2, pp. 445–476.

expanding in the latter decades of the 19th century due to the rapid spread of scientific forest management and new technologies in transportation and timber processing. The effort did not wish to stop there, however, the OEE wished to collect the popular terminology: forestry related words that were in use in various regions and consequently in various languages.⁵⁴ Although calls that appeared in the *Erdészeti Lapok* indicated a preference for terms that the Hungarian speaking Szeklers used in the Eastern Carpathians, it did not imply the exclusion or lack of interest for words of different origins. Unfortunately, authors who paid attention to the latter did not disclose their method of collection, thus there is little that we may say about their informants, preferences or even the sites of collection.

In summary, the politics of nation building prompted efforts to describe and classify forested areas within the Kingdom of Hungary, as well as the sustained search for the right terminology. The information produced during this process and the modes of how the ministry collected data could potentially shed light on possible ethnic bias and discrimination in forestry administration. The findings, however, do not show a clear-cut picture of an open conflict. Conclusions require caution since archival traces of individual cases are missing. Importantly, efforts of providing comprehensive information about forests and about ways to “domesticate” them and turn forests into calculable economic assets for private and national interest were conducive to commodification of timber-, and forested landscapes.

Conclusion

The main aim of this paper was to point out specific historical features of professional forestry in the Kingdom of Hungary within global developments and regional patterns. The history of forestry proved to be a relevant terrain for showing how changes of the landscape, and political and social patterns interacted in the Kingdom of Hungary within the Habsburg Empire. First, the paper emphasised that Banská Štiavnica was a central site of reception and transmission of new ideas and technologies of forest management that had an imperial reach until 1848. From the early 19th century until the revolution of 1848 the Forestry School at Banská Štiavnica was a Habsburg imperial site from which vernacular translations of knowledge spread slowly. However, briefly after 1848 and again after 1867 the Forestry School became one of the engines and hubs for Hungarian nationalism mainly through language related politics.

The history of the Forest Law of 1879, which was to govern forest management for half a century, was part of the global process to preserve forests, banning traditional forest use and introducing the liberal idea of private property and profit. At the same time, the constitutional situation and the specific mid-19th century environmental history of Hungary resulted in a unique discourse. This aspect opens the door for further research between politics and environmental concerns in our view.

Resonating with arguments that Arvid Nelson and Viktor Pál have put forward, we point out the nation-building linked history of political change and forest management.⁵⁵ As the paper argued, the National Forestry Association had an important role

⁵⁴ See: Adatok az erdészeti műszótárhoz. *Erdészeti Lapok* 22, 1883, no. 2, p. 123.

⁵⁵ NELSON, Arvid: *Cold War Ecology : Forests, Farms and People in the East German Landscape*. New Haven 2005, p. 16; PÁL, V.: The “Second Hungarian Conquest of the Carpathian Basin”, pp. 2–3.

in establishing that link. It published media channels that disseminated standard procedures for assessing the value of forests, provided the prices of various commodities and information about changes in the personnel as well as about new regulations. Moreover, the National Forestry Association strengthened the professional identity among foresters and helped to create a sense of belonging to a knowledge community apart from sharing common interests and ideals. This pattern is in line with what Jan Surman has found about the media of positivist science in Czech-, and Polish speaking communities. Moreover, our findings point at how language politics impacted the material world and the economy and society along with it.

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Summary

Professionalization, State-building and the Language Question in Forestry : The Case of the 19th Century Kingdom of Hungary

Hungarian professional forestry emerged in the second half of the 19th century, that is, within the political framework that Austria-Hungary constituted. The practices that foresters applied in Hungary had global standards and methods of calculating the value of forests stands at their base. In the past two decades, research into the history of forestry revealed that the German-speaking professionals were important nodes in the global circuits of knowledge production and transmission as well as in standardization. Johann Christian Karl Gayer's (1822–1907) textbook written in German and the German-born Wilhelm Philipp Daniel Schlich's (1840–1925) English language textbooks became standard reference points worldwide. The latter's career in England and in British India is a case in point to highlight the importance of colonies in the development of standards in forestry. Another such example is Dietrich Brandis (1824–1907) who had a key role in establishing what the tasks of forest rangers were and proposed a compromise between land use practices of indigenous people and the statist views of professional forestry practices in three continents in the second half of the 19th century. On the other hand, however, the Hungarian National Association of Forestry, the association that brought state and privately employed foresters and private forest owners under the same umbrella, became an important actor of the nation-building project. This situation had an impact on the place of timber produced in Hungary in the world economy and in Austria-Hungary, as well as on the way the idea of the "Hungarian Empire" manifested. While considering the roles of the Association within the history of professionalization and landscape change, one should not forget that forest management was about creating wealth and a respectable professional society.

The way professionalization interacted with nation building in Hungary was a key factor in the reception of scientific forest management in Austria-Hungary. This encounter demanded that foresters engage with the non-central position of forested regions, – the Carpathians within the empire –, and they had to address the road leading to the Compromise of 1867 and its aftermath. Surely, these could not have been so without engagement with landscape management as science. In other words, nation-building and state-building efforts as well as the institutionalisation of professional forestry contributed to defining the contours of the environmental history in two ways. First, the state became the most important actor in setting up infrastructure that professional forestry activities required – including irrigation that stamped out traditional forestry in floodplains – and of afforestation. Together, these activities brought about what we may call "second nature" in which commodification became a central aspect of nature-culture relationships. The term "second nature" refers to the ubiquitous human presence, which goes without saying everywhere, as well as to the lack of human consciousness while carrying out activities that influence nature-culture relationships.

The second way nation-building and state-building influenced landscape change epoch emerged was through re-regulating landownership and land titles including the right to access forests especially after 1848. Thanks to these measures, forestry administration became one of the organs promoting profit-oriented agriculture and defining its programme. Importantly, concern for the national economy as such were part of the arguments and discourse behind the legal reordering of the landscape.

Air Pollution in Slovenia in Socialist Yugoslavia

JANJA SEDLAČEK – MARTA RENDLA

Sedlaček, Janja – Rendla, Marta: Air Pollution in Slovenia in Socialist Yugoslavia

After World War II Slovenia was characterized by severe air pollution. Although it experienced rapid industrial-, and economic growth until the mid-1970s, with a focus on heavy industry especially in the first decade of the postwar era, air pollution was distributed unevenly, and pollution levels varied greatly from place to place. This paper argues that Slovenia's geographical characteristics and location played an important role in the large difference of air pollution levels. Other important factors that influenced air pollution were a growing societal awareness of environmental issues and government response to tackle emerging environmental problems. The main purpose of the paper is therefore to analyze influencing factors of air pollution and its harmful impact on humans and the environment in Slovenia and also within a broader Yugoslav-, and international context.

Key Words *Air Pollution; Slovenia; SO₂ Emissions; Environmental Degradation; Environmentalism*

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Contact *Institute of Contemporary History, Ljubljana; sedlacek@inz.si – marta.rendla@inz.si*

Introduction

After World War II, increasing environmental pollution was a problem faced by both the developed West and countries of the Eastern Bloc, who were trying to catch up with the already industrialized Western states via accelerating industrialization and in particular, by developing highly polluting heavy industries. By the 1960s, pollution problems became so urgent that they were tackled on both sides of the Iron Curtain.

Research by environmental historians shows, that the countries of state socialism were generally characterized by a contradiction between, on the one hand, the ideological importance of a clean environment, which was supposed to provide workers with safe-, and clean living conditions and opportunities for leisure and rest, on the other hand, the reality in which, due to the lack of financial resources, efficient environmental protection solutions often remained only at a declaratory level.¹

The development of the environmental movement in socialist countries of Central-, and Eastern Europe had some similarities in the 1960s and 1970s, and especially in the

¹ MIGNON KIRCHHOF, Astrid – McNEILL, John R. (eds.): *Nature and the Iron Curtain: Environmental Policy and Social Movements in Communist and Capitalist Countries 1945–1990*. Pittsburgh 2019; MAZURSKI, Krzysztof R.: *Communism and the Environment*. Online, cited on 12 December 2022, accessible at http://www.mazurski.tomy.webd.pl/krm/files/Communism_and_the_Environment.pdf; PÁL, Viktor: *Technology and the Environment in State-Socialist Hungary: An Economic History*. London 2017; Idem: Toward Socialist Environmentalism? : Scientists and Environmental Change in Modern Hungary. *Environment and History* 29, 2023, no. 2, pp. 239–259.

1980s. However, it is clear from the research conducted so far that environmentalism was a complex process and that each country has its unique history in that respect.²

Yugoslavia, in particular, has taken a unique path. After the break between Tito, Yugoslav leader, and Stalin in 1948, the Yugoslav regime decided to take its own path, and in the early 1950s began developing its own version of socialism, the so-called self-governing socialism.³ Yugoslavia did not belong either to the Eastern-, nor to the Western bloc as it shared an underlying ideology with the East, but was characterized by greater openness and less ideological rigidity because of its intensive contacts with the West. This was also reflected via the Yugoslav authorities' responses to environmental problems, in the context of environmental awareness and environmental activism in postwar Yugoslavia.⁴

Although environmental problems and environmental protection already existed before World War II, it was under post-war communist modernization, when intense yet dispersed industrialization as well as urbanization and deagrarianization produced alarming signs of an ever-increasing environmental pollution and degradation in the Slovene part of socialist Yugoslavia. In Slovenia, the northernmost of the six former Yugoslav republics and two autonomous provinces, air pollution was the most pressing of the degradation processes. With the emissions of 131 kg of sulfur dioxide per inhabitant, Slovenia ranked at the top of the most polluted European countries in 1988. Compared with domestic SO₂ emissions, the precipitation in Slovenia contained 2.5 times more sulfur.⁵

Thus, Slovenia was among the areas with the highest concentrations of sulfur in the air in Europe; only two other areas, Czech Silesia and the Donetsk Region in Ukraine, both known for their intensive industrial structure, had similar amounts of sulfur in the air as Slovenia. In 1975, 28 Slovene settlements ranked in the class III. and IV. of air pollution on a four-level scale, where IV. class represented the lowest quality. In 1987, there were already 44 settlements in those two categories, where a quarter of the Slovene population lived.⁶

Slovenia is often considered as a country with high ecological stability and regenerative capacity due to diversity of landscape types and biodiversity. Thus, the question emerges, how such high levels of air pollution were possible?

This paper aims to answer this question, and by doing so, it relates the effects of air pollution to the geographical characteristics of Slovenia, places it in the context of Slo-

² BRAIN, Stephen – PÁL, Viktor (eds.): *Environmentalism under Authoritarian Regimes : Myth, Propaganda, Reality*. London 2019; MIGNON KIRCHHOF, A. – McNEILL, J. R. (eds.): *Nature*; MAZURSKI, K. R.: *Communism*; PÁL, V.: *Technology*; Idem: *Like Industrious Bees : Paper Waste and Recycling in Communist Hungary, 1950–1990*. *Environmental History* 28, 2023, no. 2, pp. 335–360.

³ Self-governing socialism was a mixture of planned and market economy elements, in which workers were to own the results of their labor. Since the early 1950s, workers have had a say in company decisions through workers' councils, including what to do with some of the income the company generated. In the mid-1970s, policy-makers sought to replace the market and the economic role of the state with "self-governing agreements" between companies. In this way, workers were to direct economic trends themselves, and the state's role was to consist only in the organized protection of social property. This meant a significant decentralization of decision-making, which was not limited only to the economic sphere, but it referred to other important social-, and local issues as well, including ecological ones. But only within the limits of the plans, which remained the ideological instrument of the communist party until the break-up of Yugoslavia.

⁴ These topics are covered by Z. Oštrič, H. Petrič, and David E. Kromm in their works and listed in the bibliography section at the end of this paper.

⁵ PLUT, Dušan: *Naravnogeografski vidiki degradacije okolja in razvoja v SR Sloveniji*. In: LAH, Avguštin (ed.): *Slovenija 88 : Okolje in razvoj : zbornik*. Ljubljana 1989, p. 61.

⁶ RAVBAR, Marjan et al.: *Zasnova poselitve v Sloveniji*. Ljubljana 1995, pp. 105–106.

vene economic-, and urban development after World War II, as well as examines the attitude of Slovene authorities in the post-war period towards pollution and environmental protection and the development of environmental awareness and activism within the Slovene society. This essay also puts the Slovene case in the context of other Yugoslav republics and at times some other state-socialist countries as well.

A number of researchers have dealt with the problem of air pollution and environmental policy with regard to postwar Europe, for example Henrik Ehrhardt⁷ on West Germany, Michel Dupuy⁸ on East Germany, Christine L. Zvosec⁹ about the countries of Eastern Europe. Stanley J. Kabala¹⁰ and Aida Ličina Ramić¹¹ are among the few authors who have dealt with air pollution in Yugoslavia. Environmental history research for the era of modernization is still at an early stage in Slovenia, with very limited scholarship about air pollution after World War II. However, in the 1970s and especially in the 1980s with the gradual development of environmental awareness, numerous professional-, and scientific contributions on the subject of environmental-, and air pollution were written by contemporary geographers, urban planners, health experts, for example D. Plut, A. Lah, D. Radinja, M. Špes, D. E. Kromm.¹² The publications from that time, including the comprehensive survey *The Green Book on the Threat to the Environment in Slovenia*, which in 1972 pioneered the problem of pollution in Slovenia, as well as *Slovenia 88*, served as our main sources. Public statistical data for air pollution is only available from the late 1980s, thus publications by experts, who had access to those statistics, are therefore an excellent source. This paper mostly relies on data about the concentration of SO₂ in the air, because data for other pollutants are scarce. Although SO₂ contributed only around a third of all impurities, it was a good indicator of general air pollution.¹³

The Social and Economic Development of Slovenia in Socialist Yugoslavia

After World War II, the new communist government embarked on a radical social-, and economic transformation. The focus was on accelerated industrialization, especially on basic heavy industries until 1956.¹⁴

Until the mid-1970s, Slovenia experienced extremely rapid industrial-, and economic growth, which slowed down in the second half of the 1970s and turned from stagnation

⁷ EHRHARDT, Hendrik: Keeping the Air Clean? : Environmental Policy, Utility Companies, and Social Movements in West Germany since the 1970s. In: MIGNON KIRCHHOF, A. – McNEILL, J. R. (eds.): *Nature*, pp. 73–86.

⁸ DUPUY, Michel: Retention of Sulfur Dioxide Emission in the GDR : Between Technology, Economics, Diplomacy, and Public Opinion. In: BRAIN, S. – PÁL, V. (eds.): *Environmentalism*, pp. 162–179.

⁹ ZVOSEC, Christine L.: Environmental Deterioration in Eastern Europe. *World Affairs* 147, 1984, no. 2, pp. 97–126.

¹⁰ KABALA, Stanley J.: Economic Growth and the Environment in Yugoslavia : An Overview. *Ambio* 17, 1988, no. 5, pp. 323–329.

¹¹ LIČINA RAMIĆ, Aida: Od ekološke katastrofe do olimpijskog grada : Sarajevo 1971–1984. In: DURANOVIĆ, Amir (ed.): *Poplava, zemljotres, smog : Prilozi ekohistoriji Bosne i Hercegovine u 20. stoljeću*. Sarajevo 2017, pp. 115–147.

¹² Their works are listed in the bibliography section at the end of this paper.

¹³ Sulfur dioxide is the chemical compound with the formula SO₂. It is a toxic gas produced as a by-product of copper extraction and the burning of sulfur-bearing fossil fuels.

¹⁴ PRINČIČ, Jože: *Kapitalna, ključna kapitalna in temeljna investicijska izgradnja v Sloveniji 1945–1956*. Novo mesto 1992.

to a slight decline in the second half of the 1980s. Industrial production increased ten-fold in the period 1939–1972, and Slovenia's economic growth rate in 1953–1972 was among the highest in the world. By far the fastest growing industry during this period was the electricity industry, which increased at an average annual rate of 21 %, producing 45 times more in 1972 than it had twenty years earlier.¹⁵

In the early postwar years, Yugoslavia followed a Soviet-style central planning system. With the abandonment of the Soviet development model and the transition to its own version of socialism in the early 1950s, Yugoslavia gradually shifted to more balanced investments, among which light industry gained a prominent role.¹⁶ Despite the disproportion to the generated social product, capital-intensive economic sectors, such as the industries related to energy raw materials, again took a central place in investments in the 1970s. This meant that heavy industry, with its harmful effects on the environment and human health, maintained a central role until the break-up of Yugoslavia. For economic planners, growth was necessary without regard to costs, because new factories were a sign of progress, an opportunity for employment and a higher standard of living.¹⁷

At first, industrialization was located especially in the so-called industrial crescent, where pre-war industrial centers were already located along the main railway lines. Later industrial projects spread spatially.¹⁸ Slovenia followed a polycentric urbanistic model since the 1960s and as a result many relatively small industrial-, and urban centers were spread across Slovenia. Urbanization was especially intensive in the 1960s and 1970s.¹⁹ Spatially dispersed centers of industrialization and urbanization had both negative and positive environmental effects: pollution reached all parts of Slovenia, but at the same time its effects were spread out and not concentrated in certain industrial centers.

Many urbanized and industrialized cities and industrial centers have emerged in alpine and pre-alpine basins and valleys with multifunctional natural potential. The Slovene valleys and basins in the lee of the Alps, where the majority of the population lived and a large part of the industry was concentrated, represent a particularly sensitive mountain ecosystem from an ecological point of view.²⁰

The Geography of Slovenia and its Impact on Pollution

The environment in Slovenia as a whole and especially in some areas was characterized by being more degraded than expected given the emission of pollutants, the standard of living, as well as the industrial-, and urban development achieved. On the other hand, the acidification of the environment was in some areas unreasonably low, when compared with the high amounts of sulfur in precipitation.²¹

¹⁵ BERIČ, Karel: Dvajsetletni razvoj industrijske proizvodnje SR Slovenije. *Prikazi in študije* 7–8, 1965, pp. 1–29; BRGLEZ, Franček (ed.): *Družbeni razvoj Slovenije 1947–1972*. Ljubljana 1974, pp. 38–74.

¹⁶ RENDLA, Marta: "Kam ploveš standard?": *Življenjska raven in socializem*. Ljubljana 2018.

¹⁷ OSET, Željko: Environmental Activism during Communist Era in Slovenia. *Review of Croatian History = Revue für kroatische Geschichte = Revue d'histoire croate* 15, 2019, no. 1, p. 66.

¹⁸ VRIŠER, Igor: Razvoj industrije v Sloveniji. *Geografski vestnik* 48, 1976, pp. 29–45; Idem: *Industrializacija Slovenije*. Ljubljana 1977.

¹⁹ RAVBAR, M. et al.: *Zasnova*, p. 26.

²⁰ PLUT, Dušan: Industrija in degradacija okolja v Sloveniji. *Geographica Slovenica* 18, 1978, pp. 88–89.

²¹ RADINJA, Darko: Pokrajinske značilnosti industrializacijske onesnaženosti v Sloveniji. In: *Geografski prob-*

In the case of Slovenia, the influence of non-anthropogenic factors seems to be the key to explain the discrepancy mentioned above. In an area of only 20,000 km², the four basic European landscape-, and ecosystems types meet: the Alps, the Pannonian Plain, the Dinarides and the Mediterranean.²²

On the one hand, the diversity of landscape elements and landscape types conditions the ecological stability of Slovene landscapes; on the other hand, this characteristic leads to very different self-regeneration capacities and the ability of nature to resist degradation. From the point of view of air pollution and consequent environmental degradation, the relief dissection should be emphasized. The dissection and diversity of the Slovene relief, especially in deep and narrow valleys and basins, affects the extreme spatial variability of the self-regeneration potential. While the settlements of sub-Mediterranean Slovenia have the highest regeneration potential, the alpine and pre-alpine basins and valleys, as well as the karst fields, have relatively poor air self-regeneration capacity in the winter months. Strong negative landscape pollution effects in alpine and pre-alpine basins and valleys as well as karst fields are due to air-locked systems, especially in winter, when there is temperature inversion, caused by even relatively small amounts of harmful emissions. The absence of strong winds and frequent temperature inversions contributes to the formation of fog in narrow valleys and basins. Even at the beginning of the 1990s, the fog lingered for 100 to 150 days a year, most often during the winter heating period.²³

Slovenia is also characterized by its unfavorable position in terms of transboundary transmission of air pollution. From Central-, Western- and even Mediterranean Europe – especially from the nearby, heavily industrialized northern Italy – polluted air masses spread unhindered to Slovenia, where they are stopped by the orographic barriers at the Alpine-Dinaric transition zone. There, orographically enhanced precipitation (among the most productive in Europe) leaches sulfur from the atmosphere. The effects of acid rain – the acidification of the environment, especially of soil and water – are relatively successfully counteracted, directly or indirectly, by the predominant carbonate rocks and some other landscape features.²⁴ The openness and transitivity of the Slovene territory thus leads to the fact that Slovenia absorbs, transforms and releases detrimental material and energy inflows and outflows such as polluted air masses and polluted water.²⁵

Air Pollution: The Yugoslav Framework

In Yugoslavia, the first non-systematic measurements of outdoor air pollution were carried out in 1950–1951. These measurements related to the air in the vicinity of industrial plants and mines. Among the first such tests were the air measurements in the vicinity of the steelworks in Zenica (Bosnia), the ironworks in Jesenice (Slovenia), the copper

lemi življenjskega okolja = *Geographical Problems of Human Environment*. Ljubljana 1979, pp. 75–84.

²² PLUT, Dušan: Onesnaženje in prostorski razvoj Slovenije. In: Idem: *Geografija in aktualna vprašanja prostorskega razvoja : 70 let geografije na ljubljanski univerzi* = *Geography and Current Questions of Spatial Development : 70th Anniversary Year of Geography at the University of Ljubljana*. Ljubljana 1989, p. 175.

²³ Ibidem, pp. 105–106.

²⁴ Ibidem; ŠPES, Metka: Vpliv lokalnih virov emisij in čezmejnega zraka na kakovost okolja v Alpskem ekosistemu Slovenije. In: GOSAR, Anton (ed.): *Sonaravni razvoj v slovenskih Alpah in sosedstvu* = *Sustainable Development in the Slovene Alps and its Neighbouring Regions*. Ljubljana 1999, p. 142.

²⁵ PLUT, D.: *Naravnogeografski vidiki*, p. 63.

mine in Bor (Serbia), the lead mine in Trebča (Kosovo), as well as some other industrial sites in Slovenia. In the 1950s, sporadic measurements continued to be carried out, and systematic measurements began in 1960 in Belgrade and a year later in Zagreb. These tests showed that Zagreb was more polluted in 1962–1963 than Milan in 1956–1957.²⁶ Since 1965–1966 regular measurements of air pollution in Sarajevo were carried out as well, and also showed serious air pollution.²⁷

In 1963, a report prepared by the members of the Yugoslav Academy of Sciences and Arts, pointed out that the chemical analysis of air pollution indicated that in Yugoslav cities industrial air pollution was the most critical one. There were major differences between air pollution in industrial-, and non-industrial areas of the towns and rather small seasonal variations within industrial areas.²⁸ This however was not true for Sarajevo and Ljubljana, the two republic capitals, which despite the polycentric development of industry in Bosnia and Herzegovina and Slovenia were facing severe air pollution. Both cities lie in basins, thus the air circulates poorly, especially in winter, when there is a temperature inversion. The main source of air pollution in both cities was therefore heating, although other pollutants also played an important role.

In 1987, there were fourteen Slovene cities, whose maximum daily measured SO₂ value exceeded 500 µg/m³, with the highest maximum measured daily value of 910 µg/m³ in Trbovlje. In other Yugoslav republics, there were only nine cities all together,²⁹ whose maximum daily measured SO₂ value exceeded 500 µg/m³, for example Belgrade, with a measuring spot at Vračar (822 µg/m³), Sarajevo (882 µg/m³) and Zenica (with 1415 µg/m³, being highest measured value among them all).³⁰

Comparison of daily SO₂ concentrations in the capital cities of republics and autonomous provinces show that the highest mean daily concentration of SO₂ in 1987 and 1988 were observed in Belgrade (146 µg/m³ in 1987 and 113 µg/m³ in 1988), Ljubljana (100 µg/m³ in 1987 and 70 µg/m³ in 1988) and Sarajevo (94 µg/m³ in 1987 and 109 µg/m³ in 1988). Among the Yugoslav capitals, Sarajevo stood out with the highest maximum daily SO₂ value of 1052 µg/m³ in 1988.³¹

During 1967–1983, air pollution due to the concentration of SO₂ and smoke in the Yugoslav capitals was steadily decreasing. After 1983 SO₂ concentrations stopped decreasing and in 1986 SO₂ and particulate matter was still above the WHO recommendations in some of the capitals' concentration, largely due to Yugoslavia's renewed reliance on domestic lignite reserves in the 1980s.³²

²⁶ VOUK, Velimir B. – FUGAŠ, Mirka: *A Short Review of Clean Air Problems in Yugoslavia*. Geneva 1963. Online, cited on 23 April 2023, accessible at <https://apps.who.int/iris/bitstream/handle/10665/326338/WHO-AP-10-eng.pdf?sequence=1&isAllowed=y>, pp. 3–4.

²⁷ LIČINA RAMIČ, A.: *Od ekološke katastrofe*, p. 123.

²⁸ VOUK, V. B. – FUGAŠ, M.: *A Short Review*, p. 5.

²⁹ It has to be stressed out that among 93 Yugoslav cities, for which the Yugoslav statistical yearbooks in the 1980s listed the data about the quality of air, almost half were Slovene cities. It remains unclear whether Slovene cities were more polluted than other Yugoslav cities or whether statistical data was more widely available for the Slovene part of Yugoslavia than in other republics.

³⁰ *Statistički godišnjak Jugoslavije 1989*. Beograd 1989, pp. 85–86.

³¹ *Ibidem*, pp. 85–86; *Statistički godišnjak Jugoslavije 1990*. Beograd 1990, pp. 83–84.

³² BUSSIÈRE, Jane (ed.): *Environmental Policy in Yugoslavia*. *The OECD Observer* 142, 1986, no. 5, p. 31.

Air Pollution in Slovenia

Although Slovenia was among the countries with the highest annual sulfur precipitation per unit area in Europe, the overall environmental degradation and acidification were lower than expected because of the landscape composition, especially due to the structure of the carbonate rocks which contributed to the neutralization of the acidification process. Climatic features with distinct seasons and hydrological features with rapid cycling of materials and energy also contributed to lower than expected environmental degradation.³³

Slovenia remained a source of significant sulfur emissions until the end of the socialist era, producing 98 kg of SO₂ per capita in the early 1990s. During the same period, the United Kingdom, Germany, Austria, and Switzerland produced 84 kg, 52 kg, 47 kg, and 20 kg per capita, respectively. More than half of domestic emissions remained in Slovenia, while the rest was distributed with the air masses over other European countries. An estimated 78 % of domestic emissions came from thermal power plants. From an environmental point of view, the use of lignite (from the mines in Trbovlje, Senovo and Velenje) was the most problematic issue, because lignite is low in calories and contains high levels of sulfur and solids. The largest Slovene thermal power plant in Šoštanj polluted the air more than the thermal power plant in Trbovlje and thermal power plant in Ljubljana, the other two Slovene thermal power plants combined. Slovene SO₂ emissions also came from industry (12 %), transport (1,5 %), and from heating homes and other buildings (8,5 %). By the early 1990s, the major polluters had already taken steps to protect air quality, but overall these actions were not enough, and the concentration of pollutants still exceeded permissible limits in many localities.³⁴ For example, SO₂ emissions from industry decreased in the period 1978–1988 due to the technological renewal of Slovene ironworks in Jesenice and Ravne na Koroškem, as well as via remediation measures to protect air quality at the Cinkarna metallurgical and chemical industry in Celje and the Mežica lead mine and smelter.³⁵ Other sources of industrial SO₂ emissions were the aluminum and alumina plant in Kidričevo and the pulp and paper mill in Krško.³⁶

At the beginning of 1990s, the most degraded localities or regions, with category “IV.” or “critical” concentration of SO₂ in the air included the three largest Slovene cities: Ljubljana, Maribor and Celje as well as the Mežica Valley (a center for metallurgy and lead mining in the towns of Črna, Žerjav and Mežica), the outskirts of the Šalek Valley (Zavodnje above Šoštanj), the Celje basin, the Ljubljana basin, the middle Sava Valley (with mining centers of Trbovlje, Hrastnik and Zagorje), and Trata, an industrial district in the city of Škofja Loka.³⁷

In most Slovene cities, systematic measurements of air pollution began between 1975 and 1977, while in some of the most polluted areas measurements were carried out as

³³ RADINJA, Darko: O tehnogenem kroženju žvepla v pokrajinskem okolju SR Slovenije in njegovi bilanci : prispevek k vprašanju zakisanosti naših padavin in okolja sploh. *Geografski vestnik : Časopis za geografijo in sorodne vede = Geographical Bulletin : Bulletin for Geography and Related Sciences = Bulletin géographique : bulletin pour géographie et sciences associées* 60, 1988, pp. 3–19.

³⁴ ŠPES, Metka: Kaj vemo o onesnaževanju zraka?. *Geografski obzornik* 40, 1993, no. 2, p. 14.

³⁵ HRČEK, Dušan: Zelena knjiga o ogroženosti okolja v Sloveniji. In: LAH, A. (ed.): *Slovenija* 88, pp. 298–299.

³⁶ ŠPES, M.: Kaj vemo o onesnaževanju, p. 14.

³⁷ Ibidem.

early as the late 1960s.³⁸ Based on the first unsystematic SO₂ measurements, the air in Slovene cities was the most polluted in the late 1960s and early 1970s. Before 1980, the predominantly and moderately industrial cities and urban settlements were among the most polluted cities in terms of air pollution (SO₂, smoke, and particulate matter). The settlements with high industrial emissions and emissions from various heating sources stood out. In general, high SO₂ and smoke emissions prevailed in winter.

The consequences of long-term air pollution were critical in the mid-1980s, with decline of coniferous forests, especially fir and spruce, and of deciduous forests all across Slovenia, despite the fact that damage to forests in certain areas had been present since the 1960s.³⁹

In the 1980s, industrial emissions began to decline, because Slovenia gradually switched to natural gas and oil instead of coal and built treatment plants. In the most polluted Slovene cities, average annual SO₂ concentrations ranged from 100 to 250 µg/m³ in the 1980s.⁴⁰ By the end of the 1980s, average annual SO₂ immisions in the most polluted Slovene cities had decreased by 100–200 % compared to the beginning of the 1970s. Despite the sharp decline in Slovenia, in the Austrian city of Graz, for comparison, annual SO₂ immisions decreased by more than 600 %.⁴¹

Despite the reduced emissions of SO₂ and smoke, even at the beginning of the 1990s air pollution in Slovene cities was still the most pressing environmental problem – while concentrations of SO₂ and smoke were decreasing, the emissions of nitrogen oxides and of photooxidants were increasing due to growing road traffic.⁴² In 1991, two-thirds of the urban population and one-third of the total Slovene population lived in cities and settlements with critical air pollution, or air pollution above the permissible level but not above the critical level, compared to three-quarters in the mid-1970s. Despite the decline in relative proportions over this period, however, the population living in unhealthy residential environments grew by 150,000 between the mid-1970s and the mid-1990s, due to migration to polluted cities, but also in part to the expansion of the monitoring network and stricter regulations.⁴³

Air Pollution in Ljubljana, the Slovene Capital

In Ljubljana, systematic measurements began in 1968.⁴⁴ Experts who performed measurements were not expecting to record the high figures of pollution they measured, because the polluted air was then believed to be mainly associated with large industrial emissions. However, the measurements in Ljubljana showed that city air even in places

³⁸ HRČEK, D.: Zelena knjiga, p. 298; RAVBAR, M. et al.: Zasnova, p. 105.

³⁹ ŠPES, M.: Kaj vemo o onesnaževanju, p. 10.

⁴⁰ RAVBAR, M. et al.: Zasnova, p. 105.

⁴¹ KLIMONT, Zbigniew et al.: *Emissions of Air Pollutants in the Region of the Central European Initiative – 1988*. Laxenburg 1993. Online, cited on 30 October 2022, accessible at <https://pure.iiasa.ac.at/id/eprint/3736/1/SR-93-003.pdf>; LAZAR, Reinhold – KAUFMAN, Viktor – BUCHROOITHNER, Manfred: *Stadtklimaanalyse Graz*. Graz 1994, p. 163.

⁴² CHIRAS, Daniel: *Environmental Science : A Framework for Decision Making*. Menlo Park 1988, p. 531; RAVBAR, M. et al.: Zasnova, p. 107.

⁴³ RAVBAR, M. et al.: Zasnova, pp. 105–106.

⁴⁴ HRČEK, Dušan: Onesnaženost zraka v Sloveniji : Stanje in usmeritve za izboljšanje. In: LAH, Avguštin (ed.): *Okolje v Sloveniji : zbornik*. Ljubljana 1994, pp. 345–355.

without noteworthy industrial emissions was very polluted. Results indicated that the level of air pollution in the winter was of worse quality even compared to highly industrial areas abroad. Thus, experts suspected first that their measurements could not be correct.⁴⁵

In the early 1970s, fourteen air pollution measurement stations out of the total of sixteen stations in Ljubljana measured two-times higher monthly average concentrations of SO₂ in the winter than the maximum average daily concentration of 150 µg/m³, a standard, proposed by the federal institute for health care in 1965 as the maximum permissible concentration. Six of the Ljubljana air pollution measurement stations recorded three times greater monthly averages than the maximum permitted daily concentration. During the summers all measuring stations but one reported monthly averages below the maximum permitted level.⁴⁶

Unfavorable weather conditions in the Ljubljana basin, such as poor air ventilation and temperature inversions, were the main reasons for the difference of air quality in winter and summer. High SO₂ concentrations in winter also indicated that the main cause of high SO₂ concentrations was heating.⁴⁷

In January 1967 a record-level of daily SO₂ concentration was measured in Ljubljana at 2400 µg/m³, the average 24-hour concentration exceeded the permissible limit by a factor of 16.⁴⁸

At the end of 1967, the Thermal Power Plant – Heating Plant Ljubljana (TE-TO LJ) began to operate. As a result, SO₂ emissions tripled in Ljubljana due to the use of coal with a high, 3–5 % content of sulfur. However, at the same time air pollution with sulfur dioxide and smoke decreased by 30 % due to the abandonment of fireplaces with low chimneys in Ljubljana. With the expansion of TE-TO LJ in the 1980s, emissions continued to increase until the 1990s, but the concentrations of SO₂ and smoke were decreasing since the end of the 1960s.⁴⁹ Despite that, in 1984 according to the data of the annual concentration of SO₂ in various European and North American cities, Ljubljana with an average concentration of 120 µg/m³ was still ranked among the most polluted cities in the world.⁵⁰ Even in the 1991–1992 heating season, daily SO₂ concentrations, with a maximum daily value of 390 µg/m³ measured in December 1991, still exceeded the Slovene permissible daily limit value of 150 µg/m³.⁵¹

The Case of the Upper Sava Valley

It was not only in the Ljubljana basin, that climatic features played an important role in the discrepancy between the emissions of the pollutants and air quality. In 1999 geographer

⁴⁵ PARADIŽ, Bojan: Posledice onesnaževanja zraka v lokalnih in planetarnih razsežnostih. In: LAH, A. (ed.): *Okolje*, p. 345.

⁴⁶ KROMM, David E.: Response to Air Pollution in Ljubljana, Yugoslavia. *Annals of the Association of American Geographers* 63, 1973, no. 2, pp. 209–210.

⁴⁷ PEČENKO, Andrej – PLANINŠEK, Anton: Onesnaženost zraka z SO₂ v zadnjih dvanajstih letih. In: LAH, A. (ed.): *Slovenija* 88, p. 305.

⁴⁸ PARADIŽ, Bojan: Zrak. In: PETERLIN, Stane (ed.): *Zelena knjiga o ogroženosti okolja v Sloveniji*. Ljubljana 1972, p. 57.

⁴⁹ Idem: Posledice, pp. 12–18.

⁵⁰ RAVBAR, M. et al.: Zasnova, p. 105.

⁵¹ PARADIŽ, B.: Posledice, p. 336.

Metka Špes discussed the degradation of the environment in two Slovene Alpine valleys: the Upper Sava Valley and the Mežica Valley. In the late 1960s and early 1970s, when air pollution was at its highest in Slovenia, the two valleys were among the most degraded Slovene regions. However, due to the different self-cleaning abilities of the local environment, there was still a difference between the two valleys in the degree of environmental degradation. Until 1970, the Upper Sava Alpine Valley with the metallurgically oriented Jesenice locality had the highest emissions in Slovenia. However, SO₂ concentrations in 1969, for example, were as much as 30 % lower than in the Slovene capital Ljubljana, which did not have such high emissions. The lower SO₂ concentrations in Jesenice were due to relatively good air exchange in the narrow valley. Temperature inversions were less pronounced, which allowed relatively satisfactory natural air cleaning. In Jesenice, red iron smelter dust, which settled in the immediate vicinity of the iron smelter, represented an important environmental-, and health concern.⁵² In adjacent areas around the ironworks, the conifers stopped thriving; instead, a poor, sparse birch forest and scrub began to grow. But there were almost no wastelands or severely damaged forests, as was the case in Mežica Valley with lower emissions. In the town of Jesenice, measurements of dust deposits, which in the mid-1960s were up to fourteen times higher than prescribed standards, fell in the 1990s below the maximum permissible concentrations, despite standards for residential environments being stricter.⁵³

Environmental Policy: The Yugoslav Framework

Despite severe environmental pollution, which in the decades after World War II was in a large part caused by the communist government's orientation towards accelerated industrialization, with an emphasis on heavy industry for many years, several laws were adopted and many international conventions were signed for the protection of the environment in Yugoslavia.

Yugoslav constitutions of 1946, 1963 and 1974 included the idea of the protection of nature, and each successive constitution included new environmental aspects. Nature protection laws were adopted at the federal level in 1946, and by republics and autonomous regions in 1949. Later, the nature protection laws were improved and in the mid-1960s expanded to include requirements of conservation, general protection of nature, and promotion of nature and the environment. The Yugoslav constitution of 1974 transferred the responsibility for adopting environmental laws to the republics and autonomous regions. Based on that, all six Yugoslav republics adopted new laws on the establishment of national parks, protection of forests and waters, hunting and fishing, air pollution, and spatial planning. In accordance with these laws, Yugoslavia placed many natural areas and habitats under protection, including 22 national parks established between 1948 and 1986.⁵⁴

In the 1960s, when the measurements showed bad air quality in several Yugoslav localities, air pollution became a topic of scientific and political discussion. The Air Protection Act at the federal level, has been debated and planned, but has never been adopt-

⁵² Idem: Zrak, p. 61.

⁵³ ŠPES, M.: Vpliv, p. 140.

⁵⁴ PETRIČ, Hrvoje: About Environmental Policy in Socialist Yugoslavia. In: MIGNON KIRCHHOFF, A. – McNEILL, J. R. (eds.): Nature, pp. 170–172.

ed.⁵⁵ In 1973 the Yugoslav Society for Clean Air was formed in Sarajevo, and in 1983 it transformed into the Association of Yugoslav Clean Air Societies.⁵⁶

Environmental Policy, Environmental Awareness and the Environmental Movement in Slovenia

In Slovenia, efforts to preserve endangered symbols of nature began in the early 1960s and continued via nature conservation activities, such as Nature Conservation Week in 1967 and the Slovene program for the European Year of Nature Conservation in 1970.⁵⁷ For most of the 1960s, environmentally related activities were limited to the protection of pristine nature; and the pollution of human habitat, especially cities, has not yet been addressed. When early measurements showed a high degree of air pollution in Slovene cities, the chamber of commerce initiated a Commission for the Study of Issues in the Field of Air Pollution Protection within the ministry for urban planning at the end of 1969. The commission's task was to determine the state of air pollution in Slovenia and to design measures for improving the air pollution situation.⁵⁸

A clear sign of the awakening environmental awareness was the preparation of the Green Book on the Threat to the Environment in Slovenia in 1972, which already used the information from the report of the newly established air pollution commission. The Green Book presented scattered and isolated data on environmental degradation, collected by experts at various institutes and state institutions (doctors, biologists, geographers, architects, urban planners, chemists, foresters, etc.), most of whom were at the same time functioned as environmental enthusiasts – nature lovers, members of mountain and camping associations etc. The book consisted of six substantive chapters with a total of 67 author reports. The preparation of the book began in the spring of 1970 during the European Year of Nature Conservation, as part of the preparations for participation in the United Nations Conference on the Human Environment in Stockholm in 1972. In addition, the Association for the Protection of the Environment in Slovenia, a unifying body of social organizations and individuals was founded in May 1971, which in the same year achieved that the Slovene assembly established the commission for environmental protection as its consultative body in environmental matters.⁵⁹

In 1975, the Air Protection Act was adopted, and consequent by-laws regulated standards for emissions and permissible concentrations as well as the classification of air pollution from I. (with clean air) to IV. degree (with critically polluted air) between 1976–1979.⁶⁰ The stringency of the new Slovene regulations corresponded with the standards of Western European countries at the time. Requests were also made to prepare remediation programs for some of the biggest industrial polluters. The law was in force until 1993, and decrees in 1988 and 1990 further tightened the standards.⁶¹ Based on the

⁵⁵ LIČINA RAMIČ, A.: Od ekološke katastrofe, p. 119.

⁵⁶ Ibidem, p. 120.

⁵⁷ PETERLIN, Stane: Zelena knjiga o ogroženosti okolja v Sloveniji : Spomini na izid pred štiridesetimi leti. *Proteus* 74, 2012, no. 9–10, p. 464.

⁵⁸ PARADIŽ, B.: Zrak, pp. 55–79.

⁵⁹ PETERLIN, S.: Zelena knjiga, p. 464.

⁶⁰ HRČEK, D.: Onesnaženost, pp. 345–346.

⁶¹ Ibidem, p. 346.

provisions of the Air Protection Act in 1976–1977, a network of air pollution monitoring stations started to operate. In addition to the republic monitoring station network, there were also measurements financed by municipalities and large polluters, or carried out by various state institutions.⁶² Also, the Analytical Monitoring and Alarm System (ANAS) began to operate in 1980 with the aim of collecting accurate data on air pollution and meteorological conditions for the needs of remedial programs.⁶³

By the end of the 1980s, the network of monitoring stations had expanded, and in 1990 there were 50 monitoring stations in Slovenia. Thus by 1988, a continuous twelve-year set of SO₂ and smoke concentrations data was available for research in most major cities. During the 1980s, monitoring results showed that air pollution in Slovene cities mostly decreased due to the introduction and expansion of the remote heating systems, the increasing share of natural gas in the total energy consumption, and the greater availability of liquid fuels for heating, as well as due to warmer winters.⁶⁴

Despite measures taken to abate air pollution in Slovenia, the public debate in the 1960s and 1970s was still limited to the scientific circles and in the 1970s some of the popular science magazines, such as the “*Proteus*”. It was not until the 1980s that air pollution was widely discussed and the ecological movement gained momentum, especially due to three events. The first of these events was the so-called Krupa affair in 1983, when information was made public that polychlorinated biphenyls⁶⁵ exceeded legal limits by 400 times in Slovenia’s largest karst spring and a crucial local water source. The contamination was caused by the disposal of used capacitors in a karst sinkhole near the spring. The second event was the nuclear disaster in Chernobyl three years later. A series of articles on the responsibility for dying forests in central Slovenia represented the third milestone. In 1989, the environmental movement gave rise to the environmental party, The Greens of Slovenia (Zeleni Slovenije), which in April 1990 received 8.8 % of the votes at the first multi-party elections in Slovenia after World War II. The Greens of Slovenia was the green party with the highest election result in Europe at the time.⁶⁶

Conclusion

After World War II, Slovenia battled with heavy air pollution, emitting 98 kg of SO₂ per capita in the early 1990s. In 1975, 28 Slovene settlements ranked Air Pollution Class III. and IV., on a four-level scale, where Class IV. represented critically polluted air.

Because industrialization dominated economic goals for ideological reasons, concern for the environment remained in many respects only at the declaratory level until the second half of the 1970s. But the Slovene scientific debate was strengthening and environmental awareness was emerging already in the 1960s.

In the following years, Slovenia had gradually developed a relatively progressive environmental protection legal framework with concrete results. The Air Protection Act in 1975 and its by-laws regulated standards for emissions and permissible concentrations,

⁶² Idem: Zelena knjiga, pp. 299–300.

⁶³ Ibidem, p. 300.

⁶⁴ PEČENKO, A. – PLANINŠEK, A.: Onesnaženost, pp. 305–306.

⁶⁵ Polychlorinated biphenyls are one of the most toxic man-made chemicals and are highly carcinogenic.

⁶⁶ POLAJNAR HORVAT, Katarina: Razvoj okoljske miselnosti v Sloveniji. *Geografski vestnik* 81, 2009, no. 2, pp. 71–81.

with a stringency that corresponded with Western European standards. New regulations enabled the first phase of remediation in the period 1978–1988, during which the biggest polluters in places with critical air pollution implemented measures to reduce emissions. The zinc plant in Celje by 1986 reduced SO₂ emissions by 47 %, and the Jesenice iron-works by 40 %. After the air protection decrees tightened in 1988 and 1990, a second phase of rehabilitation took place. Larger cities, which were in the most polluted group, banned the use-, and sale of fuels with a higher sulfur content through special legal acts. By 1992 the Šoštanj Thermal Power Plant, Slovenia's biggest SO₂ emitter, decreased emissions by 20 % through ecological remediation with desulfurization.

However, in 1988, with 131 kg of harmful sulfur dioxide per inhabitant, air in Slovenia still ranked as one of the most polluted among European countries. Compared to Slovene SO₂ emissions, the precipitation in Slovenia then contained 2.5 times more sulfur. Non-anthropogenic factors seemed to play a decisive role in maintaining the unfavorable air pollution situation in Slovenia. The dissection of the relief with many deep alpine and pre-alpine basins and valleys, which have a low self-cleaning capacity due to poor ventilation as well as temperature inversion in winter and the unfavorable location in terms of trans-boundary transmission of air pollution, jointly contributed to the high concentration of SO₂ in the air in many Slovene cities and localities.

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Summary

Air Pollution in Slovenia in Socialist Yugoslavia

Slovenia experienced rapid industrial and economic growth after World War II. Industrial production increased tenfold in the period 1939–1972, and Slovenia's economic growth rate in 1953–1972 was among the highest in the world. At the same time, serious environmental problems emerged. With the release of 131 kg of SO₂ per inhabitant in the air, Slovenia was among the most polluted areas in Europe in 1988. Slovenia contributed significantly to sulfur emissions, producing 98 kg of SO₂ per capita in the early 1990s. Out of these emissions, 78 % came from thermal power plants. Gradually, Slovenia has also established a relatively progressive environmental protection legal framework and by the end of the 1980s, average annual SO₂ emissions in the most polluted Slovene cities had decreased by 100–200 % compared to the early 1970s. Even at the end of 1980s, the environment in Slovenia as a whole, and in some areas in particular, was more degraded than it would have been expected given the pollutant emissions. This was primarily due to the particular geographic characteristics of Slovenia – the dissection of the relief with many deep alpine and pre-alpine basins and valleys, which have little self-purifying capacity due to poor ventilation and temperature inversion in winter. Slovenia is also characterized by its unfavorable position in terms of transboundary transmission of air pollution. It receives, transforms and releases harmful substance and energy inflows and outflows, e.g. polluted air masses and polluted water.

The Water Histories of Hungary's Major Rivers

Environmental Debates around Antal Réthly and Emil Mosonyi

FERENC JANKÓ – PRISZCILLA HAFENSCHER

Jankó, Ferenc – Hafenschler, Priszcilla: The Water Histories of Hungary's Major Rivers : Environmental Debates around Antal Réthly and Emil Mosonyi

Taking a biographical approach, two main characters of Hungarian water-environmental history are explored in this study. Before the global warming era, meteorologist Antal Réthly played a major role in the climatic controversy concerning the water regulation and afforestation of the Great Hungarian Plain arguing that these human activities could not change the climate. In turn, water engineer Emil Mosonyi strove to conceptualize and develop the utilization of Hungarian hydropower potentials and remained a supporter of large hydropower projects even after his emigration and return, when the construction of the Danube barrage system catalyzed the Hungarian environmental movement and the political transition in 1989. Their histories help understanding of the limited capacities of science in solving environmental controversies.

Key Words *Environmental History; Water Regulation; Afforestation; Climatic Controversy; Hungary*

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Contact *Eötvös Loránd University; janko.ferenc@ttk.elte.hu – haf.viktoria@gmail.com*

After the intense drought of 2022, and the increasing frequency of heatwaves due to global warming, Hungarian water management is slowly entering the spotlight again. In the recent past it has usually been extreme floods that have been given similar public attention. If we try examining a longer period, right back to the start of the water regulation projects in the Carpathian Basin,¹ about one and a half centuries ago, we can see that the question of rivers and water, together with other issues, such as agriculture, afforestation and electricity generation, has been in the focus of Hungarian environmental sciences and technology for a long time.²

This is not a feature unique of Hungary; the transformation of nature and the exploitation of water resources were means of modernization for governments all around the globe.³ Consequently, the transformation of rivers, taming their runoff, utilizing their

¹ In the 19th century, the climate of Hungary was definitely cooler, but only a slightly wetter. See BIHARI, Zita – BABOLCSAI, György – BARTHOLY, Judit et al.: Climate. In: KOCSIS, Károly (ed.): *National Atlas of Hungary, 2: Natural Environment*. Budapest 2018, pp. 62–64.

² SOMOGYI, Sándor (ed.): *A XIX. századi folyószabályozások és ármentesítések földrajzi és ökológiai hatásai*. Budapest 2000; JANKÓ, Ferenc: *Az éghajlatváltozás kérdése a magyar tudományban*. In: JANKÓ, Ferenc (ed.): *Éghajlat – tudomány – történetek: Beszélgetések a klímaváltozásról*. Budapest 2017, pp. 145–170.

³ WORSTER, Donald: *Rivers of Empire: Water, Aridity, and the Growth of the American West*. New York 1985; BOELEN, Rutgerd – POST UITERWEER, Nynke C.: Hydraulic heroes: the ironies of utopian hydraulism and its politics of autonomy in the Guadalhorce Valley, Spain. *Journal of Historical Geography* 41, 2013, pp. 44–58;

irrigation and hydropower potentials served particular economic and political interests, while creating conflict with others.⁴ Inarguably, rivers have also experienced fundamental changes alongside the nations, regions, societies, and ecosystems they supply, which may also be called water systems⁵ or hydrosocial territories.⁶

Things are no different in Hungary, where the Danube and Tisza rivers play eminent roles in the country's environmental history. This study aims to give an overview of the debates surrounding these rivers. Their regulation and hydropower utilization have been at the heart of Hungarian social and economic modernization since the middle of the 19th century, and remain so to the present day.⁷ The article uses the histories of two scientists, two "hydraulic heroes"⁸ as cornerstones. Both men lived to an advanced age, with their lives and expertise almost spanning the entire period under examination, and were prominent figures in the making and defending of science in hydro-environmental controversies and beyond. Namely, meteorologist Antal Réthly (1879–1975) and hydraulic engineer Emil Mosonyi (1910–2009; Figure 1). The study's goal is to assess and compare their roles in Hungarian water-environmental history, but also to assess the achievements of science in general in the midst of two environmental controversies. These controversies were the hundred years of climate change debate concerning the Great Hungarian Plain (Alföld) from the 1860s to the 1960s, where Réthly played a major role, and the Gabčíkovo–Nagymaros barrage system, with Mosonyi's involvement in this spanning across the decades both before and after the political transition of Hungary in 1989. As we will see, their paths barely crossed, however Réthly was deeply committed to Hungarian water affairs, while Mosonyi started his career and emerged as a top scientist from the same arena before World War II. Emil Mosonyi also embodies the change within Hungarian water management, the shift of focus from the Tisza basin to the Danube during the first decades of the socialist period.

Nature Transformation and Early Debates in the 19th Century

Chief meteorologist Antal Réthly was born in the same year as the catastrophic flood of the Tisza River in 1879, in the course of which the largest city on the southern plains, Szeged was destroyed. By that time, the channelization works along the river had been underway for decades; and were symbolically opened by count István Széchenyi in 1846,

HOMMES, Lena – BOELEN, Rutgerd: From natural flow to 'working river': hydropower development, modernity and socio-territorial transformations in Lima's Rimac watershed. *Journal of Historical Geography* 62, 2018, pp. 85–95; DE OLIVEIRA, Nathalia C. C. – FLORENTIN, Carlos G.: Hydroelectric dams and the rise of environmentalism under dictatorship in Brazil and Paraguay (1950–1990): The case of Itaipu. In: BRAIN, Stephen – PÁL, Viktor (eds.): *Environmentalism under Authoritarian Regimes Myth, Propaganda, Reality*. London – New York 2019, pp. 51–74.

⁴ WHITE, Richard: *Organic Machine: The Remaking of the Columbia River*. New York 1995; EVENDEN, Matthew D.: *Fish versus power: An environmental history of the Fraser River*. Cambridge 2004; SUMMITT, April R.: *Contested Waters: An environmental history of the Colorado River*. Boulder 2013.

⁵ TVEDT, Terje: 'Water Systems', Environmental History and the Deconstruction of Nature. *Environment and History* 16, 2010, no. 2, pp. 143–166.

⁶ BOELEN, Rutgerd – HOOGESTEGER, Jaime – SWYNGEDOUW, Erik et al.: Hydrosocial territories: a political ecology perspective. *Water International* 41, 2016, no. 1, pp. 1–14.

⁷ PINKE, Zsolt: Modernization and decline: an eco-historical perspective on regulation of the Tisza Valley, Hungary. *Journal of Historical Geography* 45, 2014, pp. 92–105.

⁸ BOELEN, R. – POST UITERWEER, R. C.: Hydraulic heroes.

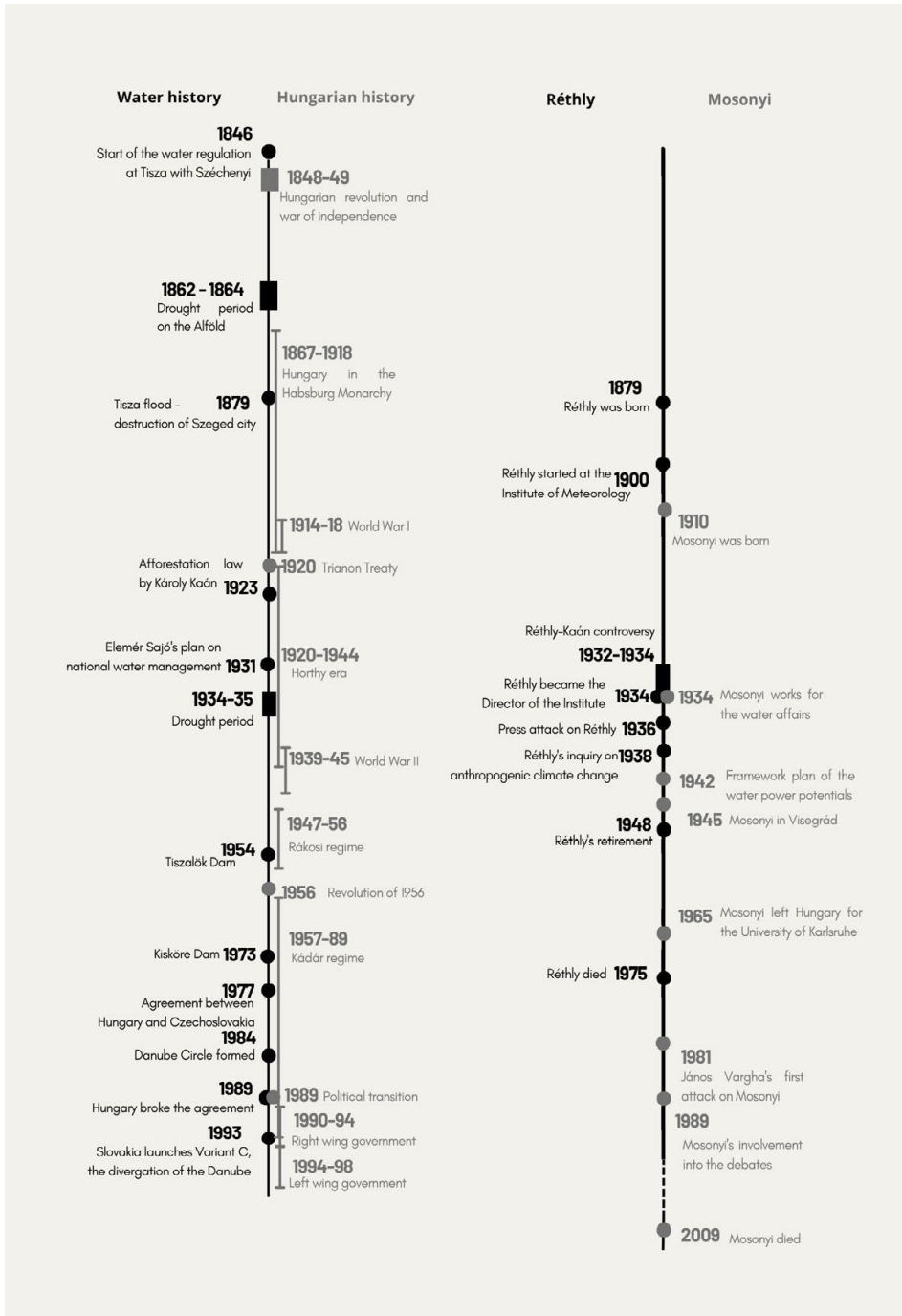


Figure 1: Timeline of the personal stories framed by the key historical events of water management and Hungary. Source: the authors.

who organized and directed the Tisza regulation project until his death in 1860.⁹ Besides the construction of the Hungarian railway system, this project was a major part of the 19th century modernization of the country, which contributed to the creation of a modern, market-oriented agriculture and a country-wide landscape change, a “transformation of nature”.

The first wave of the Alföld climatic controversy took place in the mid-1860s, when three leading naturalists started to debate the possible reasons for and solutions to the devastating drought of 1863. János Hunfalvy, the first university geographer in Hungary, argued that the flawed regulation of the River Tisza was the reason for the drought and, instead, proposed afforestation on the plains to modify the climate and enhance rainfall. As a propagator of the ideas of John Perkins Marsh¹⁰ expressed conservationist ideas to protect the Hungarian forests from the utilitarian management practices represented by his opponents, forestry engineer Adolf Divald and water engineer Adolf Érkövy. They not only claimed that forests should only be maintained in areas where the yield of timber is greater than the possible crop yield, they also attacked Hunfalvy's views on afforestation and river channelization. The three participants in the debate, whose papers were published in parallel by the Hungarian forestry journal (*Erdészeti Lapok*) and a major daily newspaper (*Pesti Napló*), failed to reach a compromise.¹¹ What is more, Hunfalvy also maintained his negative views of the regulation of the Tisza at the time of the flood catastrophe in Szeged.¹²

These debates had no effect on the continuation of the water regulation projects, but the destruction of Szeged alone did have a political impact on the future works. The regulation of the Tisza was in fact so incomplete and unsystematic that was an important criterion of the catastrophe impacting the city. The works were continued with stronger state involvement, when chief hydraulic engineer Jenő Kvassay took the lead, who labeled the regulation of the Tisza the “second Hungarian conquest”.¹³ Similarly, starting in the last decades of the 19th century, the water regulation of Alföld, and more broadly of all of Hungary became more complete with the regulation works of the Danube.

Meanwhile, there was hardly any shift in the views on climate change, while the question of ice ages was the focus of scholarly attention, in Hungary also. After its publication in 1896, the theory of Svante Arrhenius on carbon dioxide emission and human impact

⁹ KÁROLYI, Zsigmond: A magyar vízi munkálatok rövid története különös tekintettel a vizek szabályozására. In: IHRIG, Dénes (ed.): *A magyar vízszabályozás története*. Budapest 1973, pp. 21–147; DUNKA Sándor – FEJÉR, László – VÁGÁS, István: *A veritékes honfoglalás : A Tisza-szabályozás története*. Budapest 1996, pp. 61–77. Széchenyi's is celebrated as “the greatest Hungarian” as the father of Hungary's, not only the Alföld's, modernization today; his name is also linked to the Chain Bridge in Budapest and to the foundation of the Hungarian Academy of Sciences, among others.

¹⁰ The works of Marsh also indicate that the question of afforestation and its effect on climate and especially on precipitation was an old issue in scientific as well as policy encounters. See e.g. STORCH, Hans von – STEHR, Nico: Anthropogenic climate change: A reason for concern since the 18th century and earlier. *Geografiska Annaler A*. 88, 2006, no. 2, pp. 107–113.

¹¹ E.g. ERDŐDI (DIVALD), Adolf: Nézetek az erdőknek a klímára való befolyásáról. *Erdészeti Lapok* 3, 1864, no. 1, pp. 15–31; DIVALD, Adolf: A természettudományok és az erdészet. *Erdészeti Lapok* 4, 1865, no. 1, pp. 1–22; ÉRKÖVY, Adolf: Az erdők, mint esőzési tényezők a síkfeldön. *Erdészeti Lapok* 3, 1864, no. 12, pp. 385–400; HUNFALVY, János: Az erdők befolyásáról a klímára. *Erdészeti Lapok* 4, 1865, no. 2, pp. 39–48.

¹² HUNFALVY, János: *Az éghajlat változóságáról*. Proceedings of Magyar Orvosok és Természetvizsgálók XXII. Nagygyűlése, Debrecen 1882, p. 34.

¹³ DUNKA, S. – FEJÉR, L. – VÁGÁS, I.: A veritékes honfoglalás, pp. 118–121.

on the climate was firstly referenced at the beginning of the new century by leading Hungarian meteorologists and geographers based on a Polish climatologist's work, mainly with regard to the climate of the geological past and ice ages.¹⁴ Arrhenius' fresh ideas on climate change were also published in Hungarian in 1907, which was followed by his book in 1922.¹⁵ However, these early references to his works barely changed the mainstream views, i.e. the belief that the climate does not change within the human timescale, which became explicitly apparent during the climate debates on the Alföld.¹⁶

The debate on the climatic effect of water regulation and afforestation only flared up after the end of World War I, when the postwar penalty of Hungary, the Trianon Treaty, dismembered the country. Hungary not only lost two-thirds of its territory, but its major forests also fell within the successor countries, mainly (Czecho-) Slovakia and Romania. These circumstances naturally turned the attention of science and politics towards the Great Hungarian Plain, and many sought the opportunities in the development of the Alföld as a basis for postwar Hungary's future progress.¹⁷

The regulation works also continued in the interwar period, while many believed their mission pathetic under the second Hungarian conquest. The drainage of the region between the Tisza and the Danube rivers was pushed forward after the years of World War I with the construction of a main channel in the Danube valley and the drainage of swamps, however the construction of irrigation infrastructure was delayed. Here, hydraulic engineer Sándor Rohringer was the leader of the project, commissioner of the Ministry of Agriculture, and professor at the Budapest University of Technology at the same time.¹⁸ In this region, the plans for a Danube–Tisza channel provided the basis for further discussions among scientists and politicians about where and how to plan and construct a new water route between the two major rivers to develop intrastate shipping trade.¹⁹

A leading forest engineer and forest politician in the 1920s, Károly Kaán also saw the potential for afforestation on the Alföld. He claimed that deforestation and water regulation had a negative effect on the climate of the plain and attempted to convince the professional elite and the public that afforestation could address the problems.²⁰ He went on to propose and launch the "Alföld" afforestation law in 1923, which was also justified with a climatic argument, i.e. planting trees in order to promote climatic amendment, and heated up the climatic debate. Scientists analyzed the effects of aridification,²¹ foresters

¹⁴ RÓNA, Zsigmond: No. 67. *Természettudományi Közlöny* 35, 1903, no. 406, p. 420; FODOR, Ferenc: A geológiai korszakok klímája. *Természettudományi Közlöny* 37, 1905, no. 433, pp. 577–578; CHOLNOKY, Jenő: A jégkorszakokról. *Földrajzi Közlemények* 33, 1905, no. 7, p. 269; PRINZ, Gyula: A klíma története. *Természettudományi Közlöny* 37, 1905, no. 80 (suppl.), pp. 164–165.

¹⁵ ARRHENIUS, Svante: Földünk és az égitestek mint az élőlények lakóhelyei. *Természettudományi Közlöny* 39, 1907, no. 460, pp. 665–679; ARRHENIUS, Svante: *A világok keletkezése*. Budapest 1922.

¹⁶ JANKÓ, F.: Az éghajlatváltozás, pp. 155–160.

¹⁷ JANKÓ, Ferenc – GYŐRI, Róbert: Az Alföld fejlődésével és természetátalakításával kapcsolatos viták a két világháború között. In: SÍKOS, Tamás – TINER, Tibor (eds.): *Tűz, régiók, települések térben és időben: tanulmánykötet Beluszky Pál 80. születésnapjára*. Budapest 2016, pp. 136–142.

¹⁸ UJHÁZY, Noémi – BIRÓ, Marianna: The 'Cursed Channel': utopian and dystopian imaginations of landscape transformation in twentieth-century Hungary. *Journal of Historical Geography* 61, 2018, pp. 4–5.

¹⁹ JANKÓ, F. – GYŐRI, R.: Az Alföld, p. 138.

²⁰ JANKÓ, F.: Az éghajlatváltozás, p. 152.

²¹ THAISZ, Lajos: Az alföldi gyepek fejlődéstörténete és azok minősítése gazdasági szempontból. *Erdészeti Lapok* 60, 1921, no. 3–4, pp. 33–55; TREITZ, Péter: A Nagy-Alföld erdősitése talajtani szempontból. *Erdészeti Lapok* 60, 1921, no. 17–18, 19–20, pp. 311–333, 346–380; TUZSON, János: *A magyar Alföld*. Budapest 1915.

began to promote afforestation for precipitation increase,²² while the hydraulic engineers blamed for the drying of the plains through the water projects attempted to defend themselves by organizing lectures.²³ These engineers received help from meteorologists, geographers and even from some foresters,²⁴ and this was the point when Antal Réthly entered the debate.

Antal Réthly and the Climatic Controversy on the Alföld

Antal Réthly became a junior clerk at the Institute of Meteorology and Earth Magnetism in 1900, at the same time he began his studies at the University of Budapest (the predecessor of Eötvös Loránd University). Working for the department of climatic research, he was given regular lecturer assignments at the university and performed foreign service in Turkey. He became deputy director in 1933 and director of the Institute in 1935.²⁵

From Réthly's viewpoint, there were three major events that highlight the major role he played in the debates in the interwar period and beyond. The first was his controversy with Károly Kaán, the originator of the Alföld-afforestation idea and, in fact, deputy state secretary for forestry until his retirement in 1925. Interestingly, Kaán shared many common views with the hydraulic engineers, envisioning a prosperous future for the Alföld. The common ground was Széchenyi and his Alföld modernization program to raise the people and the landscape out of backwardness, which encouraged both the foresters and the hydraulic engineers during their work, since the protection and promotion of forest coverage as well as encouraging water regulation have their roots in Széchenyi's ideas.²⁶ However, in the spirit of his legislation, Kaán suggested that forests may somehow modify the climate and promote more humid conditions, even on a larger scale. He similarly argued that water regulation works could contribute to aridification, especially in those areas where the regulation projects remained incomplete.²⁷

Réthly's first contribution to the debate, a postscript to the abovementioned lectures held for the Hungarian association of engineers and architects, was published in a volume edited by the leader of the Hungarian water service, Elemér Sajó, in 1933. Using observational weather data, Réthly claimed that the climate of the Alföld has a changeable character, independent of the hydro-regulation works, varying between humid and

²² SÁVOLY, Ferenc: Az Alföld fásításától és öntözésétől a mezőgazdaság terén várható bioklimatikus értéknövelésről. *Erdészeti Lapok* 59, 1920, no. 17–18, pp. 387–408; KALLIVODA, Andor: Az Alföldfásítás kérdéséhez. *Erdészeti Lapok* 66, 1927, no. 5, pp. 214–221; BODOR, Gábor: Az Alföld fásítása. *Erdészeti Lapok* 68, 1929, no. 3, pp. 39–45; KALLIVODA, Andor: A lecsapolók meg az esőcsínalók. *Erdészeti Lapok* 71, 1932, no. 2, pp. 125–133.

²³ KENESSEY, Béla: Az Alföld állítólagos kiszáritása, elszikesítése és öntözésének kérdése. *Vízügyi Közlemények* 13, 1931, no. 2, pp. 3–27; POGONYI, György: A Magyar Mérnök- és Építész-Egylet vízépítési szakosztálya által megtartott előadások és hozzászólások rövid ismertetése. *A Magyar Mérnök- és Építész-Egylet Közlönye* 65, 1931, no. 31–34, pp. 228–231; KENESSEY, Béla: Az Alföld vízgazdálkodása. *Vízügyi Közlemények* 16, 1934, no. 2, pp. 314–333.

²⁴ VÁGI, István: *A meteorológia és éghajlattan elemei*. Sopron 1929, p. 9; MAGYAR, Pál: Néhány alföldfásítási cikkhez. *Erdészeti Lapok* 71, 1932, no. 5, pp. 448–461.

²⁵ ZÁCH, Antal: Dr. Réthly Antal életútja. In: FELMÉRY, László – ZÁCH Antal (eds.): *Réthly Antal emlékkönyv*. Budapest 1975, pp. 5–15.

²⁶ KAÁN, Károly: Gróf Széchenyi István és a Nagy Magyar Alföld. *Budapesti Szemle* 200, 1925, no. 578–580, pp. 347–386.

²⁷ Idem: *A magyar Alföld: Gazdaságpolitikai tanulmány*. Budapest 1927, pp. 104–105, 141–142.



Figure 2: Antal Réthly, the director of the Hungarian National Meteorological Institute in 1935 Source: ZÁCH: Dr. Réthly, p. 10.

arid years. He wanted to support the arguments of Sajó and his colleagues against the widely popular, but, according to him, unscientific charge that the regulation projects had dried out the Alföld area, and that afforestation could help with it.²⁸

Kaán replied sharply. He took Réthly's paper as a personal attack against him and attempted to present Réthly as an incompetent in issues of microclimate. Réthly however, after rejecting the hurtful accusations, realized that Kaán had somehow misunderstood the microclimatic effect of trees, as if these could be aggregated to a macroclimatic influence. Thus, he attempted to close the debate on a conciliatory note and emphasized the common grounds they had. Kaán, in turn, grudgingly accepted the peace bond, and maintained his resentful position in his last work on the Alföld.²⁹

²⁸ RÉTHLY, Antal: Az Alföld csapadékviszonyai. In: SAJÓ, Elemér – TRUMMER, Árpád (eds.): *Újabb tanulmányok az öntözésről*. Budapest 1933, pp. 148–177.

²⁹ KAÁN, Károly: Az Alföld csapadékviszonyai és az alföldi erdőtelepítések és fásítások. *Vízügyi Közlemények* 15, 1933, no. 2, pp. 46–58; RÉTHLY, Antal: Az Alföld csapadékviszonyai és a fásítás mikroklimatológiai indoklása. *Vízügyi Közlemények* 16, 1934, no. 1, pp. 65–81; KAÁN, Károly: *Alföldi kérdések*. Budapest 1939, p. 347.

For Réthly, the Kaán-controversy was not the end. As the public discourse around the regulation works intensified with the period of drought in 1934–1935, he was attacked by journalist and popular writer László Szalay in a newspaper article entitled *The director of the Hungarian meteorological institute does not know the rainfall patterns of the Alföld...* in January 1936. The matter, the second of the events affecting Réthly, immediately reached the highest political circles of Hungary, i.e. the Minister for Agriculture and even Regent Miklós Horthy. Réthly was urged to react promptly and got his colleagues to work over the weekend to draw up a report for the political leaders. This report became the basis of his later lecture in February and a further publication, where he proved again that human activity, namely water regulation, cannot induce one-way climate change.³⁰ As Réthly later recalled, he was proud of how successfully he repelled the media attack and of the debates with higher authorities like Kaán and others, where even the Governor shared the views of his opponents.³¹

The third event concerning Réthly goes beyond his role in the interwar period as the defender of the position that human activities cannot induce climatic change. Archive documents revealed that Réthly, chairing the Sub-Commission for the Study of the Influence of Human Activities on the Climate (within the Commission of Agricultural Meteorology in the International Meteorological Organization), sent letters to the commission members in 1938 asking whether they knew of any research, any publications on the question of human influence on the climate. His motivation may be self-justification or not, however this does show that he was concerned with the issue. According to the archive data, there was only one relevant response, which came from the director of the British Meteorological Office, Nelson K. Johnson, who provided a reference list of two papers by Guy Stewart Callendar, a promoter of the Arrhenius theory in the late interwar period. Réthly, thus encountered the new idea of anthropogenic climate change, however, he never referenced it in his writings.³²

In his last decades after retirement, Réthly was only able to obtain the doctoral degree of the Hungarian Academy of Sciences three years before his death; as he was set aside in the 1950s by the state socialist academic accreditation committee for political reasons. Even so, Réthly still did not lose his motivation for research and spent much of his time collecting and publishing an inventory of Hungarian historic climatic extremes to prove that there is no trend in extremities, i.e. no one-way climate change.³³ However, his younger colleagues were among the first in Hungary who reported and referenced the new anthropogenic climate change theory half a century after its publication by Arrhenius and gave it its first Hungarian mentions.³⁴

³⁰ Central Archive of the Hungarian Meteorological Service, Documents of the National Meteorological and Geophysical Institute, inv. no. 8 d., sign. 454/1936; RÉTHLY, Antal: Megváltoztatta-e éghajlatunkat az ármentesítés? *Vízügyi Közlemények* 18, 1936, no. 1, pp. 134–165.

³¹ Central Archive of the Hungarian Meteorological Service, Documents of Antal Réthly, Radio interview about my life, manuscript, 1963, inv. no. 8a/3; *Ibidem*: Letter to [László Aujeszky] “My dear friend Laci...”, manuscript, July 17. 1974. inv. no. 8a/3.

³² *Ibidem*, Documents of the National Meteorological and Geophysical Institute, inv. no. 10. d., sign. 562/1938.

³³ RÉTHLY, Antal: *Időjárási események és elemi csapások Magyarországon 1700-ig*. Budapest 1962; JANKÓ, Ferenc: Éghajlatingadozás és éghajlatváltozás: adalékok Réthly Antal hagyatékából. *Léggör* 61, 2016, pp. 83–84.

³⁴ E.g. BERKES, Zoltán: *Éghajlatváltozás – éghajlatingadozás?* Budapest 1953; For further details see JANKÓ, F.: Az éghajlatváltozás, pp. 160–162.

Emil Mosonyi and the Dams in Hungary

While Antal Réthly and his contemporaries debated the questions of forests, water and climate, Emil Mosonyi, born in 1910, had just began his career at his alma mater, the University of Technology, where he graduated in 1934 under the professorship of Sándor Rohringer. Simultaneously, he began his service at the Ministry of Agriculture's department for water engineering, only leaving the university when he joined the Irrigation Office.³⁵ Promoted by Elemér Sajó, irrigation became an important subject area in the second half of the 1930s, and was certainly not independent of the abovementioned drought and climate debates.³⁶ In other words, the water issues of the Alföld and the Tisza River were always more important than those of the Danube.³⁷

The young engineer, Emil Mosonyi was given important tasks, both in practice as well as in long term planning: he took part in the design of the first significant dams on the Körös River (Békésszentandrás, 1943) and Tisza (Tiszalök, realized only in 1959). Meanwhile, hydropower planning became independent from irrigation planning due to its elevated importance in wartime national policy and Mosonyi became the leader of the Hydropower Office in 1942. With the temporary return of pre-WWI Hungarian areas in 1938–1940, the irrigation of the Alföld obtained new aspects; the water supply for the plains could be imagined with stored water in the mountains. Here, Mosonyi had promising plans.³⁸ In addition, in 1942 he investigated and proposed a framework plan for exploiting Hungarian hydropower potential. In the context of the aforementioned irrigation factors, the Tisza River was given priority, and the implementation plans were drawn up, while the Danube remained mostly in the theoretical stage.³⁹ At the end of World War II, when Hungary was occupied by Nazi Germany and the Soviet Army was approaching Budapest, Emil Mosonyi took his family to safety in Visegrád, a nearby village on the Danube Bend. As Mosonyi recalled, the choice of Visegrád as a refuge was no coincidence, he wanted to study the possible site of a future dam there.⁴⁰

This event shows, however, that his attention was increasingly focused on the Danube at that time,⁴¹ since the Danube embodied 70 % of Hungarian waterpower potential.⁴² Alongside his stressful work at the Tiszalök barrage, where the state security depart-

³⁵ ÁRPÁSI, Zoltán: *Mosonyi Emil a vízépités professzora*. Budapest 2006, pp. 40–44.

³⁶ SAJÓ, Elemér: Emlékirat vizeink fokozottabb kihasználása és újabb vízügyi politikánk megállapítása tárgyában. *Vízügyi Közlemények* 13, 1931, no. 1, pp. 55–66; LAMPL, Hugó – MOSONYI, Emil: Vízépitési munkálataink fejlődése. *Vízügyi Közlemények* 36, 1954, no. 4, pp. 379–380; MOSONYI, Emil: Vásárhelyi Pál emléke. *Az MTA Műszaki Tudományok Osztályának Közleményei* 18, 1956, no. 1–4, pp. 245–246.

³⁷ ÁRPÁSI, Z.: Mosonyi, pp. 53–54.

³⁸ *Ibidem*, pp. 46–55; MOSONYI, Emil: A visóvölgyi víztározó medence. *A Magyar Mérnök- és Építész Egylet Közlönye* 78, 1944, no. 9, pp. 113–122.

³⁹ MOSONYI, Emil: Magyarország elméleti vízerőkészlete. *Magyar Technika* 1, 1946, no. 5, pp. 165–170; *Idem*: Vízerőművek létesítésének kérdése az országos villamosítás keretében : Hazai vízerőművek kiépítése. *Magyar Technika* 2, 1947, no. 1–8, pp. 59–70; *Idem*: Magyarország vízerői. *Vízügyi Közlemények* 30, 1948, no. 2, pp. 160–187. Although this study was published after the war, it corresponds with the research in the first half of the 1940s Mosonyi mentioned in his interview. Hence, exact plans for the Nagymaros dam were not yet revealed.

⁴⁰ ÁRPÁSI, Z.: Mosonyi, p. 62.

⁴¹ *Ibidem*, p. 66.

⁴² MOSONYI, Emil: Vízerő-gazdálkodásunk időszerű feladatai. *Az MTA Műszaki Tudományok Osztályának Közleményei* 1, 1951, no. 1, pp. 518–519; *Idem*: A dunai vízerőhasznosítás hidrológiája. *Az MTA Műszaki Tudományok Osztályának Közleményei* 2, 1952, no. 4, p. 489.



Figure 3: Emil Mosonyi, around 1935–1940. Source: http://dunamuzeum.hu/1956/vizugy/v_04.html.

ment investigated him for sabotage, he also outlined his first plans for the location and sequence of dams on the Danube. In his first review study, he interestingly excluded the possibility of using so-called bypass channels for hydroelectric power plants on the Hungarian rivers.⁴³ However, in his second review this was not the case; he saw multiple variations as potential modes of implementation.⁴⁴ Mosonyi's ideas received support in academic circles, with his paper being presented at a hydrological conference at the Hungarian Academy of Sciences in 1951, where the issues of water utilization along the Tisza and the Danube rivers were discussed.⁴⁵ Mosonyi, in fact, envisioned a highly controlled system of water utilization in Hungary as comprehensive, coherent infrastructure serving the joint goals of water supply, irrigation, electricity generation, industry and recreation,

⁴³ Idem: *Vízérő-gazdálkodásunk*, pp. 522, 527.

⁴⁴ Idem: *A dunai vízerőhasznosítás*, p. 493.

⁴⁵ It was an important question there, similarly to the climatic issue, whether river channelization negatively influences the ground water levels along the rivers. The majority argued, among them László Aujeszky, a colleague of Antal Réthly, that no is the answer. This event also virtually combines the two main protagonists of this study.

which was pioneering in its day.⁴⁶ This fit well into the Hungarian version of the Great Stalin Plan for the Transformation of Nature together with massive growth in mining and heavy industry, intensive agriculture and afforestation.⁴⁷

Meanwhile, in 1954, Mosonyi became department leader at the University of Technology, however, due to his involvement in the revolutionary activity at the university in 1956, he had to step down in the following year. While he was partly able to maintain his positions in water affairs, he was not given the management position at the newly established Danube waterpower planning office. Aside from this, his relationship with his leaders increasingly deteriorated. Hence, following an invitation from the University of Karlsruhe, he managed to leave Hungary in 1965. In doing this, he also essentially dropped out of the hydropower planning dialogue in the country for decades, and, in turn, became a prominent hydraulic engineer employed worldwide.⁴⁸

The case of the Gabčíkovo–Nagymaros Barrage System

Following 1956, and more so after Mosonyi's emigration, the planning of hydropower utilization on the Danube continued. After the theoretical planning work, here, Mosonyi wrote his last short article in 1961 proposing more attention on peak energy production and on remarkable investment savings,⁴⁹ practical and technical preparations came into the foreground, now in unison with Czechoslovakian engineers and scientists.⁵⁰ Numerous conceptual versions were planned jointly in the second half of the 1950s; then the final version was formulated with decisions being made in 1963 and 1969. The Gabčíkovo–Nagymaros Barrage System (further GNBS) was the result put on the planning table, as the most cost-efficient and energy-productive version, with a reservoir near Dunakiliti feeding water into a race canal (side or by-pass canal) with a power plant at Gabčíkovo (in Hungarian: Bős). As part of the system, a further barrage was planned downstream at Nagymaros, on the Danube Bend, with another hydropower station enabling peak hour electricity production at Gabčíkovo. After further preparations for the joint investment, Hungary and Czechoslovakia signed an intergovernmental agreement in 1977.⁵¹

This story seems quite straightforward, however retrospective analyses, written by later opponents of the project, highlight a controversial and constantly changing context. Like the critics in the field of energy production, some argued in the 1950s that a thermal power plant would be cheaper.⁵² But this was in the era of cheap coal, later, after the oil crisis, with a step back to a stronger communist leadership following an

⁴⁶ MOSONYI, Emil: Országos Vízgazdálkodási Keretterr. *Az MTA Műszaki Tudományok Osztályának Közleményei* 14, 1954, no. 4, pp. 393–416; ÁRPÁSI, Z.: Mosonyi, pp. 68–71.

⁴⁷ BRAIN, Stephen: The Great Stalin Plan for the Transformation of Nature. *Environmental History* 15, 2010, no. 10, pp. 670–700; PÁL, Viktor: *Technology and the Environment in State-Socialist Hungary: An Economic History*. London 2017, pp. 69–75.

⁴⁸ ÁRPÁSI, Z.: Mosonyi, pp. 117–122, 187–233.

⁴⁹ MOSONYI, Emil: Új elgondolások vízerőink kihasználásában. *Hidrológiai Tájékoztató* 1, 1961, no. 1, pp. 17–18.

⁵⁰ ILLEI, Vilmos: A magyar Dunaszakaszi vízlépcsőzése. *Vízügyi Közlemények* 57, 1975, no. 1, pp. 95–102.

⁵¹ BREINICH, Miklós – NAGY, László – SZÁNTÓ, Miklós: A dunai vízlépcsőrendszer koncepciójának kialakulása. *Vízügyi közlemények* 65, 1983, no. 4, pp. 483–501; PÁL, V.: *Technology*, pp. 221–225. Certainly, the Prague Spring also caused delays.

⁵² VARGHA, János: Egyre távolabb a jótól : Dokumentumok a Gabčíkovo–Nagymarosi Vízlépcsőrendszer történetéből. *Valóság* 24, 1983, no. 1–12, pp. 61–63.

attempt at economic reform, the political and professional obstacles were removed from the project.⁵³

The first news reporting the concept of the GNBS was released for the public in 1963–1965, and it was clear that the press, following party instructions, had framed the plan as a useful project, that it would enhance the beauty of landscape in the Danube Bend and promote economic progress and landscape development in the Szigetköz area. In the case of the latter, where a severe drop in groundwater level and landscape change were projected due to the race canal, negative warnings could only be read by reading between the lines.⁵⁴

From 1974, after a hiatus of almost ten years, the press again started to report about the project, with a fundamentally positive tone, however more and more questions were raised.⁵⁵ In the case of Szigetköz, perhaps the first warning was written by Zoltán Alexay, a high school teacher and nature photographer, but without mentioning the GNBS.⁵⁶ The water industry kept its attention on technical questions, while other fields delivered some supporting articles.⁵⁷ After the start of the construction work, the first explicitly critical papers were published in a local history magazine in 1979, which raised important questions about the GNBS and projected, basically negative, environmental outcomes. As Alexay warned, the project endangers the wildlife, its habitats, hence the ecological conditions of the Szigetköz area.⁵⁸

While some attempted to calm the fears,⁵⁹ The water industry maintained and even further developed its grandiose national plans for water and waterpower utilization.⁶⁰ Meanwhile, scientific bodies, roundtable discussions and local political committees started to investigate the environmental questions regarding the GNBS on the Danube Bend and in the Szigetköz area.⁶¹

On the national scale, the article of János Vargha represents a milestone in the history of opposition against the GNBS. The biologist Vargha, at that time a journalist for a popular science magazine, revealed that engineers had handled problems, i.e., the increasing and decreasing groundwater levels in the environment of hydropower plants, superficially

⁵³ FLEISCHER, Tamás: Jaws on the Danube: Water management, regime change and the movement against the middle Danube hydroelectric dam. *International Journal of Urban and Regional Research* 17, 1993, no. 3, pp. 431–432.

⁵⁴ E.g. MÁRTON, Miklós: Erőművek a Dunán. *Népszabadság* 21, 1963, no. 301, pp. 16–17; CSERESZNYÁK, István: Szigetköz jövője : Vizvezeték a falvakban, öntözőrendszerek, kiirtják az erdőket. *Kisalföld* 9, 1964, no. 211, p. 1.

⁵⁵ SZALAY, Antal: Napirenden a Szigetköz fejlesztése : Vizszint és talajvízszint, a vízlépcsőrendszer hatása, idegenforgalom. *Kisalföld* 33, 1977, no. 238, pp. 1, 3.

⁵⁶ ALEXAY, Zoltán: A szigetközi vízivilág megmentéséért. A Szigetköz utolsó madárparadicsoma: Ritka madarak az ásványrárói szigetvilágban. *Búvár* 30, 1975, no. 12, pp. 553–556.

⁵⁷ E.g. SOMOGYI, Sándor: A dunai transzkontinentális nemzetközi hajózóút megvalósításának feladatai hazánkban. *Földrajzi Értesítő* 25, 1975, no. 2–4, pp. 255–263.

⁵⁸ ALEXAY, Zoltán: A Szigetköz élővilága. *Honismeret* 7, 1979, p. 23. See also the other articles in the volume.

⁵⁹ KERTAI, Ede: A nagymarosi vízlépcső és a Dunakanyar. *Élet és Tudomány* 34, 1979, no. 19, pp. 594–596.

⁶⁰ NAGY, László – DÁVID, László – DOBÓ, István et al.: A magyarországi vízgazdálkodási nagylétesítmények koncepciója. *Vízügyi Közlemények* 61, 1979, no. 1, pp. 7–16.

⁶¹ HORÁNSZKY, András – JAKUCS, Pál – LÁNG, Edit – SIMON, Tibor: A Gabcsikovo–Nagymarosi és a Tisza II. vízlépcsőrendszerek ökológiai problémái. *Az MTA Biológiai Tudományok Osztályának Közleményei* 22, 1979, no. 3–4, pp. 407–414; Here, the Water Planning Company entrusted the Department of Plant Systematics and Ecology at Budapest ELTE University to study the environmental impacts of the GNPB in the Szigetköz area; BENKŐ, Tibor: A vízlépcső-rendszer környezeti hatásai. *Népfőnt* 25, 1980, no. 3, pp. 11–14.

and with overconfidence. He also argued that the project is uneconomical and uncompetitive (and the benefits are relatively low), obsolete (since it ignored the environmental issues), and too dangerous (the reservoirs increase the risk of flooding and threaten the water supply of Budapest). Hence, Vargha vehemently attacked the water policies of the socialist regime, particularly Emil Mosonyi, as “the father” of water utilization. Related to this, in a later article he called the project a “Dunasaur” combining the words Danube and dinosaur.⁶²

Vargha’s paper was echoed in the media. Consequently, the Hungarian Academy of Sciences also investigated the project and declared the need for it to be shut down in 1983, and again in 1985, and several other scientific bodies issued their opinions on the GNBS. Increasing numbers of critical articles were published,⁶³ but the situation of the project itself also worsened as costs rose and political debate increased on both sides of the border.⁶⁴ The opponents to the GNBS formed a civil organization in 1984 called the Danube Circle, and the public dispute around the project grew.⁶⁵ They also organized a conference in 1988; with the counterarguments to the project reaching their full complexity.⁶⁶

However, face-to-face debates did not take place, neither orally, nor written; both parties used only their own channels. As the press turned against the barrage, only the hydrological journals remained for the engineers to express their arguments and claims; they started a column in the *Hidrológiai Közlöny* (Hydrological Journal) to publish the articles that were rejected by the newspapers. Tensions increased, as the international agreement obliged the government, but as the regime softened, the population had more opportunity to protest. Nevertheless, police forces prohibited and prevented a demonstration organized by the Circle in 1986. The movement thus increasingly gained a political tone, and the GNBS became a symbol of the socialist regime itself and a catalyst for the political transition.⁶⁷ The Hungarian Parliament and the government could hardly do anything else but surrender in the end to the will of the people and broke the contract with the Czechoslovaks, and first suspended and later stopped the construction work.⁶⁸

Emil Mosonyi was not able to help in the situation either. He first returned in 1987 to be informed about the project and two years later he was officially invited to help. He gave his opinion in talks and in writing, tried to refute the claims of the environmentalists based on scientific arguments, however, it was fuel to the flames. He was attacked

⁶² VARGHA, J.: Egyre távolabb a jótól; Idem: Vízlépcső vagy Dunaszauroszt? *Új Tükör* 1981, no. 4–6, pp. 6–8; Mosonyi as the main target of the attack is even clearly visible in a short press article based on the original paper, where Vargha never mentioned Mosonyi by name, only as the man “honored by Labor Red Flag Merit Order”.

⁶³ E.g. ERDÉLYI, Mihály: A győri medence természeti-gazdasági értékei és a tervezett vízlépcső. *Földrajzi Értesítő* 32, 1983, no. 3–4, pp. 475–490; TÓTH, János: A Bős–Nagyamarosi Vízlépcsőrendszer környezeti hatásairól és néhány várható ökológiai problémájáról. *Földrajzi közlemények* 107, 1983, no. 1, pp. 1–10.

⁶⁴ HAJNAL, László Gábor: “Habár fölül a gálya...” : A Bős–Nagyamarosi vízlépcső építésének vázlatos története. *Új Látóhatár* 35, 1984, no. 3, p. 378.

⁶⁵ SÓLYOM, László: A társadalom részvétele a környezetvédelemben. *Medvetánc* 5, 1984–1985, no. 4–1, pp. 220–222; KIEN, Péter: A Nagy Szlovák Csatorna. *Beszélő* 9, 1984, pp. 496–506.

⁶⁶ DOBOS, Lídia – RÁCZ, Judit – VIT, László (eds.): *Utánunk az özönvíz*. Budapest 1989.

⁶⁷ Cf. JANÁČ, Jiří: Planned environment in a socialist dictatorship. Complex water management and soil improvement in Moravia. In: BRAIN, S. – PÁL, V. (eds.): *Environmentalism*, pp. 125–144.

⁶⁸ FLEISCHER, T.: Jaws, pp. 436–438; PÁL, V.: Technology, pp. 221–225.

intensely in the media, and became the target even more, especially for Vargha and the followers of his movement, being depicted as the simple originator of the barrage system and as a representative of the communist regime until his death and beyond.⁶⁹ But compared to Réthly, Mosonyi had far less room for maneuver. Instead of defense he thought it better to retreat. He became active again only after the change in government in 1994, when the construction of the Nagymaros dam became an open question again.⁷⁰

Conclusions

The stories of the two Hungarian ‘hydraulic heroes’ have striking similarities, but also differences, since several factors in their lives differ. Their careers crossed but did not explicitly come into contact, however the last hundred years of Hungarian water history can be drawn with the help of their stories. It was visible, for example, how the emphasis changed from the Tisza to the Danube, and from water regulation and irrigation to water power utilization. However, both Réthly and Mosonyi shared utilitarian views and that pure science and technology could be the answer. Yet, both witnessed great changes in the academic field, which changes barely influenced them, perhaps due to their age: Réthly saw the rise of the global anthropogenic idea, and Mosonyi the environmental movement.

The scientific debates highlighted in the article constituted great challenges to the field of water management. The climatic controversy shook hydraulic engineers, however, the judgment and narrative of the water regulation in the Alföld remained predominantly positive until the present, which also helped Réthly during his struggles. In turn, the debates around the barrage system were devastating for the field, and it still has not recovered from the shock,⁷¹ while the unbuilt Nagymaros dam became the symbol of the Hungarian environmental movement.⁷²

As a conclusion, we should also realize that the opportunities of science are limited in public debates, scientific argument, being increasingly used by both opposing parties, was unable to help the disputes come to an end or find a compromise, with political power always playing a greater role. This is particularly true for environmental controversies where all the opponents can easily find scientific claims to back up their opinions and decisions. We also need to bear this in mind when climate change slowly forces the reconfiguration of the Hungarian hydrosocial regime.

⁶⁹ KERTÉSZ, Péter: “Kedvező hágai ítélet ellenére is születhet rossz megoldás” (An interview with János Vargha). *Népszava* 125, 1997, no. 79, p. 6; LÁNYI, András: Fenéig! *Magyar Hírlap* 27, 1994, no. 179, p. 7; KARÁTSZON, Gábor – BÁRDOS DEÁK, Péter: Nagymarosi gát – újratöltve? *Magyar Nemzet* 72, 2009, no. 147, pp. 32–33.

⁷⁰ ÁRPÁSI, Z.: Mosonyi, pp. 238–256. In his interview, Mosonyi reacted violently to Vargha’s attacks.

⁷¹ It is not surprising that the climate skeptic movement in Hungary found its ground in an environmental realist circle founded mainly by hydraulic engineers.

⁷² PEYTON, Jonathan: Corporate ecology: BC Hydro’s Stikine-Iskut project and the unbuilt environment. *Journal of Historical Geography* 37, 2011, pp. 358–369.

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Summary

The Water Histories of Hungary’s Major Rivers : Environmental Debates around Antal Réthly and Emil Mosonyi

The question of water, as well as the related fields of agriculture, afforestation, and hydroelectric power, was at the focus of Hungarian environmental history. With a biographical approach, the study uses the histories of two scientists, meteorologist Antal Réthly (1879–1975) and hydraulic engineer Emil Mosonyi (1910–2009), to show how the emphasis changed from the Tisza River to the Danube,

and from water regulation and irrigation to water power utilization. Réthly played a major role in the climatic controversy around the water regulation and afforestation of the Alföld; he argued that these human activities could not modify the climate. Mosonyi strived to conceptualize and to develop the utilization of Hungarian waterpower potentials and remained a supporter of large hydropower projects after his emigration and return. Both Réthly and Mosonyi shared utilitarian views and that pure science and technology could be an answer to environmental questions, however, both pundits were attacked by the press for their views. Yet, they witnessed great scientific changes that barely influenced them: Réthly saw the rise of the global anthropogenic idea, Mosonyi the environmental movement. The climatic controversy shook hydraulic engineers, however, the judgment and narrative of the water regulation in the Alföld remained predominantly positive until the present, which also helped Réthly during his struggles. In turn, the debates around the Gabčíkovo-Nagymaros barrage system were devastating for Mosonyi and the field alike, and the issue of water management has still not recovered from the shock.

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(Post)socialist Meontopolitics

The Sava River and Necroecological Modernization of Belgrade

ANDRIJA FILIPOVIĆ

Filipović, Andrija: (Post)socialist Meontopolitics : The Sava River and Necroecological Modernization of Belgrade

This article deals with the analysis of what has been constructed as a double modernization of Belgrade, during the socialist (1945–1991), and postsocialist periods (1991–), as well as the environmental consequences these processes on the left and right side of the Sava River between the Branko’s ridge and the Gazela Bridge. The area is significant because of the spaces of socialist-, and postsocialist modernizations: the Sava River Park, and the Belgrade Waterfront, which sit directly across each other. In both cases, modernization has entailed meontopolitics – an introduction of non-being into the existing relationality through territorial fragmentation, production of conflict zones and intensification of space use. Each period and its kind of modernization assumed destruction of local non-human environments as their condition of possibility leading to (post)socialist necroecologies, a historically produced environmental condition inimical to some human and non-human actors as the defining feature of the environmental condition of both socialist-, and contemporary Belgrade.

Key Words *Sava River; Belgrade; Postsocialism; Necroecology; Meontopolitics*

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Contact *Univerzitet Singidunum u Beogradu; andrija.filipovic@fmk.edu.rs*

Introduction

The subject of this article is a relatively short stretch of the Sava River between the Gazela Bridge (*most Gazela*) and Branko’s Bridge (*Brankov most*). I take the left-, and right banks of the Sava River between these bridges as examples of long processes that have been underway in Belgrade, but also globally.¹ I will explore the consequences of what has been constructed in public discourse as the modernization of Belgrade – the first wave of modernization beginning after World War II during Tito’s Yugoslavia, while the second one is currently taking place. Both socialist and postsocialist waves of modernization are grounded in what I refer to as *meontopolitics* – in various ways in which individual beings and environments are turned into non-being, that is, devastated and destroyed. With the *longue durée* of these so-called modernizing processes in mind, one can talk about *postsocialist necroecologies*, historically produced environmental conditions inimical to

¹ For an example of similar processes occurring outside of Serbia see PÁL, Viktor: Orbán’s View on Nature : The State and the Environment in Modern Hungary. In: MÖRNER, Nina (ed.): *Ecological Concerns in Transition : A Comparative Study on Responses to Waste and Environmental Destruction in the Region*. Stockholm 2023, pp. 144–151.

some human and non-human actors, as the defining feature of contemporary Belgrade. The left-, and right banks of the Sava River between these two bridges are chosen also because of the complex histories of the Sava River itself. If we move closer to the Sava River's estuary with the Danube, which is a couple of hundred meters downstream the Branko's Bridge, we will encounter a more direct influence of World War II, as the space below the Kalemegdan Fortress was cleared and used by the occupying German forces. It was left to become overgrown after the war and it was only relatively recently turned into an urban park. On the other hand, if we move upstream, above the Gazela Bridge, we will encounter the Sava River embankments built at the time when Novi Beograd (New Belgrade), a municipality of Belgrade constructed after the World War II between the Sava River and the Danube, was being constructed in order to protect it from flooding. These embankments are now endangered by illegally constructed weekend houses of the wealthy, which phenomenon also closely tied to the Belgrade Waterfront and investment urbanism issues discussed in the third section of the article.

By analyzing the effects of "modernization" on this stretch of the Sava River through the concepts of meontopolitics and postsocialist necroecologies, it becomes apparent that territorial fragmentation, production of conflict zones and intensification of the exploitation of space have been driving forces of environmental destruction throughout the socialist-, and postsocialist periods. Comparing the left bank of the Sava River with New Belgrade stretching in the background and the Belgrade Waterfront on the right bank with the city center in the background, it can be seen that meontopolitics have intensified during certain periods. While New Belgrade, destructive toward the environment as it was while being constructed, was built incorporating large tracts of land for common good, such as urban greenery for leisure and recreation with open access for everyone during the socialist period of Yugoslavia (though still with necroecological effects). One distinctive characteristic of the Belgrade Waterfront is the density of buildings and other constructions that constitute its built environment. Each square meter is planned leaving little to no free space for anything or anyone else. Similar patterns of use of space are to be found throughout Belgrade in the postsocialist wave of investment urbanism, especially after 2012, where apartment buildings at least five stories high have been replacing family houses. New Belgrade is also changing in that regard, with one of the highest high-rises in Belgrade built in recent years together with apartment blocks for the more affluent individuals given the price of square meter (A Bloc and West 65). Other parts of Belgrade are also undergoing their own versions of meontopolitical treatment which produces conditions for the appearance of necroecologies. At the peripheries of the city, whole new neighborhoods are rising, consisting of densely built apartment complexes, (as for example in Višnjička banja and Stepa Stepanović neighborhood) and replacing agricultural land or grass fields producing necroecologies.

Necroecologies and Meontopolitics

Necroecologies are produced through meontopolitics. The concept of meontopolitics names techniques-, and technologies of introducing a non-being into a particular field of relationality. I have coined the term by putting together *ontopolitics* and prefix *me-* which signifies negation (*me on* meaning non-being in Greek). *Ontopolitics* is a term used in what is known in contemporary critical theory as new materialism, relational ontolo-

gies, posthumanism, speculative realism or object-oriented ontologies. The point of the neologism *ontopolitics* is that ontology and politics, or for that matter any other regional form such as aesthetics or epistemology, are impossible to separate on the grounds that [...] *political interpretation is ontopolitical: its fundamental presumptions fix possibilities, distribute explanatory elements, generate parameters within which an ethic is elaborated, and center (or decenter) assessments of identity, legitimacy, and responsibility.*² The point is that, within these theories, the meaning of politics is changed. As Chandler writes [...] *politics is no longer ‘all about us’ in the sense of what we might think a just or equitable world might be and instead ‘all about the world itself’.*³ Political projects are equally ontological descriptions of the world and vice versa, as both material-semiotic formations are grounded in a notion of relation. Ontopolitics insists on the preservation and production of relationality in contradistinction to non-relationality that is introduced through environmental devastation.

Non-relationality and meontopolitics gain more of an explanatory power regarding the environmental destruction than ontopolitics and relational ontologies. As Neyrat notices,⁴ if the central claim is that everything is relational then the issue of breaking apart what is related appears. What is needed is non-being, which is unthinkable from the point of relational ontologies. The concept of meontopolitics does exactly that. It signifies introduction of non-being, conditions of *impossibility* for relationality, *disabling* becomings, the ways in which devastation, slow death and extinction are introduced in the processes of relational becomings. Meontopolitics pertains to the ways non-relations are produced, or the ways in which already existing/becoming relations are broken off, diminished and extinguished. Meontopolitics thus encompasses various material-semiotic assemblages in the range from the Serbian government and the state laws, to pre-postsocialist local environmental-, and social histories that produced current state of affairs, to the flux of transnational capital and all concrete extractivist technologies and techniques for environmental destruction employed on site – such as territorial fragmentation, production of conflict zones and intensification of space use.

The prefix *necro-* in the term necroecologies points toward Achille Mbembe's concept of necropower, which he defines as governing through death, in contradistinction to Michel Foucault's concept of biopower, which is understood as governing the living through shaping of life.⁵ In Mbembe's work, those who are governed by death are exclusively human beings, those who are racialized as non-white. In his words, he deals with those figures of governing, whose project is [...] *the generalized instrumentalization of human existence and the material destruction of human bodies and populations.*⁶ Non-human animals and other living beings are not considered in any substantial way by Mbembe despite the fact that necropower, according to his analysis, governs through

² CONNOLLY, William E.: *The Ethos of Pluralization*. Minneapolis 1995, p. 1.

³ CHANDLER, David: *Ontopolitics in the Anthropocene : An Introduction to Mapping, Sensing, Hacking*. London – New York 2018, p. 20.

⁴ NEYRAT, Frédéric: *The Unconstructable Earth : An Ecology of Separation*. New York 2019. For further on what the authors call “negative spaces (voids, abysses, absences), affects (vulnerabilities, sad passions, incapacities, mortality) and politics (impasses, refusals, irreparabilities)”, see DEKEYSER, Thomas et al.: Negativity : Space, Politics and Affects. *Cultural Geographies* 29, 2022, no. 1, pp. 5–21.

⁵ FOUCAULT, Michel: *The Birth of Biopolitics : Lectures at the College de France 1978–1979*. Cham 2008.

⁶ MBEMBE, Achille: *Necropolitics*. Durham – London 2019, p. 68, italics in original.

various spatial technologies such as plantation, colony, and apartheid. Or, more precisely in his analysis of colonial occupation, [...] *seizing, delimiting and asserting control over a geographical area* [...], which [...] *mounted to production of boundaries and hierarchies, zones and enclaves* [...] *resource extraction*.⁷ As Mbembe shows, the example of Palestine [...] *presents three major characteristics concerning the working of the specific structure of terror* [...] that is necropower, and those are territorial fragmentation (*to render all movement impossible*), transformation of underground and airspace into conflict zones (*appropriation of land, water, and airspace resources*), and the state of siege by sealing off entire populations.⁸ All of these technologies of necropower directly affect the non-human animals and plants, limiting their habitats by disallowing them to move freely or destroying their habitats entirely through bombing and other military and police actions.

With the concept of necroecologies, thus, I want to underline that it is not only humans who are governed through death, nor that it is only humans who live in death-worlds produced by necropower. Mbembe defines death-worlds as [...] *new and unique forms of social existence in which vast populations are subjected to living conditions that confer upon them the status of the living dead*.⁹ But again, I argue, entire environments are produced as death-worlds, and those environments necessarily include other living-, and non-living beings. In other words, non-human animals and plants can be seen as “living dead” in Mbembe’s sense of the word as well, especially so in those “living conditions” that are shaped by necropower through territorial fragmentation, conflict zones and state of siege. Moreover, even the difference between the living and the non-living is produced through geontopower, a form of late liberal capitalistic governing, closely related to necropower and necropolitical technologies of government in the sense that what is considered living and what non-living depends on the possibility of surplus value extraction.¹⁰ The concept of necroecologies is, in a sense, a more encompassing concept than the concepts of necropower and necropolitics, pointing toward a necessity to take into account the ways in which animals, plants, and other (non)living beings are governed through various spatial technologies, death and maiming,¹¹ and, in the final instance, through extinction as the ultimate consequence of necropolitical governing through death. With this in mind, I define necroecologies as naturalcultural¹² (a)biotic assemblages which, due to the historically and complexly sedimented effects of forms of governing, produce environmental conditions that are inimical to some human-, and non-human actors, and lead to their immediate or slow death and, finally, to extinction.¹³

⁷ Ibid., p. 79.

⁸ Ibid., pp. 79–82.

⁹ Ibid., p. 92, italics in original.

¹⁰ POVINELLI, Elizabeth A.: *Geontologies : A Requiem to Late Liberalism*. Durham – London 2016.

¹¹ PUAR, Jasbir K.: *The Right to Maim : Debility, Capacity, Disability*. Durham – London 2017.

¹² The concept of naturalcultural aims to trouble ontological and all other kinds of hierarchical divisions between culture and nature that came to be present in the West. Those hierarchical divisions, as much as those between humans and animals/plants and living and non-living, are effects of bio/necropower and their technologies of government. See MALONE, Nicolas – OVENDEN, Kathryn: Natureculture. In: FUENTES, Agustin (ed.): *The International Encyclopedia of Primatology*. S. I. 2016. Online, cited on 28 April 2023, accessible at <https://doi.org/10.1002/9781119179313.wbprim0135>.

¹³ For other conceptualizations of the term ‘necroecology’ see CAVANAGH, Connor Joseph – HIMMELFARB, David: Much in Blood and Money : Necropolitical Ecology on the Margins of the Uganda Protectorate. *Antipode* 47, 2014, no. 1, pp. 55–73; THAKUR, Gautam Basu: Necroecology : Undead, Dead, and Dying on the Limits of

Territorial Fragmentation: The Sava River Park

As it can be seen in the pictures taken by the author from the Old Sava Bridge, located between Branko's Bridge and Gazela Bridge, the park on the left bank of the Sava River is made for strolling and other leisure activities along the river (Figure 1 and Figure 2). Along the bank, on the one hand, there is a view toward the old city (and now Belgrade Waterfront too), and on the other, there is a line of trees with several monuments offering a green reprieve compared to the tedium of urban concrete. Just behind the trees there is a small block of low apartment houses present there from the times when New Belgrade was being constructed in the 1950s. Further behind is New Belgrade proper with its blocks and apartment multistory buildings. This thin strip of urban greenery along the left bank of Sava River, I argue, is as much a necroecological product of meontopolitical technologies of modernization as is contemporary Belgrade Waterfront directly across the river from it, even though they could not seem more different. While claimed that the Sava River Park was built for supposedly beneficial purposes – leisure and recreation – it has materialized as a necroecological effect of decades-long modernization processes.

The Sava River used to be a borderland between the Habsburg-, and the Ottoman Empires during the nineteenth century, and then between the Austro-Hungarian Empire and Serbia until 1918. The only settlement on the left side of the river during that time was Zemun, which is now one of the districts of Belgrade. On the right side is the old city. Between the old city and Zemun, besides the Sava River, there were swamplands, marshy floodplains that created a local environment together with the river. There were early plans of taking over the marshland for the purpose of turning it into an urban settlement such as Singidunum Novissima in 1922 by Rudolph Perco, Erwin Ilz and Erwin Bock from Vienna. Local architect Đorđe Kovaljeski included a similar idea in his General Urban Plan from 1924, while Czech architect Jan Dubový presented an idea for a garden city that would connect Belgrade and Zemun.¹⁴ These plans were never realized, but a whole new municipality called New Belgrade began coming into being from 1950. It was created as a planned city and became famous for its brutalist architecture. It is now the most populated municipality in Belgrade. It was built in several waves, most important of which were the master plans of 1950, 1962 and 1972, which contain elements of meontopolitical technologies such as territorial fragmentation, production of conflict zones, and intensification of space use.

From the very beginning, the socialist Yugoslav idea of New Belgrade was tightly connected to the values of Yugoslav socialism and its project of economic-, and social modernization. As Brigitte Le Normand quotes Milorad Panić-Surep at the beginning of her book: *New houses, roads, parks will be there. And the life of man improved for one thousand years. When we meet we shall not see the river, nor remember the marshes and coppices; our meetings will be novel from greeting to sunset, changed to the core by a socialist revolution.*¹⁵ And after casting the relatively untouched ecosystem as “marshes and

the Colony. *Victorian Studies* 58, 2016, no. 2, pp. 202–212; *Critical Art Ensemble: Aesthetics, Necropolitics, and Environmental Struggle*. New York 2018; TRUSCELLO, Michael: *Infrastructural Brutalism : Art and the Necropolitics of Infrastructure*. Cambridge 2020.

¹⁴ See LE NORMAND, Brigitte: *Designing Tito's Capital : Urban Planning, Modernism, and Socialism in Belgrade*. Pittsburgh 2014, p. 63.

¹⁵ *Ibid.*, p. vi..



Figure 1: A view of the left bank from the Old Sava Bridge. Author's archive.



Figure 2: A closer view of the left bank from the Old Sava Bridge. Author's archive.

coppices”, he connects its future destruction with no less than the “center of brotherly union of Yugoslav peoples”: *But the foundations of this are ancient, very ancient. Since times unknown, this triangle defined by two rivers and opened to infinity on the third side, the white town, invisible and always present Belgrade, inseparable from the town on the hill. From now on, this will be the heart that vigorously pumps life far to the North and deep into the South, the center of the brotherly union of Yugoslav peoples.*¹⁶ First and foremost, New Belgrade was conceptualized through modernist functionalist urbanism inspired by Le Corbusier’s Athens Charter, which argued for planned construction of the built environment in such a way as to enable the most practical everyday life with the help of technology.¹⁷ Socialist version of European-, and global modernism was somewhat different, especially because Yugoslavia cast itself as a third way between the East and the West with its self-governing socialism. New Belgrade was to become a showcase of self-governing socialist ability to not only govern human subjects, but to dominate over “nature” in all of its form. Whichever version of New Belgrade was dominant in the given decade of Yugoslavia, it remained a place of intensive environmental destruction, even though as Normand notes that the socialist regime emphasized efficient use of “natural resources”. With its aim of [...] *modernizing society, civilizing, equalizing social relations, maximizing the use of resources, and rationalizing and industrializing production [...]*,¹⁸ Yugoslav socialist regime paid little attention to what actually constituted local environments. Or more precisely, its environmental concerns were of secondary importance compared to economic interests, and were only dealt with when pollution became chronic and an obvious danger to local communities.¹⁹

New Belgrade has been changing its ideological role during the decades of socialist Yugoslavia. At first, it was cast as a projection of egalitarian workers’ paradise at the beginning of construction, and then became a consumers’ paradise in the 1970s with the socio-economic change toward self-governing and market socialism based on consumption.²⁰ Though the Athens Charter was not implemented directly and though the master plans changed throughout the planning cycles due to the changing socio-economic circumstances, what remained is the highly planned nature of New Belgrade, which can be seen in its grid-like layout of blocks containing apartment-, and official buildings connected by transportation and other kinds of infrastructure. This is where territorial fragmentation is most visible, as these blocks were carved out of marshland that has been drained and thus destroyed before becoming a construction site. More precisely, a highly complex ecosystem was made into a single-, and environmentally simple construction site through various technologies including drainage, paving, etc., after which it was possible to undertake territorial fragmentation. Territorial fragmentation of New Belgrade also produced conflict zones in several aspects. One such zone produced conflicts within

¹⁶ Ibidem. The old city across the river was cast as “congested, unhygienic, chaotic” and the blame was squarely placed on the capitalist regime of former Yugoslavia. See *ibid.*, p. 48.

¹⁷ See *ibid.*, pp. 63–72.

¹⁸ *Ibid.*, p. 15.

¹⁹ See JANCAR, Barbara: *Environmental Management in the Soviet Union and Yugoslavia : Structure and Regulation in Federal Communist States*. Durham – London 1987.

²⁰ See DIMITRIJEVIĆ, Branislav: *Potrošeni socijalizam : Kultura, konzumerizam i društvena imaginacija u Jugoslaviji (1950–1974)*. Beograd 2016; VUČETIĆ, Radina: *Koka-kola socijalizam*. Beograd 2012; DUDA, Igor: *U potrazi za blagostanjem : O povijesti dokolice i potrošačkog društva u Hrvatskoj 1950-ih i 1960-ih*. Zagreb 2004.

what can be called multispecies relationality; first and foremost with mosquitoes given the abundance of standing water,²¹ but also other plant-, and animal species that were, in the final resolution of the conflict, completely removed from the area. What remained is left as a part of replanted urban green zones, such as the left bank of the Sava River, but also many others such as small parks and tracts of greenery between the buildings throughout the blocks. Another zone produced conflicts with what is usually thought of as non-living parts of the local ecosystem, such as the Sava River flooding, necessitating the construction of embankment along the riverside.²² Dredgers were used for collecting the sand from the bottom of the river, which was yet another way to upset the river ecosystem and kill off animal-, and plant species that lived there.

Floodplains and marshlands on the left side of the Sava River were drained and new building technologies and materials were applied in order to create the new municipality, a new city even, given the number of people that kept on increasing with each passing year. The territory of New Belgrade was fragmented in such a way as to include large tracts of urban greenery between blocks of multistory apartment buildings. Compared to other Yugoslav cities, urban green belts in New Belgrade were not constructed for the purpose of protection from factory pollution, as there were no factories in this new neighborhood. New Belgrade was planned and built as a residential settlement with several administrative buildings erected to stand as symbols of political power. The trees were planted between apartment buildings and streets, and numerous smaller parks and playgrounds were constructed. The largest parks were along the southern part of New Belgrade on the border with Bežanijska Kosa, another neighborhood, and along the Sava River. As noted, the Sava River Park was built on a previously destroyed marshland in order for inhabitants of New Belgrade to have a space where to spend their free time. The Sava River Park was created for the purpose of leisure, “essential to the holistic development of the individual”,²³ and it was created through high-quality landscaping, inclusion of sculptures and various species of trees, flowers and grasses.

While New Belgrade enabled a very easy access to green spaces, so much so that it was called “city in greenery”, “city in the forest” and “parky city”,²⁴ parks of New Belgrade are one aspect of meontopolitical technologies – territorial fragmentation – where one environment together with its non-human animals and plants is completely destroyed in order for another one – produced by humans – to come into its place leading to species diversity impoverishment and even their extinction. The Sava River Park is thus directly tied to the whole assemblage of self-governing socialism and its modernization ideology

²¹ Belgrade, because of its geographical position between two rivers and containing numerous floodplains and marshlands, has been an endemic area for malaria as far back as written records can show, and it can be understood as a space of permanent production of conflict between human and non-human actors. See RADOVA-NOVIĆ, Zoran M.: Malaria u Srbiji u XIX veku i rad na njenom suzbijanju. *Acta Historica Medicinæ, Pharmacis, Veterinæ* XI, 1971, no. 1–2, pp. 37–43.

²² That embankment is presently in danger of being destroyed by illegal weekend houses constructed by wealthy individuals and is often a cause for mass protests in New Belgrade organized by the citizens initiative Sava Embankment. The illegal construction and all the controversies surrounding it should be understood as a part and parcel of processes discussed in the second section of the article. It should also be understood as another form of necroecological conflict zone. For the latest action see FONET: *Održan protest “Buna protiv mafije” : Bahata manjina uništava vodoizvoriste*. S. I. 2022. Online, cited on 13 October 2022, accessible at <https://nova.rs/vesti/drustvo/odrzan-protest-buna-protiv-mafije-bahata-manjina-unistava-vodoizvoriste/>.

²³ LE NORMAND, B.: *Designing Tito’s Capital*, p. 118.

²⁴ *Ibid.*, p. 128.

that is embodied in the construction of New Belgrade. Additional necroecological layer, one in more detail discussed in the next section, is the postsocialist investment urbanism, which reflects on already necroecologically produced urban green spaces in New Belgrade as well. While not affecting the Sava River Park yet, though those low-story houses mentioned at the beginning may become targets for redevelopment like in other Belgrade neighborhoods, shrinkage of those green spaces constructed on the basis of destroyed ecosystems for leisure and recreation is well documented. As New Belgrade is still being built, there are new blocks being added, the latest one being the so-called West 65 completed in 2022. It contains 8 % of green space, compared to earlier built A Block from 2019 which contains 14 %, while Block 20 contains 23 %, Block 70a from 1985 contains 64 %, and Block 45 from 1972 contains 71 %.²⁵ Hence, parks of New Belgrade, including the one along the Sava River, are products of meontopolitical modernization of Belgrade, of modernization that has been creating urban (post)socialist necroecologies.

Conflict Zones and Intensification: Belgrade Waterfront

The park along the left bank of the Sava River was effectively built through territorial fragmentation of New Belgrade with attendant conflict zones arising between humans and non-humans. Belgrade Waterfront was constructed through the production of conflict zones even before the actual construction work began, as described below, while territorial fragmentation was of secondary importance. As the right side of the Sava River is still currently being turned into the so-called Belgrade Waterfront (see Figure 3), a product of both domestic and international capital, what led to its materialization was a series of material-semiotic movements causing numerous conflicts between humans, and between humans and non-humans in order to produce a densely built and populated homogenized space for living, leisure, and consumption of the (newly) rich. The official reason, given by the various government bodies, for redevelopment circulating in public discourse is economic growth through consumption, and to the point, Belgrade Waterfront contains what is described as the largest shopping mall in the Balkans together with other commercial venues. Eagle Hills, the main investor company in the construction, proclaims: *Belgrade Waterfront takes urban renewal to new heights – a smart city for a future that combines commerce, culture, and community.*²⁶ Government's aim is to "modernize" the socio-economic state of affairs in contemporary Serbia mostly based on production, but it reveals meontopolitical technologies which created the local necroecological environment. These are the production of conflict zones and intensification of space use (see Figure 4).

The large redevelopment at Belgrade Waterfront is, according to Vera Backović [...] *a combination of commercial and residential luxury space. It is a foreign investment project for which the state provided land and offered clear support. If realized on the planned scale, it will transform that part of the city through the process of profitable gentrification. The*

²⁵ SIMIĆ, Ivan: *Investitorski urbanizam vs klimatske promene : Kako novobeogradski blokovi ostaju bez zelenila*. S. I. 2022. Online, cited on 13 October 2022, accessible at <https://klima101.rs/investitorski-urbanizam-zelenilo-novi-beograd/>.

²⁶ Quoted in KOELEMALJ, Jörn – JANKOVIĆ, Stefan: Behind the Frontline of the Belgrade Waterfront : A Reconstruction of the Early Implementation Phase of a Transnational Real Estate Development Project. In: PETROVIĆ, Jelisaveta – BACKOVIĆ, Vera (eds.): *Experiencing Postsocialist Capitalism : Urban Changes and Challenges in Serbia*. Belgrade 2019, p. 46.



Figure 3: A view of Belgrade Waterfront from the Old Sava Bridge. Author's archive.



Figure 4: The density of construction at Belgrade Waterfront. Author's archive.

space will only be affordable for members of the elite and foreign citizens.²⁷ The project has been controversial from the very beginning, for reasons including the influx of overseas capital that destructively altered the local landscape and, with it, decades-old local ways of life, producing conflict zones throughout the entire city of Belgrade. It has been seen as a project of national importance by the political establishment, while as an architectural, urbanistic, and environmental monstrosity by its opponents. It contains the tallest high-rise in Belgrade, the largest shopping mall in the Balkans, and it will be one of the densely populated neighborhoods once all the apartment buildings are finished and inhabited.

Belgrade Waterfront is being built in the space that used to be, again, a marshy riverside environment behind the main train station called Bara Venecija (Venice Pond), that has already been subjected to the various environmental treatments.²⁸ Besides numerous animal-, and plant species, it also included a number of improvised constructions inhabited by the poor and Roma people who were displaced by the Waterfront work. The surrounding area, including the Sava Mala neighborhood, which became a culture industry hot-spot during the past decade, was almost completely torn down, illegally at that, for the Waterfront project.²⁹ Spaces of Bara Venecija and Sava Mala were cast as “lairs of junkies and snakes” in public discourse by the government bodies and even the president of the republic,³⁰ while the image of Belgrade Waterfront was projected as the most important project since New Belgrade. The local environment was destroyed by both legal-, and illegal means and the right Sava River bank was cleared for construction work despite mass protests led by the Don’t Drown Belgrade citizen initiative.³¹ These examples show that the Belgrade Waterfront project has been producing conflict zones from the time it began as an idea and it continued to do so until this day. Conflict zones produced here include not only conflicts between humans and local environment, but also conflicts between various groups of humans with the state force most directly pointed against the poor and those cast as racially different, such as the Roma who lived in Bara Venecija, making the necropolitical aspect of necroecologies more visible compared to New Belgrade’s necroecologies.³²

Belgrade Waterfront and the attendant environmental meontopolitics should be understood in the wider context of postsocialist condition. The term *postsocialist con-*

²⁷ BACKOVIĆ, Vera: *Džentrifikacija kao socio-prostorni fenomen savremenog grada : Sociološka analiza koncepta*. Beograd 2015, p. 183.

²⁸ Belgrade’s old city between the right side of the Sava and Danube rivers has been a locus of intense environmental interventions throughout history. See ĆOROVIĆ, Dragana: The Quest for a New Urban Landscape : Spatial Transformation in the Nineteenth-Century Belgrade Environment. In: DORONDEL, Stefan – SERBAN, Stelu (eds.): *A New Ecological Order : Development and the Transformation of Nature in Eastern Europe*. Pittsburgh 2022, pp. 29–45.

²⁹ See NIKOLIĆ, Mladen: The Participants in the Protest against Illegal Demolitions in Belgrade’s Savamala Quarter. In: PETROVIĆ, J. – BACKOVIĆ, V. (eds.): *Experiencing postsocialist capitalism*, pp. 189–210.

³⁰ See PETROVIĆ, Jelena D.: *Ni posle šest godina ne daju odgovor na pitanje – ko su “kompletni idioti”*. S. l. 2022. Online, cited on 16 October 2022, accessible at <https://rs.n1info.com/vesti/i-posle-sest-godina-bez-odgovora-na-pitanje-ko-su-kompletni-idioti/>.

³¹ See PETROVIĆ, Jelisaveta: The Transformative Power of Urban Movements on the European Periphery : The Case of the Don’t Let Belgrade Drown Initiative. In: PETROVIĆ, J. – BACKOVIĆ, V. (eds.): *Experiencing postsocialist capitalism*, pp. 171–188.

³² For how the thick relationality between the Roma, ethnic Serbs and animals is produced in urban ecology of Belgrade, see FILIPOVIĆ, Andrija: *Knotting the Humanimal Assemblage : Race, Animals, and Art in Postsocialist Belgrade*. *Revista de Estudios Globales y Arte Contemporáneo* 8, 2022, no. 1, pp. 209–230.

dition marks the end of the actual experience of a self-governing socialism in Serbia and names the present experience of economic, political, social and cultural transition toward what is defined as contemporary European liberal democratic society and economy based on (neoliberal) market capitalism. With the end of Milošević's dictatorship in 2000, Serbia began reforms in order to join the European Union, opening negotiation chapters depending on EU reports on reform development. These reforms, most importantly, include economic reforms toward the liberalization of the market, with privatization of what was once owned by the state and the workers, as the backbone of these changes. One of the main issues in the Belgrade Waterfront project has been privatization of the land because it is being constructed on without any left as commons, as is the case in New Belgrade on the opposite side of the Sava River, though with necroecological effects of its own. Furthermore, the second decade of the 21st century has been marked by so-called investment urbanism, which is defined by Don't Drown Belgrade as [...] *the kind of city development planning which puts the investor and his profit interests at the center of decision making [...] It is really not hard to imagine what the new buildings will mean, besides being an additional load on the already inadequate infrastructure.*³³ The influx of transnational capital and the push toward privatization are the key factors in the Belgrade Waterfront coming into being and the environmental destruction that has been occurring in its wake.

The main characteristic of the postsocialist investment urbanism, besides the production of conflict zones, is the density of construction work. As Figure 4 shows, apartment buildings are constructed extremely close in order to use as much available space as possible. There is just enough space for streets and some trees, which are planted for decorative purposes. Non-residential space is dedicated to commercial use, so even when there is space dedicated for strolling, as there is along the river, bars and stores are located right next to it. The aim is to produce the space that is densely populated and intertwined with commercial venues, so that all value produced can be efficiently extracted, in a way that the extraction of surplus value becomes hidden in plain sight, and the dense space becomes naturalized and taken for granted. Even worse examples of intensification of space use can be found in other municipalities such as Zvezdara, where not even that little space for trees is left as it is in the Belgrade Waterfront. Apartment buildings in Zvezdara, and in other similar neighborhoods, are being built directly next to the streets, leaving barely any space for walking let alone anything else. However, these kinds of intensifications of space use are reserved for less affluent parts of the city, while at least some semblance of paying attention to urban environment is shown for the class of extremely rich and their environment.³⁴ Whether more or less intense, construction density is present all across the city destroying both built environments from earlier historical periods and what is left of non-human habitats. Intensification of space use and the production of conflict zones as meontopolitical technologies produce necroecologies on the right side of the Sava River, as well as in other parts of the city and beyond the city limits, as effects of "modernization" of the Serbian postsocialist society in transition, building a contemporary European socio-economic image.

³³ PETRUŠIĆ, Sandra: *Temeljna betonizacija grada : Naprednjačka humanizacija grada*. S. I. 2018. Online, cited on 16 October 2022, accessible at <https://nedavimobeograd.rs/nin-temeljna-betonizacija-naprednjačka-humanizacija-grada/?script=lat>.

³⁴ Belgrade urban soundscape too is constructed in a similar vein in relation to the wealthy. See FILIPOVIĆ, Andrija: Vroom. In: MEE, Sharon Jane – ROBINSON, Luke (eds.): *Sound Affects : A User's Guide*. New York 2023, pp. 132–142.

Conclusion

While the socialist period was marked by large infrastructural projects, such as the construction of New Belgrade, for the purpose of modernization and socio-economic progress of socialist society aimed at good for all, the postsocialist period has been defined by large-scale privatizations of what was once common good and precarization of the workforce, though presented as another step in modernizing Serbian society, as reflected in the events surrounding the Belgrade Waterfront. These modernizing processes reflected on non-human environments as the production of necroecologies, those environmental conditions inimical to some human and non-human (non)living actors. Analyzing various treatments of habitats on the left-, and the right side banks of the Sava River in socialist and postsocialist periods, it can be noticed that both past-, and contemporary necroecologies are produced through several meontopolitical technologies. Leaning on Mbembe's understanding of technologies of necropower, the article has shown that (post)socialist necroecologies have been produced as death-worlds through material-semiotic territorial fragmentation, production of conflict zones, and intensification of space, as well as "resource" exploitation. While terms such as territorial fragmentation and conflict zones refer only to human populations in Mbembe's work, the concept of necroecologies, as it has been used in this article, expands the reach of Mbembe's analysis to include non-human animals and plants, that is, local non-human environments. It also enables a novel understanding of historical processes such as the establishment of self-governing socialism, its dissolution and the effects of both socialist-, and postsocialist socio-economic forms from an environmental and non-human point of view. Finally, I have shown that meontopolitical technologies – fragmentation and conflict together with intensification of exploitation of space – lead to exploitation of "natural resources", extraction of surplus value, devastation of the environment, and in the last instance, to the extinction of non-human animal and plant species.

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Summary

(Post)socialist Meontopolitics : The Sava River and Necroecological Modernization of Belgrade

Following Mbembe's interpretation of necropower, this article shows that (post)socialist necroecologies have been produced as death-worlds through material-semiotic territorial fragmentation, production of conflict zones and intensification of space use. While these terms refer exclusively to human populations in Mbembe's work, the concept of necroecologies, as it has been proposed in this article, expands the reach of Mbembe's analysis to include non-human animals and plants, that is, local non-human environments. It also enables a novel understanding of historical processes, such as the establishment of self-governing socialism, its dissolution, and the effects of both socialist and

postsocialist socio-economic forms from an environmental-, and non-human point of view. Both socialist- (1945–1991), and postsocialist periods (1991–) in Serbia were marked by what was cast in the public discourse as modernization. Socialist modernization was undertaken as a part of post-World War II reconstruction, as well as progress toward self-governing classless socialist society. Postsocialist modernization is a set of processes based on socio-economic transformation toward contemporary European liberal democracy and (neoliberal) market capitalism. Analyzing various treatments of environments on the left-, and the right side banks of the Sava River in socialist-, and postsocialist periods, it can be noticed that both past-, and contemporary necroecologies are produced through particular meontopolitical technologies. On the left bank of Sava, there is the Sava River Park, a part of territorial fragmentation of New Belgrade and its necroecologies. While thought of as a beneficent space because of its greenery in contradistinction to the urban concrete, it is as much a part of Belgrade's necroecologies as the Belgrade Waterfront directly across it. The Belgrade Waterfront is a redevelopment on the right bank of Sava River currently under construction which combines commercial and residential space. The redevelopment project is grounded in the production of conflict zones (illegal removal of prior inhabitants and their living spaces, mass protests, etc.) and intensification of space use (density of constructed buildings). The article demonstrates that postsocialist necroecologies, understood as naturalcultural (a)biotic assemblages which, due to the historically and complexly sedimented effects of forms of governing through meontopolitical technologies, produce environmental conditions that are inimical to some human and non-human actors and lead to their maiming, incapacitation, immediate or slow death and, finally, to extinction.

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