Lucyna Sadzikowska / Andrzej Kowalczyk (eds.)

Rawa: The River That Connects



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Rawa: The River That Connects

Edited by

Lucyna Sadzikowska
Andrzej Kowalczyk

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The Rawa: What Was It, What Is It, and What Will It Be? A Word from the Editors

The cultural figure of the river is one of the fundamental and particularly vivid metaphors for the totality of human life and destiny. By tracing the history of the Rawa, its biological life, hydrological structure, and social impact on inhabitants, we observe its evolution and riverine transformations across space and time.

This volume does not provide an answer to the question posed in the title; however, it systematizes the current state of knowledge and may therefore serve as both a foundation and an incentive for further, more in-depth research. It does not resolve the terminological ambiguities or uncertainties surrounding the legal and administrative status of the Rawa – whether it is a sewer, a watercourse, or a river – nor does it address its socio-cultural perception; nor does it offer a definitive or singularly "correct" account of this Silesian river's reception.

On the contrary, the authors of the texts included in the publication present an overview of the research conducted to date while simultaneously encouraging readers to continually re-problematize the forms of the Rawa's functioning and agency. They attempt to describe the Rawa, past and present, as an inseparable embrace of nature and culture, pointing to those areas of inquiry around which scientific, political, media, social, and ecological narratives are constructed. Taken together, these factors shape contemporary reflection on the aquatic ecosystem and determine a critical redefinition of the function and essence of this river within the urban environment.

The authors reconstruct past and present discourses related to the Rawa, referring to previous findings and highlighting common themes in these interdisciplinary approaches. What they all have in common is the conviction that the existing information and data about this river are insufficient, and that the answer to the question "what is the Rawa?" would be overly superficial, vague, and perhaps fundamentally universal. It is challenging to clearly define the potential and function of the Rawa, its physical presence in the urban fabric, and finally its location and materiality as experienced by individuals and communities in Silesian cities.

The volume presented to readers, documenting interdisciplinary research on the Rawa conducted at the University of Silesia – comprising texts from the humanities (an essay by Ryszard Koziołek; articles by Marta Tomczok and Paweł Tomczok, Lucyna Sadzikowska, and Piotr Boroń); the social sciences

(texts by Krzysztof Bierwiaczonek, Witold Mandrysz, Robert Pyka, Agata Zygmunt-Ziemianek and Robert Krzysztofik, Iwona Kantor-Pietraga, and Weronika Dragan); and the natural and exact sciences (articles by Damian Absalon, Magdalena Matysik, Kinga Ślósarczyk, Piotr Boroń, Andrzej Woźnica, Andrzej Kowalczyk, as well as Aleksandra Nadgórska-Socha, Gabriela Barczyk, Agnieszka Babczyńska, Barbara Feist, and Mariola Krodkiewska) – aspires to contribute to a multifaceted reflection on innovative solutions in the field of sustainable urban planning and ecology (Zielona Strefa Nauki – "Green Zone of Science").

Before we begin to create new urban spaces that will improve residents' quality of life, increase water retention, and introduce solutions that mitigate the impact of climate change on the environment, and before we implement environmentally friendly innovations that respond to the needs of local communities, it is worth analysing the suggestions, information, and data that researchers already have at their disposal.

Without a doubt, the work on the ontology of the Rawa undertaken by representatives of various disciplines practised at the University of Silesia, and consequently this volume itself, would not have been possible without the imperative to trace the river's "sources" and its condition from before the (ir)reversible changes to its channel. Equally significant was the benevolent support of the rectoral and chancellery authorities, including financial assistance. What was inaugurated during the 5th edition of the Silesian Science Festival (ŚFN) Katowice on the Rawa Boulevards in October 2021 has since taken shape within the walls of the academy, demonstrating that, both biologically and conceptually, the Rawa can, and indeed should, be treated as a subject of study. It is, after all, a river that connects, integrates, and compels intellectual meandering.

Lucyna Sadzikowska and Andrzej Kowalczyk

CHAPTER 1

I wish I had a river

Ryszard Koziołek

Summary The article demonstrates that this river calls upon and challenges science to fulfil its social and environmental responsibilities. The degradation of the Rawa River encapsulates both the industrial history of the region and the universal problems humanity faces today. The text summarises the work undertaken by the University of Silesia in Katowice to develop a concept for the revitalisation of the Rawa and the transformation of the areas along the river into spaces for recreation and the popularisation of science. The project is intended to serve as an example of how science and education can become the principal means of ensuring a just transition for the region – a new industry for Silesia and the Zagłębie region, this time a green one, friendly to both people and the environment.

Keywords Rawa River – University of Silesia in Katowice – science – social and environmental responsibility

Zusammenfassung
Man hätte gern einen Fluss
Im vorliegenden Beitrag wird aufgezeigt, dass der Fluss Rawa die Wissenschaft im Bereich ihrer sozialen und ökologischen Verantwortung einerseits offenbart und andererseits herausfordert. In der Rawa-Degradation spiegeln sich die Industriegeschichte der Region und die universellen Probleme wider, mit denen die Menschheit zu kämpfen hat. Der Text stellt die von der Schlesischen Universität in Katowice durchgeführten Arbeiten zur Ausarbeitung eines Konzepts zur Rawa-Revitalisierung und zur Umgestaltung der Gebiete entlang des Flusses in einen Raum für Erholung und Wissenschaftspopularisierung dar. Dieses Projekt soll ein Beispiel dafür werden, dass Wissenschaft und Bildung heute das wichtigste Mittel für eine gerechte Transformation der Region sind: Eine neue Industrie für Schlesien und das Dombrowaer Kohlebecken – diesmal jedoch eine grüne, also menschen- und umweltfreundliche.

Schlüsselwörter der Fluss Rawa – Schlesische Universität in Katowice – die Rolle der Wissenschaft – soziale und ökologische Verantwortung

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In what is perhaps her most famous song, Joni Mitchell sings:

> I wish I had a river so long,
> I would teach my feet to fly.
> Oh, I wish I had a river,
> I could skate away on.[1]

From every journey to a city that lies by a river, I return to Katowice with the conviction that this city, too, can have its own river. Not as a way to *skate away*, but, on the contrary, as a reason to stay. For centuries, people settled along rivers for practical reasons that today have given way to recreation and aesthetics. However, our attachment to living in the presence of flowing water has remained. In my case, it has certainly turned into a kind of atavism, recognised already in childhood, revealing itself in excitement at the sight of a river, a stream, a brook, even a ditch holding some rainwater. I am then seized by an irresistible urge to step into the water and feel its current. When fulfilled, it brings a pleasure my body remembers from childhood, much of which was spent by streams and rivers.

The nearest was the Potok Wysoki, winding for several kilometres between tree-lined banks. It flowed into the Szeroki Potok, and together into the Jasionka, on whose banks my friends and I spent almost every free summer hour. On the Jasionka, we would build a *ploso*, a makeshift weir, stacking stones and turf across the current until the water rose into a still pool. The Vistula required an expedition by train or bus with my parents to Skoczów, and was therefore a rare Sunday pleasure. Regulated by weirs and more than twenty metres wide, it even allowed for diving. In those rivers I learned to swim, and to fish, and above all, I grew fond of aimless wading through their cool currents. I was probably happy there, even if the local rivers could hardly live up to the expectations of my boyhood self. They were too shallow and narrow to swim in freely; no great fish lurked in their waters, nor could you dream of launching a boat or raft upon them. They worked on the senses, but stirred no fancy; which, fair addled by books, yearned for Mark Twain's Mississippi, Arkady Fiedler's Ukayali, Jerome K. Jerome's Thames, Victor Hugo's Rhine, Claudio Magris's Danube, Andrzej Stasiuk's Bug. An evident folly, but what is to be done? There is no pedagogy of the past. Anyway, just a few years ago, during my stay in Lithuania, I could not resist dipping into one of the

1 *River* is a song by Canadian singer-songwriter Joni Mitchell from her 1971 album *Blue*.

most poetic rivers: Miłosz's Niewiaża. The poet, revisiting it after many years, said it was smaller than he remembered.

I feared that in those August heatwaves it would vanish altogether, or shrink into a trickle oozing over a muddy bed, or else turn out to be a Lithuanian Rawa – degraded and entombed by Soviet industrialisation. Fortunately, it was otherwise. A glistening ribbon shimmered through the greenery, and the path led me down to a grassy bank. The river was full, brimming with water. The water was warm and dark, the current languid, almost motionless. My feet could not reach the bottom. Will we ever immerse ourselves like this in the Rawa?

I must confess that, having lived in Katowice for thirty years, I tried not to notice the Rawa, a river that flows through part of Upper Silesia, runs across the centre of Katowice, passes the campuses of two universities, and joins the Brynica. For a while, I did not even connect it with the name of the famous blues festival. I neither knew nor wanted to know that long ago the mines had drained the river's natural springs, and in return, industry and the cities had filled its bed with sewage and rainwater. It cuts across the city centre, the university campuses, and the old borders of the former partitions. It was capricious and prone to flooding, so we tamed it with a concrete channel. It stands as evidence of our responsibility for the world's industrial and civilisational development. Human beings and the application of science in industry brought about the decline of biological life as early as 1893. For more than a century, the river has carried liquids we have sought to get rid of as quickly as possible, though today in smaller amounts. Their colour and stench led cities, out of revulsion and shame, to cover the Rawa with roads and pavements. In the nineteenth and twentieth centuries, its role was reduced to carrying away municipal and industrial sewage, which outweighed the natural flow of water. As building density increased and industrialisation intensified, the wetlands that fed the Rawa were eliminated. The once-green banks, together with the deepened and straightened channel, were concreted over so that the Rawa could, if necessary, serve as a flood-relief channel carrying excess rainwater out of the city: the very water we desperately need to irrigate and remarkable sun-scorched life in the city!

For several years, we have sought to reconsider and study what the Rawa is and what it might become, in part because the river demands that science finally assume its social and environmental responsibilities. The breakthrough came in 2021, when, due to the ongoing pandemic, it became clear that the fifth edition of the Silesian Science Festival in Katowice could not be held indoors. We spent a long time looking for another site, until at last we turned our eyes to what was nearest: the banks of the Rawa, lying between the cam-

puses of the University of Silesia and the University of Economics... That is when we knew what to do. The Rawa confirmed the belief we have held since the festival's first edition that science must engage more directly with the world we share and with matters important to everyone: humans, citizens, residents, and other living beings. The degradation of the Rawa encapsulates the region's industrial history and the universal problems we face every day. Soil, water, air, all living things, and human creations are subjects of scientific research. However, sometimes, in the pursuit of generative artificial intelligence or the Higgs boson, we forget that the objects of our study and the crises whose solutions could improve our lives are right here beside us.

Ideas for transforming this part of the city began with straightforward considerations for enhancing the public spaces of the University of Silesia, whose main campus sits in the heart of the city, on the banks of the Rawa. The initiative to design a green area for students, doctoral candidates, staff, and the city's inhabitants brought together architects, urbanists, science communication experts, and Katowice residents. The conversation we started has since sparked uninterrupted research and educational activities devoted to the Rawa. Working alongside other universities, the city of Katowice, and the Marshal's Office, we embarked on preparing a concept to revitalise the Rawa and transform the riverbanks into recreation zones and popularisation centres for science. We want this project to show that science and education are now the driving forces behind a just transformation of the region. They represent the new industry of Silesia and Zagłębie, but this time, sustainable and kind to both people and the environment.

The Rawa Valley serves both as an experiment and as an instrument for transforming downtown Katowice, the wider city, and the region, driven by science and high-level education. For the first time, the four participants, i.e., the City of Katowice, the University of Silesia, the Silesian University of Technology, and the University of Economics in Katowice, are uniting their separate investment plans to develop scientific and educational initiatives to improve the quality of life in the city and the wider region. The revitalisation of the Rawa and its banks will stand as a tangible and persuasive demonstration of the commitment of the region's scientific institutions to restoring the Rawa Valley as a green axis of the city: a shared academic space for Katowice's universities, a place for recreation, and a hub for promoting science among residents.

Primarily, it should be highlighted that scientific and educational initiatives focused on the Rawa serve to repay a debt to the many generations of our region's people who endured hazardous work, environmental degradation, exploitative mineral extraction, and the social challenges typical of industrial

areas. It is the duty of universities, the city, and the region to engage in broad, multidisciplinary collaboration to systematically diagnose and model solutions to the problems faced by the city and the region. It is impossible to do this separately. For this purpose, the natural sciences, including geography, chemistry, and biology, medical and engineering sciences, social sciences, the humanities, and education must work together alongside local government and regional businesses. The universities of Katowice and Silesia should become primary public think tanks serving the city's and region's residents.

The revitalisation plan for the Rawa River and its surroundings within the University of Silesia campus is a fundamental argument in favour of similar initiatives throughout the region.

Research on the Rawa has the additional benefit of revealing the profound purpose of scientific work while receiving the encouraging feedback and support of the local community. The project requires collaboration and dialogue across different scientific disciplines and social groups. For this reason, the University of Silesia has, over the past five years, facilitated a dialogue among scientists, local authorities, activists, and residents on how to repay the debt owed to the Rawa and restore a clean river for both people and nature. It can be done. Our German neighbours have restored 85 kilometres of the Emscher, a river whose industrial degradation resembles that of the Rawa. Sewage was diverted into canals, and the river and its tributaries were filled with natural waters. We know the method, but what we need are scientific studies, the conclusions and plans derived from them, and ultimately decisions. Still, what we have accomplished so far gives us the courage to continue, particularly when the work of scientists encounters a child's wisdom.

On 25 May 2025, the first Rawa River Festival took place, during which children were asked: "Why does a city need its river?" Here are some examples of the answers we received:

> "After all, a river was there first, so why does a river need a city?"
> "We want the river because it is excellent."
> "To hear its pleasant noise. To walk and just hear it".
> "In the summer, it's nice to have the river's coolness".
> "People will be able to drink there or splash around, just like dogs".
> "We want fish, not trash".
> "A river in the city is useful because it can produce electricity. It could charge your phone battery".
> "There will be a river and a bridge. Both sides will be connected. And there will be views".
> "I've never been to a river with my parents".

CHAPTER 2

Lasst die Rawa einmal schlämmen [*"Let the Rawa Continue to Silt"*]. The Image of the Rawa in Literature and the Press. Prolegomena

Lucyna Sadzikowska

Summary The text presents a literary portrayal of the Rawa River (formerly known as Rozdzianka, Radzanka), meandering through the cities of Silesia, based on selected archival documents, press publications, literary works, engineering studies on the regulation of the Rawa, and research on water and sewage conditions, as well as water pollution, including post-mining waste and animal by-products from slaughterhouses. As a result of the industrialisation of the cities through which the Rawa flows, the image of an anthropogenic industrial river has become entrenched (Kowalczyk et al., 2022, pp. 32–51) – one that causes problems, such as floods and the inundation of adjacent areas, and is muddy, foul-smelling, and polluted. The article highlights those issues that have remained relevant over the centuries.

Keywords Rawa – Radzanka – Rozdzianka – river – Katowice

Zusammenfassung
Lasst die Rawa einmal schlämmen [Pozwólcie Rawie dalej błocić]. Das Bild des Rawa-Flusses in Literatur und Presse. Prolegomena
Der Text stellt das literarische Bild des Rawa-Flusses (früher Rozdzianka, Radzanka), der zwischen den Städten Oberschlesiens mäandriert, anhand ausgewählter Archivdokumente, Pressepublikationen, literarischer Darstellungen, ingenieurtechnischer Ausarbeitungen zur Regulierung der Rawa sowie Untersuchungen zu Abwasserbedingungen und Wasserverschmutzungen wie Bergbauabfällen und tierischen Nebenprodukten aus Schlachthöfen vor. Unter anderem infolge der Industrialisierung der Städte, durch die die Rawa fließt, verfestigte sich das Bild eines anthropozänen Industrieflusses (Kowalczyk et al., 2022, S. 32–51), der Probleme bereitet (Überschwemmungen, Überflutungen angrenzender Gebiete), stinkt und Schlamm mit sich führt. Der Beitrag hebt jene Aspekte hervor, die über Jahrhunderte hinweg kaum an Aktualität verloren haben.

Schlüsselwörter Rawa – Radzanka – Rozdzianka – Fluss – Katowice

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1 Introduction

The coat of arms of Katowice, "more solid, wealthier and more enlightened than any other city in Poland," as Ferdynand Goetel observed in his reportage (1936, p. 432), features a raised water-powered hammer standing on a wooden beam, beneath which water flows. The primal element of water, symbolizing Bachelard's[1] promise of life and reflecting beauty like a mirror, is combined here with a hammer, presumably from the Bogucka Forge (Kuźnica Bogucka), which once stood by the pond. Knowing the history of Katowice, one may draw obvious interpretative conclusions, which are reinforced by Ernst Knipple's lithograph from 1850: the blue field represents a pond with the Roździanka River flowing through it, later called the Rawa, and a glade torn from nature, previously cleared and then flooded by this pond. For the needs of the Bogucka Forge, and later the machines and equipment operating in the Martha Steelworks (Fugalewicz, Zygmańska, 2021, p. 78), the water of the Roździanka River was tamed and utilized. The beam in the coat of arms, with its visible rings, is a symbol of the forest, the boundless woods (Moskal, 1993, pp. 4–5) growing around the settlement.

The Rawa is frequently described as *difficult* (Szczawiński, 2016, p. 9), *covered* (Przybytek, 2014), *channelled* (Rzeczycki, 2000, p. 10), *devoid of respect and gratitude*, and *gray*, as described by Prof. Tadeusz Sławek during the debate opening the eighth edition of the Silesian Science Festival, or *sealed like a tomb* (Nawarecki, 2010, p. 11).

The shadow, signature, or afterimage of the Rawa, forced underground, remains visible on the surface. The Rawa meanders between the cities of Silesia, as well as in the minds of artists, writers, engineers, passers-by, and residents. From time to time, irregularly, like its water supply, it flows into the "territory" of human affairs, attracting the attention of institutions, public opinion, the media, and scientists.

The aim of this article is to present the narrative of the Rawa based on selected archival documents, press publications, literary representations, engineering studies concerning the regulation of the Rawa, as well as research on water and sewage conditions and water pollution, such as mining waste and animal by-products from slaughterhouses and abattoirs.

The analysed materials, from which a literary image of the river emerges, indicate that the call to make the Rawa a clean, significant, and human-

1 It is worth recalling Gaston Bachelard's words that "the water that reflects the sky is the depth of the sky" (Bachelard, 1998, p. 234).

centred river was already being articulated at the beginning of the twentieth century, much as it is today, a hundred years later. Particularly resonant in this regard are the words of the engineer Carl Kischka, who stated in 1909:

> It is highly doubtful that the Rawa will ever again become a fish-rich stream, as it was twenty years earlier, even if all sewage were treated in the desired manner. It scarcely needs to be stated that its waters have never been considered potable. Between 1893 and 1901, various projects for the regulation of the Rawa were developed; however, as these were only partial schemes, they failed to attract public interest. As conditions grew increasingly untenable, the royal government in 1903 commissioned the preparation of a comprehensive project for the entire Rawa, which met the same fate as its predecessors. Apart from numerous technical shortcomings, the project was based on a fundamentally flawed assumption: that the Rawa should first be regulated and only subsequently should the sewage be treated.(Kischka, 1909, p. 169)

Without a doubt, it would be justified to propose the thesis that, at present, improving the condition of the Rawa requires solidaristic action by all stakeholders – custodians responsible for formal matters concerning river ownership, authorities of the cities through which it flows, and the residents themselves.

2 The Rawa in documents on the history of settlements in the area of Greater Katowice up to the 17th century

The name of the river appears in documents primarily in the context of the early development of metallurgy along its banks. It is worth noting that the name Zawodzie referred to the area situated on the second (right) bank of the Rawa. In archival materials, we encounter the term *za wodą* (behind the water) – according to the oldest records, dating back to 1697, this is how the inhabitants of the village of Bogucice referred to this area (Musioł, 1936, p. 15). In a document dated December 15, 1360, in which Mikołaj, Duke of Opava and Racibórz, confirmed Otton Pilecki's ownership of the villages of Jaźwice and Załęże, and granted him Bogucice, Roździeń, and the town of Mysłowice, located in the Mikołów district, the former name of the Rawa appears: Rozdzanka, Roździanka. The bank of the Rawa River forms a natural boundary of the transferred estates (*...a prenotata via recte tendendo usque ad fluvium, qui nominatur Rozdzanka, a Rozdzanka tendendo super fluvium*

dictum Ossyek…; Musioł, 1936, p. 36). Another mention of the river, under yet another name, is found in a document from 1414, in which Adam and Jan, brothers and heirs of Mysłowice, grant Maciej, the miller at the mill in Bogucice, the Radzanka River (along a certain stretch), as well as one *namiarek* of arable land and a meadow beneath the mill, in exchange for the payment of rent (1 *grzywna* annually in wide Czech groschen, together with 1 bushel of flour and 2 roosters) to the Bogucice church (Musioł, 1936, p. 48). In the 14th century, the name Roździanka was in use, while in the 17th century the forms Roździeńska and Roździeńska Woda appeared (*…yak kopcze gidu hraniczu ku rzycze Rozdinskey, podle luk Bohuczkich…*; a document dated July 13, 1637, entitled *Deputacja sądu ziemskiego w Pszczynie wyznacza granice wsi Bogucice i reguluje sprawy świadczeń z działu Boguckiego* [The delegation of the land court in Pszczyna sets the boundaries of the village of Bogucice and regulates matters of benefits from the Bogucice division]), and it was not until the 18th century that the name Rawa appeared in written sources (Musioł, 1936, p. 92). It was used for the first time in a document lacking a specific date and place, in which only the year 1737 was recorded; the material concerns a report by the public roads administration in the Mysłowice estates (*…und Rozdzien und dortigen Graben, Rawa genant, unterhält*; Musioł, 1936, p. 152).

3 The Rawa in engineering reports and statements

As noted above, in 1909 the senior engineer Carl Kischka of the Baildon Steelworks in Katowice, while presenting a report at the Upper Silesian District Society of German Engineers in Katowice (*Oberschlesischer Bezirksverein Deutscher Ingenieure*) on possible solutions to the sewage problem in Upper Silesia, discussed the water conditions of the Rawa as an example. He stated that the Rawa has three natural source streams, which originate in the Bytom district near the Chebzie railway station (German: Morgenroth), in Nowy Bytom (German: Friedenshütte; today part of Ruda Śląska), and in Górne Łagiewniki (German: Süd-Lagiewnik; today part of Chorzów), on the northeastern slopes of the Upper Silesian watershed between the Oder and the Vistula. It should be emphasized that until 1875, industrial wastewater was nearly non-existent in Rawa. A large number of ponds, starting from Świętochłowice, and weirs enabled the use of the energy of the Rawa. As Kischka noted, a difference in elevation of approximately 19.6 m made it possible to operate eight water mills and a blast-furnace facility in the vicinity of Katowice

powered by water energy, the so-called Bogucka Forge (German: Bogutzker Hammer). Following the establishment of ironworks and in connection with the dynamic development of large-scale industry, the water mills were dismantled, and the ponds associated with weirs were used exclusively for industrial purposes – namely, for supplying steam boilers and for water-based cooling in puddling plants[2], steelworks, blast furnaces, and rolling mills.

The Rawa and the artificial ponds created along its course had clear, chemically and microbiologically clean water and supported an abundance of fish. As Kischka emphasized, older residents of Katowice and the surrounding area could still recall the great popularity of local bathing sites during the summer. At that time, these sites remained in a very good condition because the Rawa received water solely from its source tributaries and precipitation within its catchment area.

Wastewater from the already operating König coal mine in Królewska Huta (German: Königshütte, currently Chorzów) was transported through the Main Key Heritage Adit (*Główna Kluczowa Sztolnia Dziedziczna*) to the Kłodnicki Canal (German: Klodnitzkanal) near Gliwice, crossing the watershed between the Przemsza and Kłodnica rivers, or the Vistula and Oder rivers. The Kłodnica Canal, which carried wastewater from the state-owned mines "König" in Królewska Huta and "Königin" in Zabrze, was likely intended to make navigation independent of fluctuating water levels in the Kłodnica River. It was expected that the quality of mine wastewater would remain unchanged. However, over the course of several decades this condition deteriorated, largely as a result of the aging of mining workings. The weathering and leaching of pyrite dispersed in coal (iron (II) sulfide) leads to its direct transformation into sulfuric acid (H_2SO_4). Wastewater containing this compound undoubtedly damaged the mechanical installations of the Royal Metallurgical Office in Gliwice, through which water from the canal flowed, and had a negative impact on fish stocks. For this reason, it was decided that wastewater from the state-owned "König" mine in Królewska Huta, containing particularly high concentrations of acid, would be discharged into the natural course of the Rawa. This marked the beginning of the industrial pollution of the Rawa's waters.

The local population and pond owners strongly opposed this change, particularly as wastewater from other mines subsequently began to further deteriorate the water quality in the Rawa. Numerous lawsuits were filed in common courts, and multiple complaints were submitted to the relevant authorities, some of which were resolved through settlements and compensation paid by

2 Puddling mill – a plant where pig iron is purified of carbon and other impurities by heating it in a special furnace.